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Case No: CL-2018-000640

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
QUEEN'S BENCH DIVISION
COMMERCIAL COURT

Royal Courts of Justice
Rolls Building, Fetter Lane,
London, EC4A 1NL

Date: 14/04/2021

Before :

THE HONOURABLE MR JUSTICE HENSHAW

Between :

(1) TOUCAN ENERGY HOLDINGS LIMITED
(2) TOUCAN GEN CO LIMITED

Claimants

- and -

(1) WIRSOL ENERGY LIMITED
(2) WIRCON UK SOLAR ASSETS GMBH
(3) WIRCON GMBH

Defendants

Stephen Cogley QC, Samuel Townend and Sophia Hurst (instructed by **Stewarts Law LLP**)
for the **Claimants**

Craig Morrison, Emily Husain and Jacob Rabinowitz (instructed by **Enyo Law LLP**) for the
Defendants

Hearing dates: 7-8, 12-15, 19-23, 26-30 October and 4-5 November 2020

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Approved Judgment

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(A) INTRODUCTION

1. This is a multi-faceted dispute arising out of the construction and sale of nineteen solar energy parks in various locations across England and Northern Ireland.
2. Most of the solar parks were designed and built by the First Defendant (“*Wirsol*”), between 2015 and 2017, as Contractor under a series of Engineering, Procurement and Construction Contracts (“*EPC Contracts*”). The Employers under the EPC Contracts, and owners of the leases of the solar park sites, were a number of special purpose vehicles (the “*SPVs*”) owned at the time by the Defendants’ group.
3. On 25 May 2017 the Second Claimant (“*Toucan Gen Co*”) purchased from the Second Defendant (“*Wircon UK*”) its shares in the two companies which ultimately owned the SPVs, thereby acquiring ultimate ownership of the solar parks. On the same date, the First Claimant (“*Toucan Energy*”), Toucan Gen Co and Wirsol entered into a collateral agreement for Wirsol to procure “Asset Life Extensions”, i.e. extensions to the solar parks’ leases and associated planning rights, in exchange for specified consideration (“*the ALE Contract*”).
4. The Claimants’ case is that, by reason of breaches by Wirsol of the EPC Contracts, the solar parks contain defects. The Claimants claim (as assignees of the SPVs’ claims) damages to compensate them for those defects. The damages sought include claims for alleged blight of the solar park investments, and damages for the costs said to have been incurred by the SPVs’ holding companies in refinancing their borrowings. A claim is also made for alleged breach by Wirsol of Operation and Maintenance Agreements (“*O&M Agreements*”) with the SPVs in the period immediately following the SPVs’ termination of the EPC Contracts. In addition, the Claimants pursue a number of claims for breaches of warranty under the Sale and Purchase Agreements by which their group acquired the solar parks. The Claimants claim approximately £7 million compensation for alleged defects in the solar park, a further £6.8 million (or more) for ‘blight’, £8.8 million alleged losses on a refinancing said to have been necessary by reason of the alleged defects, £2.5 million for the loss of an option over adjoining land at a site at Outwood, and a number of ancillary claims, making a total of around £28 million.
5. All these claims are denied by the Defendants, save that they admit liability for direct losses caused by certain of the alleged defects.

6. The Defendants counterclaim approximately £6.4 million under the ALE Contract. The Claimants deny that any liability arises under that contract, on the basis that (a) one of the conditions subsequent set out in the contract was neither satisfied nor waived and (b) no valid asset life extensions were procured.
7. For the reasons set out below, I have concluded (in outline) that:
 - i) the Claimants' claims for damages necessary in order to rectify certain of the alleged defects succeed, as do certain warranty claims arising from the same defects (albeit the latter do not give rise to any additional damages);
 - ii) the Claimants' other damages claims fail; and
 - iii) the Defendants' counterclaim under the ALE Contract succeeds, save in relation to the Widehurst site.

(B) FACTUAL BACKGROUND

(1) The parties

8. Toucan Energy and Toucan Gen Co form part of a group of companies ultimately owned by Mr Liam Kavanagh. This group also includes Rockfire Capital Limited ("**Rockfire Capital**"). Toucan Energy wholly owns Toucan Gen Co. Prior to May 2018, Toucan Energy was named Rockfire Holdings Energy Limited and Toucan Gen Co was named RFE Gen Co Limited.
9. Wirsol is an English company engaged in the business of designing and constructing solar energy parks. It was initially 67% owned by the Third Defendant ("**Wircon Germany**") and 33% owned by Mr Mark Hogan, who was its managing director with responsibility for the acquisition and construction of solar parks in the UK. On 31 May 2016, Wircon Germany acquired 8% of Mr Hogan's interest in Wirsol, and on 14 November 2019 it acquired Mr Hogan's remaining 25% Wirsol shareholding. Mr Hogan remains a director of Wirsol.
10. Wircon Germany also wholly owns Wircon UK. Prior to the Claimants' 25 May 2017 acquisition, Wircon UK owned two 'Topcos', each of which owned a 'Holdco'; and the shares in each of the SPVs were owned by one or other of the two Holdcos.
11. The current corporate structure is as follows:
 - i) Toucan Gen Co owns Toucan Solar Assets 1 Topco Limited ("**Topco 1**") and Toucan Solar Assets 2 Topco Limited ("**Topco 2**");
 - ii) Topco 1 owns Toucan Solar Assets 1 Holdco Limited ("**Holdco 1**") and Topco 2 owns Toucan Solar Assets 2 Holdco Limited ("**Holdco 2**");
 - iii) Holdco 1 owns the nine SPVs who own and operate the solar parks at Balcombe, Five Oaks, Mill Farm, Newton, Outwood, Shuttleworth, Trowle, Upper Wick and Wrea Green; and

- iv) Holdco 2 owns the ten SPVs who own and operate the solar parks at Carrowdore, Cranham, Eckland Lodge, Home Farm, Lisburn, Moor House, Otherton, Widehurst, Wilbees and Woodhouse.

(2) Original acquisition and construction of the solar parks

- 12. In 2015 and 2016 the Wircon group acquired the 19 SPVs from various third parties, with the intention of constructing solar parks at each of the sites. By September 2016 the SPVs were ultimately owned by Wircon Germany in the holding structure referred to above. At this stage the directors of the SPVs and Wirsol were identical.

(a) *The EPC Contracts and O&M Agreements*

- 13. Each of the 19 SPVs entered into two key contracts: an EPC Contract and an O&M Agreement. The EPC Contract governed the design, construction and commissioning of the solar park, while the O&M Agreement governed the ongoing maintenance of the site once it had reached a certain construction milestone under the EPC Contract (known as '*Taking Over*').
- 14. For fifteen of the solar parks ("*the Wirsol Sites*"), Wirsol was both the EPC Contractor and the O&M Contractor.
- 15. For the remaining four sites, the SPVs entered into EPC Contracts and O&M Agreements with Abakus Byes Solar UK Limited ("*Abakus*"). These were the sites at Mill Farm, Shuttleworth, Trowle and Upper Wick ("*the Abakus Sites*"). Abakus proceeded to construct these four solar parks as EPC Contractor. In late 2016 and early 2017, the SPVs for the Abakus Sites entered into settlement agreements with Abakus compromising the SPVs' claims for delay liquidated damages at each of the four Abakus Sites pursuant to the four relevant EPC Contracts.
- 16. Wirsol provided performance bonds, issued by Euler Hermes, in support of its obligations under the EPC Contracts.

(b) *Financing by BLB*

- 17. Financing for the construction of the solar parks was obtained from Bayerische Landesbank ("*BLB*") under two facility agreements:
 - i) On 10 June 2016, Holdco 1 (as Borrower), Topco 1, and its nine SPV subsidiaries (as Guarantors) entered into an agreement ("*Facilities Agreement 1*") under which BLB provided funding of £36 million.
 - ii) On 20 January 2017, Holdco 2 (as Borrower), Topco 2, and its ten SPV subsidiaries (as Guarantors) entered into an agreement ("*Facilities Agreement 2*") under which BLB provided funding of approximately £46.3 million.
- 18. Prior to advancing money, BLB received 'Lender's Reports' as envisaged by the Facilities Agreements, including two technical Independent Engineer's Reports prepared by OST Energy Limited ("*OST*"), the lender's Technical Advisor under the Facilities Agreements.

(c) Design and construction of the solar parks

19. Wirsol and its subcontractors proceeded to design and build the 15 Wirsol Sites, involving a number of consultants and third party technical subcontractors. OST originally reviewed the design of the parks prior to construction, and then reviewed them again when it produced the Independent Engineer's Reports for BLB. It conducted a further review at Taking Over, for which it produced so-called 'PAC Reports'. Wirsol also employed various third party technical consultants to assist with elements of the designs.
20. There were four significant construction milestones under the EPC Contracts: Commissioning, 'Taking Over', Intermediate Acceptance, and Final Acceptance:
 - i) "**Commissioning**" or "**G59**" was the process whereby the solar park was certified to export electricity by the District Network Operator ("**DNO**"), which then issued a G59 Certificate. Commissioning was required to take place on the Target Commissioning Date for each site, a date identified in each EPC Contract. Following Commissioning, steps were to be taken to ensure the site was revenue-generating and ready for Performance Testing designed to check that the park met the "*Guaranteed Performance Ratio*" required under each EPC Contract.
 - ii) At "**Taking Over**" or "**Provisional Acceptance**", the solar park was said to be "*taken over by the Employer*". The site had to have passed the Tests on Completion and satisfied the further conditions set out in § 10.1 of the EPC Contract, including signature by the Employer of a "**Taking Over Certificate**" or "**Provisional Acceptance Certificate**" ("**PAC**"). Taking Over was scheduled to take place at the conclusion of the "*Time for Completion*", which ran for six months after the Target Commissioning Date.
 - iii) At "**Intermediate Acceptance**", each solar park was subject to performance testing by an independent third party to ensure that it met the "*Guaranteed Performance Ratio*". Intermediate Acceptance was to be achieved one year after Taking Over occurred.
 - iv) At "**Final Acceptance**", each park was subject to further performance testing to ensure it met the "*Guaranteed Performance Ratio*," assessed on the basis of the 12 month period following Intermediate Acceptance (i.e. the second full year after the date of Taking Over). Final Acceptance was to be achieved one year after Intermediate Acceptance. At this stage the Employer issued a Final Acceptance Certificate.
21. A failure to achieve Taking Over within the Time for Completion gave the Employer a right to claim Delay Liquidated Damages ("**DLDs**"). DLDs were to be calculated on a per Megawatt (MW) per day basis, reflecting the potential for lost revenue due to delays to the contractual milestones. The EPC Contracts provides for all DLDs for the period up to Taking Over to be claimed at that stage.
22. In early 2017 the solar parks had reached different stages of completeness. By 31 March 2017, all nineteen of the solar parks had achieved Commissioning and received their G59 certificates. That was important as the existing subsidy regime changed after this

date. By the date of the sale on 25 May 2017, eight of the solar parks had already achieved Taking Over. After the sale, construction of the sites continued and the remaining eleven sites reached Taking Over on various dates from August to October 2017.

(3) Negotiation and execution of the SPAs and ALE Contract

(a) Negotiation of the SPAs

23. At the beginning of 2017 the Wircon group sought a buyer for its portfolio. A number of established UK solar industry players made offers. The Wircon group ultimately entered into negotiations with the Claimants in February 2017.
24. CMS Cameron McKenna Nabarro Olswang LLP (“*CMS*”) were the transactional lawyers for Wirsol, Wircon UK and Wircon Germany, while Eversheds Sutherland LLP (“*Eversheds*”) and Gowlings WLG (UK) LLP (“*Gowlings*”) acted for the Claimants. The Claimants engaged both Eversheds and Gowlings because Eversheds also acted for BLB, giving rise to a risk of potential conflicts in relation to banking matters.
25. To marshal the relevant documentation Wirsol created a live online database of documents known as the “*Data Room*”. This ultimately contained some 20,000 items relating to the 19 sites, organised by site and class of document. These included pre-construction information such as planning and leases, relevant legal and financial documents, site designs and datasheets for all components purchased, testing certificates and underlying technical documents. The Claimants were provided with continuous access to the Data Room from April 2017.
26. During April and May 2017, CMS and Eversheds also exchanged a ‘Q&A Log’. This was a document in which Eversheds/the Claimants would insert questions relating to the Sale, to which CMS/Wircon/Wirsol would provide responses together with a ‘Data Room Reference’ for the documents referred to. The Q&A Log ultimately consisted of a substantial Excel file, with a separate tab for each site.
27. Prior to the sale Wirsol’s asset manager, Low Carbon, produced monthly asset management reports for each of the eight sites that had reached Taking Over. These were regularly uploaded to the Data Room, with the last report produced prior to signing the SPAs being dated 12 May 2017. This report referred to the inverter capping in place at Five Oaks, Newton and Outwood, referred to later.
28. During April 2017 OST, as BLB’s Independent Technical Advisor, completed its own due diligence on the sites, including site visits, and updated its two Lender’s Reports. Mr Hogan emailed these reports to Toucan for their information, requesting that Toucan contact OST directly with any queries. OST stated that there were no material “*open issues*” at the time of writing and confirmed that “*[i]n general we consider the technology to be suitable for the Portfolio.*” No concerns were identified in relation to any of the key technical components. OST also noted that “*[c]onfirmation has been provided that forced convection cooling [for the transformers] has been installed*”.
29. The Claimants also carried out their own direct due diligence, with Wirsol’s assistance. Mr Brett Baber and Mr Barry Bennett (Toucan’s internal technical experts) conducted site visits to at least 12 of the sites in April 2017, accompanied by Mr James Richardson

of Wirsol. The two Northern Ireland sites (Lisburn and Carrowdore) were visited on 19 April 2017 by representatives of Ethical Power Ltd, who were instructed by Toucan to conduct due diligence on those sites. Toucan has not disclosed any reports produced by Ethical Power, but Mr Baber subsequently wrote ‘Site Visit Reports’ for Toucan which have been disclosed and were positive. Mr Baber also raised specific queries with Wirsol regarding the performance at certain sites, which Wirsol addressed by explaining that the figures were caused (in part) by inverter capping, and the sizing of the transformers and busbars installed at the sites.

30. The parties entered into the two SPAs on 25 May 2017, under which Wircon UK sold Topco 1 and Topco 2 to Toucan Gen Co. In total, Wircon UK received the total sum of £53,718,054.46 under the SPAs.

(b) Negotiations and entry into the ALE Contract

31. At the same time, Toucan Energy, Toucan Gen Co and Wirsol also entered into the ALE Contract, which provided for Wirsol to seek to extend the leases and planning permissions for each of the 19 solar parks by five years.
32. The concept of the ALE Contract appears to have been proposed in April 2017 by Wirsol’s financial advisers. At a meeting between Mr Kavanagh and Mr Hogan on 4 May 2017, Mr Kavanagh proposed that the ALE Contract be linked to an element of deferred consideration under the SPAs. On the Defendants’ case, though this is to a degree in controversy, the sale price under the SPAs was reduced by £2 million and it was agreed Wirsol would receive an equivalent amount as a minimum payment under the ALE Contract irrespective of whether it achieved any asset life extensions. Wirsol would receive a higher amount if the value of the asset life extensions secured exceeded £2 million, at rates fixed on a per-site basis in the ALE Contract, up to a maximum of £7.2 million. However, the Claimants proposed linking the ALE Contract to the fulfilment of the list of conditions subsequent included in the Facilities Agreements. It was ultimately agreed that Wirsol would be paid under the ALE Contract only if these conditions were satisfied or waived prior to 30 June 2018.

(4) Taking Over of the solar parks and performance in 2017

(a) Issuing the Taking Over Certificates

33. During August to October 2017, Wirsol fulfilled the Taking Over requirements for the 11 sites that had yet to reach that milestone before the sale.
34. The Claimants employed Fichtner Consulting Engineers Limited (“**Fichtner**”), a third party technical consulting firm, to evaluate the 11 sites’ compliance with the requirements for Taking Over under Clause 10.1 of the EPC Contracts and to conduct a review of the ‘PAC Reports’ produced by OST (now renamed RINA). Fichtner’s reports state that “*Provisional Acceptance for [the relevant] Solar Park was reviewed in line with Clause 10 of the EPC Contract.*” Fichtner produced a report for each of the sites, which confirmed that, subject to the perfection by Wirsol of the required documentation and retentions for certain outstanding items (called the ‘punchlist’), the sites were ready for Taking Over.

35. Over the course of September and early October 2017, Wirsol carried out the necessary further actions. On various dates in August to October 2017, Wirsol submitted requests for signature of the Taking Over Certificates for each of the relevant sites. The Claimants agreed and signed these, certifying that all steps necessary to reach Taking Over had been carried out. Some of the certificates were backdated by agreement, as the documentation had been ready to be signed by the SPVs for several weeks.
36. Under Clause 2 of the O&M Agreements, Wirsol's obligation to provide O&M services to the SPVs was conditional upon the issue of the Taking Over Certificates. As the solar parks were already fully constructed prior to Taking Over formally occurring, Wirsol had in fact begun carrying out O&M services from July 2017 for a number of the sites, some months prior to Taking Over. O&M Reports for the relevant sites in July and August were also written and issued to Low Carbon and the Claimants. Wirsol invoiced the Claimants in October 2017 for these O&M services. However, the Claimants denied that O&M fees were payable before Taking Over and they were not paid. Wirsol ultimately agreed not to pursue these fees.

(b) Performance in 2017

37. The Defendants say that during 2017 the portfolio performed well. The documents indicate that the four sites which had reached Taking Over prior to the Sale (Outwood, Newton, Balcombe and Five Oaks) each exceeded the monthly PR guarantee of 82% in July-October 2017. From July 2017, months in advance of Taking Over, nine of the remaining eleven sites were exporting power to the grid and generating revenue. In September 2017, each of the sites exceeded its required 82% Performance Ratio. In October 2017, all sites other than Lisburn exceeded their 82% required Performance Ratios. Overall, in the year June 2017 to June 2018, the actual revenue performance of the portfolio exceeded the budgeted performance of £7,081,227.98 by approximately £208,000 and the generated power exceeded the budget of 68,061.944MW by 2,110.05MW.
38. In August 2017, Mr Croucher of Toucan emailed his team saying that “[o]verall the eight Wirsol sights [sic] being asset managed by Low Carbon had a positive month in July producing 1.3% more output than the ‘budget’, so they have caught up on the expected position and are now just 0.2% behind target YTD”. In September 2017, Mr Croucher told his team “[m]onthly reports are starting to come through for September and Hassan will do the reviews to look at the issues per site and make an assessment of the significance. Most items are minor and do not impact export, so do not cost us any loses [sic] in revenue.” In October 2017, Mr Croucher reported to Mr Kavanagh and the wider Toucan team that “[i]n the main, sites have performed as well as could be expected with minimal issues of note” and that “[a]ll sites exceeded their guaranteed PR levels”, while “[a]vailability was good across the board”.

(5) Performance under the ALE Contract

(a) Initial steps

39. After the sale Wirsol took steps to seek extensions under the ALE Contract, working with its English solicitors CMS (in particular Ms Eleanor Doherty and Ms Gabriella Vis) and Belfast solicitors Cleaver Fulton Rankin for the two Northern Ireland sites.

40. Wirsol's original proposal was (in essence) that new and longer leases would be procured. Wirsol proceeded to discuss the extensions with BLB and the relevant landlord on this basis. However, on 26 October 2017 (just over two months before the 31 December 2017 deadline under the ALE Contract) Toucan Energy instructed Wirsol to obtain options to lease for the further five-year term, instead of lease extensions. Wirsol took steps accordingly.

(b) Waiver of CS49

41. During the same period, the parties sought to address the conditions subsequent incorporated into the ALE Contract. One such condition subsequent mirrored clause 31.23.1.2 of Facilities Agreement 1, and was set out as item 49 in the conditions subsequent scheduled to the ALE Contract ("**CS49**"):

"Each [SPV] shall procure delivery to the Agent [i.e. BLB] of:

...

a certified true copy of each Final Acceptance Certificate within ten (10) Business Days of issue."

42. As at the date of the ALE Contract, the earliest any of the solar parks had achieved Taking Over was 30 September 2016. As Final Acceptance under the EPC Contracts occurred two years from the date of Taking Over, none of the sites could achieve Final Acceptance before 30 September 2018 at the earliest. It was therefore plain that CS49 could not be satisfied by 30 June 2018 (the deadline specified in the ALE Contract). Wirsol's case, which I consider later, is that CS49 was accordingly waived by both BLB and Toucan Energy in early November 2017.

(c) Procurement of asset life extensions

43. The Defendants allege that by 31 December 2017, following close liaison between CMS and Eversheds (acting for the Claimants and, separately, for BLB) and negotiations with all the relevant landlords, they procured the evidence required under the ALE Contract showing that the requisite lease and planning permission extensions were available.
44. On 30 December 2017 Mr Hogan issued Wirsol's invoice under the ALE Contract in the sum of £6,405,820.80 (the "**ALE Invoice**"), in expectation of fulfilling the final requirements of the ALE Contract well in advance of the 30 June 2018 deadline. At the date on which Wirsol issued the ALE Invoice, there remained two conditions subsequent outstanding (numbers 39 and 48) which related to the substation leases for Carrowdore and Lisburn, such that the ALE Invoice was not immediately payable. The ALE Invoice therefore stated that the applicable payment date was "*10 Business Days from the Payment Date as specified under the asset life extension agreement.*" The accompanying letter detailed the basis on which all the requirements for securing asset life extensions had been satisfied.

(d) Events after December 2017

45. On 9 January 2018 Toucan Energy wrote to Wirsol stating that the ALE Invoice was not payable because the conditions subsequent had not yet all been satisfied. Mr Hogan

- responded by email to Mr Kirk the same day, acknowledging that fact and confirming that Wirsol intended shortly to close out the remaining two conditions subsequent.
46. On 16 February 2018, conditions subsequent, 39 and 48 were discharged when the necessary substation leases for Lisburn and Carrowdore were issued.
 47. On 26 February 2018, BLB (acting through Eversheds) confirmed that, from the bank's perspective, all conditions subsequent had been satisfied or waived, "*including the FAC CSs for Wirsol I*". On the same day BLB and the parties to Facilities Agreement 1 had also agreed and signed a letter confirming the waiver of the obligation to provide Final Acceptance Certificates under Facilities Agreement 1 itself.
 48. On 28 February 2018 Mr Hogan emailed Toucan Energy stating that "*all CS's have been satisfied on both the WEL45 and WEL 60 portfolio*". That email enclosed a letter stating the conditions were formally satisfied as of 16 February 2018, and thus the ALE Invoice in the sum of £6,405,820.80 was payable on 2 March 2018.
 49. On 8 March 2018 Mr Hogan messaged Mr Kirk to say that the ALE Invoice "*still hasn't been acknowledged by anyone at Rockfire - nor was my letter re CS's being satisfied.*" Mr Kirk replied, "*Understand if u need to take legal action under ALE, that's fine – we have been working through list, if assets good and debt swept and OFGEM in, then ALE easier for all.*"
 50. It then emerged that the Claimants had instructed TLT Solicitors to review the ALE documentation provided by Wirsol in December 2017 (notwithstanding that Eversheds had already seen it). On 19 March 2018 Ms Maria Connolly, head of real estate at TLT, emailed CMS to request an overview of the asset life extension matters and documentation, in advance of a client meeting with Toucan on 26 March 2018. Ms Connolly stated that she was working with Mr Kirk on this matter. In reply Ms Doherty of CMS telephoned Ms Connolly to discuss and subsequently sent an email summarising the position. Ms Doherty then sent Ms Connolly six emails attaching the relevant documents.
 51. TLT then scrutinised this documentation, and is said to have provided a 'full report' to its clients. The Claimants have claimed privilege over the documents generated during TLT's review and have provided no disclosure in relation to it. At the time, CMS sought information about the outcome of the review, but none was forthcoming. Nor, though, did TLT or the Claimants make any suggestion that the documentation had been non-compliant in any specific respects.
 52. On 20 March 2018 Mr Hogan asked Mr Kirk for an update on the ALE matter. Mr Kirk said, "*TLT are speaking with CMS on the land rights in ALE, and I'll put a proposal to you next week on ALE... Allows non contentious sites to progress, the £2m to be made, but where we have concerns - like Balcombe maybe a different route.*" Mr Kirk did not elaborate on what was meant by "*contentious*" sites.
 53. Mr Hogan continued to question Mr Kirk regarding non-payment of the ALE Invoice in April and May 2018.
 54. In May 2018 Mr Kirk and Mr Kavanagh met with Mr Hogan on several occasions to discuss the ALE matter, but no agreement was reached.

55. Discussions having failed, on 1 June 2018 Wirsol issued a statutory demand for the sum payable under the ALE Invoice. In a letter dated 13 June 2018, Toucan Energy disputed the debt on three bases, all of which it later dropped. Following receipt of Toucan Energy's letter, the statutory demand was withdrawn on 15 June 2018.

(6) Development of a dispute regarding the solar parks

56. During the same period, a dispute began to develop regarding alleged defects at the solar parks.
57. Defect notices were served on 13 April 2018, under the EPC Contracts, stating that there was ongoing water ingress into the transformer substations at ten of the solar parks and that the use of marine plywood flooring was in breach of the EPC Contracts.
58. In June and July 2018, the Claimants issued further defects notices:
- i) on 15 June 2018, a notice relating to forced air cooling at Five Oaks and the restriction placed upon the inverters at that site;
 - ii) on 22 June 2018, nine notices regarding the capacity of transformers and busbars, and the monitoring system, at nine of the solar parks; and restrictions placed on the inverters at the Newton and Outwood sites;
 - iii) on 4 July 2018, three notices alleging defects with the monitoring system at Widehurst, Eckland Lodge and Woodhouse;
 - iv) on 5 July 2018, two notices alleging non-compliance with the required power factor under the applicable Connection Agreement at the Moor House and Otherton sites (this allegation is not pursued in the present proceedings); and
 - v) on 30 July 2018, 13 defects notices summarising and reiterating the notices sent to date, plus a defect notice relating to the restriction placed on the inverters at Widehurst.
59. On 1 August 2018 Wirsol replied substantively, by letter from Enyo Law, to the defects notices issued before 30 July 2018. The letter enclosed a 47-page schedule responding to each notice and identifying the remedial work carried out or scheduled. Wirsol accepted that certain updates to the monitoring systems were required. It also made proposals to install further protection to prevent water ingress. The Defendants say that work on both matters was interrupted by the termination of the EPC Contracts, referred to below.

(7) Legal proceedings

(a) The ALE Claim

60. No further progress was made in July 2018 regarding the ALE Invoice, and on 2 August 2018 Wirsol issued a claim against Toucan Energy for payment of the ALE Invoice in the Technology and Construction Court (the "**ALE Claim**"). Wirsol also issued a summary judgment application, on the basis that Toucan Energy had offered no credible justification for non-payment.

(b) The Claimants' refinancing

61. On 11 August 2018 the Claimants issued a bond prospectus. This prospectus stated that it was issued solely to local authority investors and proposed two bond issues on the portfolio of 19 solar parks, for a total of £145 million: Issue 9 Solar for £60 million and Issue 10 Solar for £85 million.
62. The prospectus described the sites as “operating well and within the predictions expected at the outset”, “fully operational” and “within 2.5% of our expectations against revenue and costs to date.” The prospectus also stated that a significant number of the sites had a 30-year lease, thus apparently indicating that lease options under the ALE Contract had been obtained and exercised.
63. In August 2018 the Claimants refinanced the portfolio, with the Topcos repaying BLB on 31 August 2018 using part of the proceeds of their bond issue. I consider later the Claimants' claim arising from this refinancing.

(c) The Claimants' claims

64. On 16 August 2018 Eversheds sent a letter before action setting out a series of claims under the EPC Contracts and SPAs. These included an allegation, not now pursued, that the Defendants had entered into an unlawful means conspiracy to conceal the alleged defects. The Claimants' loss was estimated at “not less than GBP 10,000,000”.
65. On 16 August 2018 the SPVs sent a notice, purportedly under Clause 15.2 of the EPC Contracts, in respect of all 15 sites constructed by Wirsol. This notice enclosed all defects notices sent to date, which are summarised in a table set out at Schedule 4 of the Particulars of Claim, and gave Wirsol a further 14 days to remedy the alleged breaches.
66. On 24 August 2018 thirteen of the SPVs submitted a demand to Euler Hermes for the full amount of the performance bonds issued to them, in the aggregate amount of £2,995,716.57, based on the alleged breaches of the EPC Contracts. Euler Hermes paid the demands in early September, and Wircon Germany reimbursed Euler Hermes.
67. On 3 September 2018 the SPVs sent Wirsol notices of termination of the EPC and O&M Agreements for the 15 sites. The termination of the EPC Contracts was said to be justified by the matters identified in the defect notices. The termination of the O&M Agreements was said to be justified on the basis that the EPC Contracts had been terminated (the O&M Agreements containing a cross-default clause), and (in the case of four solar parks) on the basis that Wirsol had allegedly engaged unauthorised subcontractors.
68. Wirsol took the position that there was no valid basis on which to terminate the EPC Contracts or the O&M Agreements, and that the purported termination by the SPVs was itself a repudiatory breach. Wirsol claimed to accept that repudiation as bringing the contracts to an end. There is a dispute regarding which party's understanding of the termination process is correct, which I address later.
69. Wirsol offered to continue to provide O&M services during what would (if the O&M Agreements had been validly terminated by the SPVs) have been the contractual notice

period. There is a dispute about the basis on which Wirsol did so, and whether the Claimants failed to mitigate their loss by declining to accept Wirsol's offer. The upshot was that Wirsol did not continue to provide the services, and the Claimants temporarily de-energised the sites pending appointment of new O&M contractors. PSH Operations Limited was appointed as new O&M Contractor for seven sites on 8 September 2018, and BayWa Energy Limited was appointed O&M contractor for eight other sites on 1 November 2018.

70. On 25 September 2018 the SPVs assigned their claims under the EPC Contracts to Toucan Energy, which relies on them as providing a defence of set-off to Wirsol's claim under the ALE Contract.
71. On 1 October 2018 Toucan Energy and Toucan Gen Co issued their claims in these proceedings, claiming damages of approximately £30 million.

(d) The conclusion of Wirsol's summary judgment application

72. On 16 October 2018 Toucan Energy abandoned the three defences to the ALE Claim that it had offered to date. Instead, it asserted that it was entitled to set off the ALE Claim against Toucan Energy's own (recently assigned) claims under the EPC Contracts. In addition, Toucan Energy raised for the first time a defence based upon the alleged non-waiver of CS49.
73. On 2 November 2018 Wirsol filed its responsive evidence, and filed its Defence and Particulars of Additional Claims against the SPVs.
74. On 20 November 2018 Toucan Energy filed further evidence in the Defendants' summary judgment application, which included witness statements from both Mr Newbery of Gowlings and Mr Hill of Eversheds denying that a waiver of CS49 was given. At this point, Wirsol accepted that the ALE Claim raised contested points of evidence that could not be dealt with at a summary judgment hearing, and (after further correspondence) Wirsol withdrew its application.
75. A dispute arose regarding costs. Toucan Energy sought costs of the entire Defendants' Summary Judgment Application, including payment of costs incurred after 16 October 2018 on the indemnity basis. Wirsol sought its costs of the application until Toucan first raised the CS49 defence on 16 October 2018, and submitted that thereafter costs should be in the case. At a hearing on 6 December 2018, Waksman J awarded Wirsol 100% of its costs up to the point at which Toucan Energy changed its case on 16 October 2019, finding that the claim and summary judgment application was "*entirely properly raised*" and that Wirsol was "*perfectly entitled to keep on going*" until this point. Costs thereafter were reserved, save that the Judge also awarded Wirsol 75% of the costs hearing itself ([2018] EWHC 3924 §§ 33-38).

(e) Further procedural steps

76. Waksman J also ordered that the ALE Claim should be transferred to the Commercial Court, with a view to the parties seeking consolidation of both sets of claims. This was done, and the ALE Claim was repleaded by Wirsol as a counterclaim.

77. Further claims were subsequently added by the Claimants by amendment in spring 2019, alleging that Wirsol was liable for DLDs in respect of certain sites, and that Wircon UK had failed to disclose certain compromise agreements with Abakus. At the same time the Claimants produced a 'Scott Schedule', which set out their various allegations as to defects at the solar parks. In March 2020 the parties settled several minor claims and counterclaims.
78. Following disclosure and witness statements, the Claimants applied for summary judgment/strike-out of the counterclaim under the ALE Contract. Teare J accepted the Defendants' contention that the application should not be listed, because it could not be accommodated in July 2020 and the trial was due to commence the first week of the following term in October.
79. At a pre-trial review on 24 July 2020, Foxton J ordered Wirsol to identify the documents from the disclosed documents which it contended satisfied the requirements of the ALE Contract. Further documents were disclosed following that order.
80. Both sides agreed to provide security for costs of the other's claims and counterclaims, without prejudice to their respective positions that such security was not required.

(8) Brief summary of the components of a solar park

81. I set out below a general description of the elements of a solar park, albeit differences occur between different parks.
82. On the low voltage ("*LV*") side of the park:
 - i) Photovoltaic panels (or 'PV panels') are solar panels arrayed on a fixed mounting structure in groups (or 'strings') connected to an inverter. Sunlight is absorbed by the solar panels and converted into direct current ("*DC*"). This apparatus can be referred to as the photovoltaic system or "*PV system*".
 - ii) The direct current travels to the inverters, which convert DC into alternating current ("*AC*") for export to the electric grid. Each of these inverters is connected to multiple strings of solar panels. There are approximately 140 inverters on a 5MW site. The voltage output from the inverters is approximately 400V.
 - iii) The AC output from a group of four or five string inverters travels into combiner boxes, and then into feeder pillars (inside the substation) which combine the output from the inverters.
 - iv) The combined current from the feeder pillar pass through the LV busbar, a large copper bar.
 - v) The low-voltage 400V current passes into the transformer, which increases the voltage to either 33kV or 11kV as required by the grid. This is the point of transition to the high voltage (or "*HV*") side of the solar park.
 - vi) There are various elements of circuit protection on the LV side including miniature circuit breakers ("*MCBs*"), low voltage fuses and (in each substation)

a Woodward relay or equivalent device. This type of equipment is collectively referred to as ‘switchgear’.

83. On the HV side of the park:
- i) The 33kV or 11kV output from the transformer passes through the HV busbar.
 - ii) The HV current then travels through lengths of cabling to the point of connection with the DNO’s network, i.e. the local electricity grid.
 - iii) There are various elements of circuit protection on the HV side including an HV circuit breaker, HV switches and Micom relays.
84. In the present case, save at Carrowdore and Lisburn, each transformer substation is a metal structure based upon a shipping container, inside which the transformers, switchgear and busbars are contained. There are two substations at each of the solar parks with the exception of Cranham and Otherton, at which there is only one.
85. The voltage in the DNO’s network may vary from the standard (or ‘nominal’) voltage, depending on the balance of power generation and consumption on the network. Minor variations can occur in the short term, reflecting the changing patterns of use during the day. More substantial variations arise from long-term changes in usage patterns: for example, a major electricity consumer (say, a smelting plant) may materially reduce the long-term voltage in a given network. The DNO is required by regulation to operate in the range of 94% to 106% of nominal voltage. The transformers have the ability to compensate for periods of long-term high or low voltage by adjusting their ‘taps’ – bolts on the transformer that can be physically adjusted, in 2.5% increments, up to a total of -5% or +5%. I discuss later whether, and if so when, it is appropriate to use the transformer taps.
86. AC systems may generate both ‘real’ or ‘active’ power and ‘reactive’ power. Only ‘real’ power results in the transfer of energy. The DNO is contractually entitled, under the Connection Agreement pertaining to each site, to request that a generating installation generate or absorb a certain amount of ‘reactive’ power, which it may wish to do in circumstances where voltage is either low or high (respectively). It does so by specifying a ‘power factor’. These power factors are referred to as ‘lagging’ (i.e. exporting reactive power) and ‘leading’ (i.e. absorbing reactive power).
87. It is conventional for ‘real’ power to be expressed in kilowatts (kW), one Watt being equal to 1 Amp (current) x 1 Volt (voltage); and for ‘apparent’ or ‘total’ power (the aggregate of the real and reactive power) to be expressed in kilovolt amps (kVA). The power ratings of the transformers involved in this case are expressed in kVA.
88. This judgment refers to two different types of transformer:
- i) power transformers (to which I refer, simply, as ‘transformers’ in this judgment) are used to step up or down the voltage of power supplies; and
 - ii) voltage transformers, used to step voltage down for a specific purpose in the context of protection and measuring equipment such as (in the present case) switchgear.

(C) OVERVIEW OF CLAIMS

89. Defects In sections (E) to (P) below I consider the Claimants' defects case. This involves determining whether defects existed in fifteen of the solar parks, and the appropriate remedial work arising.
90. Blight Section (Q) considers the Claimants' claim that the measure of damages for breach of the EPC Contracts should include compensation for blight of the solar parks and/or the Claimants' investment in them. The contents of this section are also relevant to the Claimants' separate claim for breach of warranty (section (W)) insofar as it seeks compensation for blight.
91. Section (R) addresses the claim that the Claimants are entitled to recover damages for refinancing costs said to have been incurred as a result of defects in the sites for which Wirsol is responsible.
92. Section (S) concerns the Claimants' entitlement to have terminated the EPC Contracts and O&M Agreements, and a resulting claim against Wirsol for breach of the O&M Agreements during the termination notice period.
93. Sections (T) to (W) deal with claims brought by the Claimants for breach of warranties in the SPA relating to various matters.
94. Section (X) addresses Wirsol's counterclaim under the ALE Contract.

(D) WITNESSES

(1) Claimants' witnesses of fact

95. The Claimants provided statements from seven witnesses of fact.
96. Mr Liam Kavanagh is the ultimate owner of the Claimants. I found Mr Kavanagh to be an unsatisfactory witness. In his witness statements he had a tendency to purport to give evidence based on his review of the disclosed documents, including assertions that turned out to be demonstrably wrong. In cross-examination, when faced with difficult questions he would frequently retreat into stating simply that he did not agree with the questioner. As set out in more detail later in this judgment, his evidence on the refinancing issue in particular strained credulity, and I have concluded that the bond prospectus which bore his name was materially false in a significant respect. His evidence about the meaning of internal emails about the ALE Contract lacked credibility. I have concluded that I should not rely on his evidence on contested matters save where supported by independent reliable evidence.
97. Mr Daniel Kirk is an accountant who joined Toucan in January 2018 as managing director of Toucan Energy. Mr Kirk gave evidence in relation to both technical and commercial matters. I did not accept Mr Kirk's evidence on all points, and felt that the account given in his witness statement of his discussions with Mr Hogan relating to the ALE Contract did not provide a fair reflection of those exchanges (many of which were documented in one form or another). I did not, however, consider that Mr Kirk was at any stage seeking to mislead the court, and in oral evidence he was willing to make appropriate concessions.

98. Mr Ieuan Spencer, the Technical Director of Toucan Energy, gave evidence relating to the technical elements of the defects claims. Some of the contents of Mr Spencer's witness statements involved selective quotations from contemporary documents, and (as set out later) there are other aspects of his evidence which I was unable to accept. Like Mr Kirk, though, he was prepared to make appropriate concessions in cross-examination.
99. Mr Steven Croucher, the Chief Operations Officer of Rockfire Capital from March 2017 to January 2018, gave evidence largely relating to the ALE Claim. I found his evidence on that topic, particularly the meaning of certain important contemporaneous emails, to strain credibility and was not satisfied that I could rely on his evidence.
100. Ms Sarah Farrelly, the Technical Manager of Toucan Energy since January 2018, gave evidence relating to discrete technical and accreditation issues involving the Lisburn and Widehurst solar parks. She was a straightforward witness.
101. Mr Andrew Newbery, a partner at Gowlings, which formerly acted for the Claimants (though the scope of his retainer was in dispute). Mr Newbery gave evidence in relation to the ALE Contract claim. Though I am satisfied that Mr Newbery gave his evidence honestly, I did not find it entirely satisfactory. His witness statements were argumentative in tone, and purported to give evidence as to matters in which he was not directly involved, such as the correct interpretation of emails regarding the alleged waiver of a condition subsequent to the ALE Contract. They also made somewhat strident assertions about Wirsol's knowledge regarding Gowlings' role, which other evidence in the case gives reason to doubt.
102. Mr Stephen Hill, a partner at Eversheds, who also formerly acted as the Claimants' solicitors, gave evidence in relation to the ALE Claim. Mr Hill's witness statement suffered a similar fault to Mr Newbery's: he made assertions as to what (in his view) Mr Hogan of Wirsol and Mr Currier of Wirsol's solicitors CMS could or could not have believed, and in substance made submissions about key matters in issue regarding the ALE claim. Mr Hill was straightforward in his oral evidence, and it would have been preferable for his witness statement to have been confined to matters of fact within his own knowledge.

(2) Defendants' witnesses of fact

103. Mr Mark Hogan, managing director of Wirsol, gave the Defendants' primary evidence of fact. Mr Hogan frankly accepted that (like Mr Kavanagh) he retained a financial interest in the outcome of the case, and at times he had a slight tendency to be argumentative or to down-play problems with the sites. He sometimes gave longer answers than were necessary, and could be diffuse in his answers. Having said that, I did not at any stage consider that he was giving his evidence less than honestly, and by and large have accepted his evidence. I specifically reject the Claimants' contention, in their written closing submissions, that Mr Hogan's answers in cross-examination were not credible or were evasive.
104. Mr Charles Currier of CMS, who acted as Wirsol's solicitors, gave evidence in relation to the ALE Claim. He was a straightforward witness.

105. I have taken into account the Claimants' submission that the Defendants refrained from calling a number of witnesses who might have had relevant evidence to give, and the comments of Fraser J in *Energy Solutions v Nuclear Development Authority* [2016] EWHC 1988 (TCC) at §§ 317-322 (citing *Wisniewski v Central Manchester Health Authority* [1998] PIQR 324) about inferences that may be drawn. In the light of the issues in this case, I have found the Claimants' point to be significantly overstated. As appears later in this judgment, I have found it permissible to draw an inference on one issue where Mr Turner was not called. However, this is not in my judgment a case where individuals who were (adopting Fraser J's words) 'intimately involved' in important issues and had 'far greater knowledge' about them than Mr Hogan were not called.

(3) Experts

106. Permission was given to call expert evidence in four disciplines, dividing into three areas, as follows:
- i) Technical defects experts: Mr Simon Ryder and Mr Robin Halliday on electrical engineering issues (called by the Claimants) and Dr Morris Lockwood on those issues (called by the Defendants).
 - ii) Solar asset valuation: Mr Colin Johnson (called by the Claimants) and Mr Richard Slark (called by the Defendants).
 - iii) Quantity surveying: Mr Michael King (called by the Claimants) and Mr Roy Andrew (called by the Defendants).
107. Although I have not accepted every aspect of their evidence, I am satisfied that each expert was appropriately qualified, and gave evidence reflecting his genuine considered opinion. It is appropriate to comment briefly at this stage on Dr Lockwood's evidence, as the Claimants in cross-examination sought on several occasions to impugn his relevant experience, independence and impartiality. Dr Lockwood accepted that his experience did not lie in the design of transformers or solar parks. However, I am completely satisfied that his experience in electrical engineering in general, including specifically the operation of transformers, fully equipped him to provide the evidence he did. Dr Lockwood's demeanour as a witness could occasionally appear dogged, but having heard and carefully considered the evidence he gave over three reports and two days of cross-examination (in the context also of the other experts' evidence and the relevant documents), I am fully satisfied that his evidence reflected his genuine, considered opinions. I therefore reject the Claimants' criticisms of his evidence indicated above.

(E) DEFECTS: OVERVIEW OF CLAIMS AND CONTRACTUAL SCHEME

(1) Overview of claims

108. Wirsol was required to provide to the SPVs defect and damage free solar parks designed, constructed and installed to specified standards. In the words of the Employer's Requirements contained in Schedule 1 of each EPC, (also referred to in the EPC Contracts as the Employer's Construction Requirements or Specification), the overarching intent was for Wirsol:

“to procure for the Employer a modern, functional, well-designed solar power plant capable of continuous, efficient and reliable operation with minimum maintenance. The equipment supplied shall be of proven, robust and reliable design incorporating protective systems and devices with adequate factors of safety and maintainability built-in.”

109. The Claimants allege defects at fifteen sites. In summary, they allege that:
- i) ten solar parks suffered from transformers and busbars with insufficient capacity unable to cope with the supply of power from the Photovoltaic System (Scott Schedule item 1) with four of those having the supply of power from the inverters clipped or capped by Wirsol and with other adjustments that were a means adopted by Wirsol to seek to ameliorate the effects of the lack of capacity (Scott Schedule Items 2 and 3);
 - ii) at thirteen sites, Wirsol deployed forced air cooled transformers, rather than natural air cooled transformers (Scott Schedule Item 4);
 - iii) twelve sites suffered from excessive humidity and water ingress, dangerous plywood flooring, and a lack of sufficient circuit breakers (Scott Schedule Items 5- 11 and 14);
 - iv) all fifteen sites suffered from inadequate monitoring provision (Scott Schedule Items 15, 16 and 19), with one such defect alleged in respect of three sites only (Scott Schedule Item 17);
 - v) the Lisburn and Carrowdore sites were inadequately landscaped (Scott Schedule Item 20);
 - vi) at thirteen sites, Wirsol failed to comply with a warranty that it had designed the solar parks so that when completed they provide a minimum of 25 years operational life (Item 21); and
 - vii) by reason of the failure by Wirsol to remedy the defects, the SPVs were entitled to and did operate the termination provisions of both the EPC Contracts and the O&M Contracts.
110. In September 2018 the SPVs assigned absolutely to Toucan Energy the benefit of their claims against Wirsol under the EPC and O&M Contracts. Notice of the assignments was given on 28 September 2018.
111. By way of the claim assigned from the SPVs, Toucan Energy claims under and for breach of the EPC Contracts: the costs of reinstatement; diminution in value or blight reinstatement; lost revenue as a result of defects; together with a number of other losses.

(2) The EPC Contractual Scheme

112. The EPC Contracts are materially in the same form and contents.
113. Wirsol was required to carry out and complete the Works, including the Permanent Works, being the design and engineering, procurement, manufacture, installation,

construction, testing and commissioning of the solar power plant and ancillary equipment at the site, including as described in the Employer's Requirements.

114. The EPC Contracts imposed general obligations upon Wirsol as Contractor as to the quality of design, construction, and defects, including at clause 4.1 of the Conditions of Contract. This clause also contained the Contractor's warranty that the Works when completed shall provide a minimum design operational life of 25 years.
115. Clause 5.3 of the EPC Contracts contained an undertaking by Wirsol that all of its work was in accordance with, inter alia, the terms of the EPC, Good and Prudent Practice, and the technical specification and requirements of the Connection Agreement. The Connection Agreement is the agreement with the relevant DNO permitting the export of power to the network.
116. Clause 7.1 of the EPC Contracts made provision as to the quality of plant, materials and workmanship used and deployed by Wirsol.
117. Clause 11 of the EPC Contracts provided a scheme that granted a right to Wirsol during the Defects Notification Period, the two year period following the issue of the Taking-Over Certificate, to remedy defects or damage in the Works itself at its own risk and cost. By clause 11.4 in respect of a failure by Wirsol to carry out remedial work to defects or damage, the Employer may have the work carried out at Wirsol's cost.
118. The Employer's Requirements in each EPC essentially set out a specification against which Wirsol's Works were required to comply. The Employer's Requirements of particular general relevance include: Clause 2.1 (general intent); clause 2.4 (intended purpose including to provide continuous operation subject to actual irradiation levels); clause 2.12 (25 year design life requirement); clause 3.2 (general design requirements including that no single fault shall cause the failure of any duty equipment); clause 4.1 (design and operational requirements of the electrical specification); clause 4.4.5 (requirements for transformers); and clause 4.4.7 (requirements for dry type transformers).
119. Pursuant to clauses 4.1, 5.3 and 5.4 of the Conditions of Contract and clause 2.11 of the ERs the design shall comply with all laws and regulations. The Electricity at Work Regulations 1989, regulations 5 and 11 detail requirements for electrical equipment. Regulation 5 requires that "*No electrical equipment shall be used where its strength and capacity may be exceeded in such a way as may give rise to danger.*" Regulation 11 provides that "*Efficient means, suitably located, shall be provided for protecting from excess of current every part of a system as may be necessary to prevent danger.*"
120. Clause 15 of the Conditions of Contract provided a stepped mechanism for the SPVs to terminate the EPC Contracts for a wide range of causes including a failure of Wirsol to make good a notified failure to carry out any of its obligations under the EPC (clause 15.2 (a)) and a failure of Wirsol to remedy a notified remediable material breach of obligations under the EPC (clause 15(2)(g)(i)).

(3) The O&M Agreements scheme

121. The O&M contracts were agreements entered into by the SPVs and Wirsol by which Wirsol agreed to carry out maintenance, monitoring and repair services in relation to the 15 sites including to the standards set out in clause 11.
122. Clause 24 of the O&M contracts provided that Wirsol may sub-contract the performance of all or part of the Services to any sub-contractor “*provided that such sub-contractors and the terms and conditions of their appointment have first been approved by the Employer in writing, such approval not to be unreasonably withheld.*”
123. A similarly extensive scheme permitting termination of the O&M contracts by the SPVs was provided in clause 20. This included that the SPV may terminate the employment of Wirsol by written notice if specified events of default occurred including breach by Wirsol of its obligations under clause 24 (clause 20.5.3) and the corresponding EPC is terminated under clause 15 of the EPC (clause 20.5.4). The O&M contracts provided that termination takes effect 30 business days after the date of a termination notice.

(F) CAPACITY DEFECTS AND PROTECTION SETTINGS (Scott Schedule Items 1 and 3)

(1) Introduction

124. The Claimants’ case is that in relation to ten of the solar parks, Wirsol provided transformers and busbars of insufficient capacity to process the current from the inverters and this constituted a material breach of the EPC Contracts.
125. An initial point arises about the scope of this part of the claim. The Claimants’ Re-Re-Amended Particulars of Claim (“**RRRAPoC**”) allege that:

“In breach of clauses 4.1, 4.9, 5.1, 5.3, 5.4, 5.8, 9.6 & 11.1 of the EPC Contracts and paragraphs 2.4, 2.5.1, 3.1, 3.2, 4.2, 4.4 & 4.4.5 of Schedule 1 to the EPC Contracts (at least) each of the Wrea Green, Cranham, Wilbees, Moor House, Otherton, Five Oaks, Outwood, Newton and Widehurst Solar Parks the transformers, busbars and Woodward relays installed are, in combination and when operated at appropriate settings, of insufficient capacity to allow the transformers to operate at their rated output for the maximum load curve provided by the PV systems on any ratio (“the Capacity Defect”).” (§ 21)

126. The Scott Schedule, dated (in various iterations) 26 March 2019, 28 May 2019, 24 August 2019 and 1 September 2020, at “item 1”, added a tenth site, Home Farm. No claim was advanced referring specifically to the Eckland Lodge or Woodhouse solar parks.
127. The Claimants’ expert, Mr Ryder, addressed the capacity issue in his first report dated 24 June 2020 as concerning the capacity of the transformers and busbars at the ten sites named above. The relevant section (“*Scott Schedule Item 1*”) of the experts’ Joint Memorandum, dated 29 May 2020, dealt in the lists and tables at §§ 1.1.1.8, 1.1.2.14 and 1.1.2.20 only with the nine sites referred to in the RRRAPoC.

128. Dr Lockwood’s second report, dated 31 July 2020, included a table setting out the available data relating to all of the transformers, including those at Eckland Lodge and Woodhouse. Mr Ryder’s second report, also dated 31 July 2020, likewise included tables setting out capacity information in relation to the transformers and busbars including those at Eckland Lodge and Woodhouse.
129. The exhibits to Dr Lockwood’s third report, dated 11 October 2020, included information in relation to the busbars and transformers at Woodhouse but not Eckland Lodge. Mr Ryder in his third report, dated 21 October 2020, stated that he was applying his methodologies for determining the required capacity for the busbars and transformers “*to calculate the required [busbar] [transformer] capacity for the sites covered by item 1 of the Scott Schedule and two sites with a similar conceptual design (Eckland Lodge and Wood House)*”. The Claimants’ quantum expert set out figures for remedial work including the replacement of transformers and busbars at both these sites.
130. The cross-examination of Mr Ryder included the following exchanges:
- “Q. Yes. So just picking up one point to make sure it's common ground, you say you include Eckland Lodge in your table in Ryder 2, for comparison purposes. ...
- So you say there, the mini paragraph: "I've included Eckland Lodge (*Reading to the words*) for completeness and for comparison purposes." Yes?
- ... That's because, isn't it, that as regards capacity there's actually no claim in respect of Eckland Lodge or indeed Woodhouse, is there?
- A. That's quite correct. I think Dr Lockwood included Woodhouse for completeness or perhaps just because he visited the site, and I included Eckland Lodge as well.
- Q. That's fine, thank you. In that case my final substantive category relates to forced air cooling.” (Day 13/48/3-23)
131. The Claimants now seek to advance a claim in relation to busbar and transformer capacity at Woodhouse, though not at Eckland Lodge. They submit that the words “*at least*” in the RRRAPoC mean that such a claim is sufficiently pleaded, and that the parties have proceeded on the basis that it is included. Failing that, by their written closings they seek permission to amend, suggesting that “*there is no question of any further or different evidence being required*”.
132. I do not accept that any capacity claim relating to the busbars and transformers at Woodhouse is sufficiently pleaded. The Claimants’ case on capacity is set out in its RRRAPoC § 21 and, in more detail, item 1 of the Scott Schedule. In circumstances where the Scott Schedule specifies ten sites, not including Woodhouse, in relation to which the claim is made, the words “(*at least*)” in RRRAPoC § 21 do not suffice to bring Woodhouse within the claim.

133. Nor would it be just to grant permission to amend. As the exchange quoted above indicates, the Defendants presented their case at trial on the basis that no capacity claim was advanced in relation to either Eckland Lodge or Woodhouse, and (it can fairly be inferred) refrained from pursuing lines of questioning in relation to those sites on that basis. It is unnecessary and inappropriate to speculate on what further questions might have been asked, or with what outcome, had the Claimants been advancing a claim in relation to Woodhouse. Had the Claimants wished to add such a claim, they could and should have made a timely application to do so. The exchange quoted above put the Claimants explicitly on notice of the assumption the Defendants were making in this regard. In these circumstances, it is far too late to seek to amend during closings. I decline to grant permission to amend.
134. Separately, the Defendants submit that the claim for the replacement of a transformer at Cranham has been overtaken by events. The Particulars of Claim were first settled in 2018. In April 2019, the Cranham transformer failed, and it has already been replaced with an outdoor oil-immersed transformer. The Claimants have suggested that that failure was evidence of the alleged humidity defect, but no claim has been brought alleging that the Defendants are responsible for the transformer's failure. Nor have the costs of that replacement been claimed.
135. The Defendants say any capacity defect in the transformer previously in place at Cranham is therefore irrelevant, since the transformer has since been destroyed by reason of something other than any capacity defect, which can therefore have caused no loss.
136. However, as the alleged capacity defect at Cranham has possible relevance to the Claimants' alleged entitlement to terminate, I include it in my consideration below.
137. By amendments made during the course of trial, following the rulings referred to on their partly unsuccessful application for permission to amend at the start of trial, the Defendants have admitted that:
- i) the transformers at Five Oaks TX2, Newton TX1, and Outwood TX1 lack sufficient capacity and require replacement; and
 - ii) the busbars at Five Oaks TX2, Newton TX1, Outwood TX1 and Wilbees TX1 lack sufficient capacity and require replacement.

I have in this judgment adopted the parties' practice of using the designations "TX1" and "TX2" to refer to the first and second transformers at particular sites.

(2) Contractual obligations

138. The main contractual requirements relevant to transformer and busbar capacity are set out in the EPC Conditions of Contract and the Employer's Requirements.
139. Clauses 4.1, 5.3 and 5.4 of the Conditions of Contract provide as follows:

"4.1 Contractor's General Works Obligations

The Contractor shall design, execute, install, test, Commission and complete the Works in accordance with this Contract, and shall remedy any defects in the Works, in each case:

- a) in accordance with Good and Prudent Practice;
- b) in accordance with all relevant Standards and codes of practice to which the Contractor would be expected to have regard;
- c) in accordance with the Employer's Construction Requirements and the other terms and conditions of this Contract;
- d) in compliance with all applicable Laws and Permits; and
- e) in a manner that is not likely to be injurious to health or cause damage to property.

When completed, the Works shall meet the requirements as set out in paragraph 2.4 of Schedule 1 (Employer's Construction Requirements) and in the Contractor warrants that it has designed the Works to have a minimum design operational life of 25 years under the operational conditions set out in the Employer's Construction Requirements, provided that the same are operated and maintained (and where relevant, replaced) in accordance with the operational and maintenance manuals received in accordance with Clause 5.7 (Operation and Maintenance Manuals) and provided that the individual component parts sets out in Clause 4.5 (Key Sub-Contractor) shall only be warranted for the periods set out in that Clause 4.5.

The Contractor shall provide the Contractor's Documents specified in this Contract, and all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, as are required in and for the design, execution, installation, testing, Commissioning and completion of the Works and remedying of defects, in each case in accordance with this Contract.

The Works shall include any work which is necessary to satisfy the Employer's Construction Requirements, or is implied by this Contract, and all works which (although not mentioned in this Contract) are necessary for stability or for the completion, or sale and proper operation, of the Works.

..."

"5.3 Contractor's Undertaking

The Contractor undertakes that the Contractor's Documents, the design, execution, installation, testing, Commissioning and completion of the Works, the remedying of defects and the Works when completed will be in accordance with:

- a) all applicable Laws, Permits, licences and approvals;
- b) the documents forming this Contract, as altered or modified by any variations;
- c) Good and Prudent Practice;
- d) the technical specification and requirements of the Connection Agreement;
- e) the requirements to the register on the Ofgem Renewables and CHP Register and to qualify for Renewable Obligations Certificates

and shall be free and clear of all liens, charges and encumbrances of any kind.

5.4 Technical Standards and Regulations

The Contractor undertakes that the Contractor's Documents, the design, execution, installation, testing, Commissioning and completion of the Works, the remedying of defects and the Works when completed will comply with the applicable technical standards (as described in the Employer's Construction Requirements(s) the "**Applicable Standards**" and all applicable building, construction and environmental Laws' Laws applicable to the product being produced from the Works (as applicable), and other standards specified in the Employer's Construction Requirements, applicable to the Works, or defined by the applicable Laws.

Where there is any conflict between any of the standards or Laws specified in the preceding paragraph, the highest of the conflicting standards or Laws shall apply, unless otherwise agreed by the Employer in writing (as its absolute discretion).

All these Laws shall, in respect of the Works, be those prevailing when the Works are taken over by the Employer under Clause 10 (Employer's Taking Over). References in this Contract to published standards shall be understood to be references to the edition applicable on the Base Date, unless stated otherwise."

140. The Employer's Requirements include the following relevant provisions:

2.1 (*Introduction*) "The intent of the Specification is to procure for the Employer a modern, functional, well-designed solar power plant capable of continuous, efficient and reliable

operation with minimum maintenance. The equipment supplied shall be of proven robust and reliable design incorporating protective systems and devices with adequate factors of safety and maintainability built-in. ...”

2.4 (*Intended Purpose*) “The Works will comprise a solar powered power generating station with an installed generating capacity as set out in the Contract.

The Works will be connected to the existing DNO system via a new 11/33kV connection.

The Works will be:

- new, proven and safe
- designed for high availability, reliability, and efficiency
- comply with the connection agreement standards as defined by the DNO

...

- ... capable of long term continuous operation subject to actual irradiation levels during the operating life of the Works.

For the avoidance of doubt, this Section is not an exhaustive statement of the “Intended Purpose””

2.12 (*Design life*) “The Works shall be designed for a minimum operating life of a period of at least 25 years, taking full account of proximity to coastal environment and ground type (PH).”

3.2 (*General Requirements*) “...The Works shall be designed so that no single fault shall cause the failure of any duty equipment. The design shall incorporate adequate redundancy to achieve high reliability and availability incorporating redundant equipment and components with automatic startup of the standby item in the event of failure of the duty item. ...

All equipment shall be designed to permit safe shutdown on loss of electrical power supply or on loss of control equipment. The Works shall fail safe and all protection devices shall be de-energised to trip.”

4.1 (*Design and Operational Requirements*) “Electrical equipment shall:

- Comply with the “Requirements for Electrical Installations” BS7671 – 2008 and all other appropriate codes and standards.

Be designed to ensure satisfactory operation under such sudden variations of load and voltages as may be met under working conditions, including those due to starting loads, transient short circuits and internal/external fault conditions. The equipment shall be designed to withstand the specified maximum short circuit currents and duration without the temperature exceeding the value permitted for the related class of insulation. The equipment shall be considered as being operated at maximum permitted current under normal operating conditions prior to the occurrence of any short circuit current.

- Include protective relays and systems to detect all credible faults on each item of plant and equipment and their primary interconnections, and arranged so that on functioning only the faulty apparatus is removed from the circuit.
- Incorporate safety interlocking systems to ensure correct system operation, to avoid unsafe switching conditions and to ensure safe isolation for maintenance. ...”

4.4.5 (*Transformers*) “Transformers and associated equipment will comply with the requirements of IEC 60076. In addition to type testing to IEC60076 standard, Each transformer shall be routinely tested at factory prior to acceptance by the Contractor to IEC60076 standard. The tests are specified in Schedule 8.

Each transformer will be suitable in all respects to operate without injurious heating at its rated output for the maximum load curve provided by the PV System under the Site Conditions and for the transformer on any ratio operating with daily cycling. ...”

141. International Standard IEC 60076 Part 11 (“*IEC 60076-11*”) deals with dry-type transformers. Part 11 § 11 relates to temperature-rise limits and is relevant to the concept of “injurious heating”. I consider it under sub-heading (7) below. IEC 60076 Part 12 (“*IEC 60076-12*”) is entitled “*Loading guide for dry-type power transformers*”. Part 12 § 4 relates to the “*Effect of loading beyond nameplate rating*” and states:

“4.1 General

Normal life expectancy is a conventional reference basis for continuous duty under design ambient temperature and rated operating conditions. The application of a load in excess of nameplate rating and/or an ambient temperature higher than specified ambient temperatures involves a degree of risk and accelerated ageing. It is the purpose of this part of IEC 60076 to identify such risks and to indicate how, within limitations, transformers may be loaded in excess of the nameplate rating.

4.2 General consequences

The consequences of loading a transformer beyond its nameplate rating are as follows:

- the temperatures of windings, terminals, leads, tap changer and insulation increase, and can reach unacceptable levels;
- enclosure cooling is more sensitive to overload leading to a more rapid increase in insulation temperature to unacceptable levels;
- as a consequence, there will be a risk of premature failure associated with the increased currents and temperatures. This risk may be of an immediate short-term character or may come from the cumulative effect of thermal ageing of the insulation in the transformer over many years.

NOTE Another consequence of overload is an increased voltage drop in the transformer.

4.3 Effects and hazards of short-time emergency loading

The main risks, for short-time emergency loading over the specified limits, are

- critical mechanical stresses due to increased temperature, which can reach an unacceptable level causing cracks in the insulation of a cast resin transformer;
- mechanical damage in the winding due to short and repetitive current above rated current;
- mechanical damage in the winding due to short and repetitive current combined with ambient temperature higher than specified;
- deterioration of mechanical properties at higher temperature could reduce the short-circuit strength;
- reduction of dielectric strength due to elevated temperature.

As a result the maximum overcurrent is limited to 50 % over the rated nominal current.

The agreement of the manufacturer is necessary in case of overloading in excess of 50% to assess the consequences of such overloading. In any case the duration of such overloading should be kept as short as possible.

4.4 Effects of long-time emergency loading

The effects of long-time emergency loading are the following:

- cumulative thermal deterioration of the mechanical and dielectric properties of the conductor insulation will accelerate at higher temperatures. If this deterioration proceeds far enough, it reduces the lifetime of the transformer, particularly if the apparatus is subjected to system short-circuits;
- other insulation materials, as well as structural parts and the conductors, suffer increased ageing rate at higher temperature;
- the calculation rules for ageing rate and consumption of lifetime are based on considerations of loading.”

(3) Maximum load curve

142. Employer’s Requirements § 4.4.5, quoted earlier, defines the necessary transformer capacity by reference to “*the maximum load curve provided by the PV System under the Site Conditions ...*”. It appears to be common ground that the words “*load curve*” denote a “*graphical representation of the observed or expected variation of load as a function of time*”. Beyond that, however, the meaning of this phrase is a matter of controversy between the parties.
143. On its natural meaning, the phrase “*the maximum load curve provided by the PV System under the Site Conditions ...*” refers in my view to the maximum load that the PV system in fact provides. The word “*provided*” on its ordinary meaning points to actual, not theoretical, load.
144. The actual load provided by the PV system depends on a number of factors. These include not only the maximum current that the inverters are capable of producing, but also the characteristics of the system of which they form part, including (importantly) the connection to the DNO to which the power is exported. Dr Lockwood explains in his first report as follows:
- “116. As each site has in the order of 140 inverters and up to 20,000 solar panels, the complexity of analysing the electrical behaviour of the networks is beyond that which can be reliably, or efficiently, done by hand calculations. As a result, it is usual to use commercial software programs to carry out the analysis.
117. In terms of the ac electrical system behaviour, a detailed analysis of the 5 most heavily loaded sites has been carried out using a market leading power system analysis suite called “ERACS” and produced by RINA Ltd, formerly ERA Technology Ltd. The whole of the ac network was modelled including all cabling and protection devices.
118. The circuit topology and component data were entered by a company called PSE2 on my instruction. I have carried out detailed checks on the circuit topology and data entry and I confirm that they are correct.

119. The resultant network drawings, either with or without results, are too complex to be presented in this report in a useful form. However, the complete networks, including the detailed results, will be provided to the Claimants' experts following submission of this report. Anybody involved in the case can review the network topology, data, and results using viewer software available free of charge via <https://www.eracs.co.uk/demo-request>.

Power system analysis summary results

Loadflow studies

120. The general term "Loadflow" covers the steady state operation of an electrical power system. The calculation predicts the voltage profile across the network and the currents flowing in the individual components. The results allow the easy identification of any parts of the network that might be overloaded.
121. To carry out the calculations, the boundary conditions of the network are defined. The base boundary condition for the solar park studies was taken as maximum power from every inverter, at unity power factor, with the voltage at the point of connection at 100%. In other words, the base condition was for normal operation.
122. Once the base condition had been determined, variants in terms of the power factor required by the DNO and the voltage at the point of connection were explored."
145. Dr Lockwood initially carried out loadflow studies for the four most heavily loaded sites, based on the following alternative scenarios or 'cases':
- "125. For the four most heavily loaded sites the following loadflow studies were carried out:
- (1) Case 0 (base case)
 - (a) Inverters at full power.
 - (b) Unity power factor at the inverters.
 - (c) Nominal voltage (100%) at the point of connection to the DNO.
 - (2) Case 1 (realistic base case):
 - (a) Inverters at full power.

- (b) Inverter power factors adjusted to give unity power at the grid (which is different to 1(b) above since the inverters have to be adjusted to take into account for the fact that the transformers will consume Reactive Power).
 - (c) Nominal voltage (100%) at the point of connection to the DNO.
- (3) Case 2(a) (worst case scenario with a lagging power factor):
- (a) Inverters at full power.
 - (b) Inverter power factors adjusted to give power factor 0.95 lagging at the grid.
 - (c) -6% voltage (94%) at the point of connection to the DNO.
- (4) Case 2(b) (worst case scenario factoring in remedial steps taken by the operator):
- (a) Inverters at full power.
 - (b) Inverter power factors adjusted to give power factor 0.95 pf lagging at the grid.
 - (c) -6% voltage (94%) at the point of connection to the DNO.
 - (d) Transformer tap adjusted by 5%. This gives the worst case that could ever be required by the DNO but includes the appropriate remedial action by the site operator.
- (5) Case 3 (worst case scenario with a leading power factor):
- (a) Inverters at full power.
 - (b) Inverter power factors adjusted to give power factor 0.95 pf leading at the grid.
 - (c) +6% voltage (106%) at the point of connection to the DNO.”

Subsequently, Dr Lockwood presented figures for all the relevant sites in his third report and its exhibits, and these were the subject of questions and submissions during the trial.

146. In understanding these figures it is necessary to bear in mind the relationship between voltage, current and power, which in simple terms may be expressed as power = current x voltage. Thus for a given level of power, current increases as voltage decreases. Transformers are rated by reference to current. A reduction in DNO voltage necessarily leads to reduced voltage on both the high voltage and (leaving aside use of the taps discussed below) the low voltage side of the transformers. Assuming constant power, that results in increased current flowing through the transformers. Hence, in Dr Lockwood’s analysis, the ‘cases’ in which he assumes reduced voltage (down to “-6% V” or “94%”) result in higher busbar and transformer currents than arise in “normal operation”.
147. It is also necessary to recall the concept of ‘power factors’ outlined in § 86 above. It is common ground between the electrical engineering experts that, other things being equal, leading power factors tend to result in higher current through the system, including the busbars and transformers, than lagging power factors do. As Mr Ryder explains:

“For any given real power output, the highest inverter current will be given by the lowest inverter voltage. The inverter voltage depends on both the voltage at the point where the solar farm is connected to the network and also the voltage drop or voltage rise through the transformer. The voltage drop or rise through the transformer depends on the current and the power factor. The worst-case is with leading power factor, as this causes the voltage rise through the transformer meaning that the inverter output voltage must be reduced to compensate.”

That factor is also reflected in Dr Lockwood’s figures.

148. The load data exhibited to Dr Lockwood’s third report was set out individually for each solar park and (where applicable) each of the park’s two transformers, and summarised in two tables constituting Schedules 1 and 2 to that report. I reproduce Schedules 1 and 2 below:

Schedule 1 - busbars					Busbar currents					% above protection threshold				
Site	Transformer	No of Inverters	Busbar rating A	Protection Threshold for busbars	Normal operation	ML - 6% V	ML -6% V	SR -6% V	SR -6% V	Normal operation	Q1	Q2	Q3	Q4
						0.95 lagging pf -5% tap	0.95 lagging pf no tap	0.95 leading pf -5% tap	0.95 leading pf no tap		ML -6% V 0.95 lagging pf -5% tap	ML -6% V 0.95 lagging pf no tap	SR -6% V 0.95 leading pf -5% tap	SR -6% V 0.95 leading pf no tap
Cranham	1	82	4000	3900	3499	3684	3868	3735	3924					0.62%
Five Oaks	1	65	3200	3120	2774	2926	3073	2946	3094					
	2	72	3200	3120	3069	3226	3388	3265	3430		3.40%	8.59%	4.65%	9.94%
Home Farm	1	75	4000	3900	3202	3202	3202	3202	3202					
	2	64	3200	3120	2737	2889	3038	2910	3050					
Moor House	1	69	3200	3120	2942	3098	3253	3129	3288			4.26%	0.29%	5.38%
	2	68	3200	3120	2906	3062	3216	3089	3246			3.08%		4.04%
Otherton	1	66	3200	3120	2816	2956	3074	3008	3159					1.25%
Outwood	1	72	3200	3120	3077	3244	3406	3270	3434		3.97%	9.17%	4.81%	10.06%
	2	66	3200	3120	2820	2980	3129	2992	3141			0.29%		0.67%
Trowse Newton	1	74	3200	3120	3153	3314	3479	3358	3526	1.06%	6.22%	11.51%	7.63%	13.01%

	2	65	3200	3120	2779	2933	3081	2951	3099					
Widehurst	1	44	3200	3120	2258	2385	2507	2402	2525					
	2	54	3200	3120	2771	2913	3061	2958	3110					
Wilbees	1	69	3200	3120	2984	3142	3299	3175	3350		0.71%	5.74%	1.76%	7.37%
	2	70	3200	3120	2948	3106	3263	3135	3293			4.58%	0.48%	5.54%
Woodhouse	1	69	4000	3900	2949	3108	3267	3141	3301					
	2	68	4000	3900	2912	3072	3230	3101	2912					
Wrea Green	1	68	3200	3120	2900	3053	3207	3085	3242			2.79%		3.91%
	2	68	3200	3120	2906	3060	3215	3091	3248			3.04%		4.10%

2 - transformers

Site	Transformer	No of Inverters	Transformer rating A	Protection Threshold for transformer	Transformer currents					% above protection threshold				
					Normal operation	ML - 6% V 0.95 lagging pf -5% tap	ML -6% V 0.95 lagging pf no tap	SR -6% V 0.95 leading pf -5% tap	SR -6% V 0.95 leading pf no tap	Normal operation	ML - 6% V 0.95 lagging pf -5% tap	ML -6% V 0.95 lagging pf no tap	SR -6% V 0.95 leading pf -5% tap	SR -6% V 0.95 leading pf no tap
Cranham	1	82	5052	4926	3499	3684	3868	3735	3924					
Five Oaks	1	65	3233	3152	2774	2926	3073	2946	3094					
	2	72	3233	3152	3069	3226	3388	3265	3430		2.34%	7.48%	3.57%	8.81%
Home Farm	1	75	4041	3940	3202	3202	3202	3202	3202					
	2	64	3233	3152	2737	2889	3038	2910	3050					
Moor House	1	69	3233	3152	2942	3098	3253	3129	3288			3.19%		4.30%
	2	68	3233	3152	2906	3062	3216	3089	3246			2.02%		2.97%
Otherton	1	66	3233	3152	2816	2956	3074	3008	3159					0.21%
Outwood	1	72	3233	3152	3077	3244	3406	3270	3434		2.91%	8.05%	3.73%	8.94%
	2	66	3233	3152	2820	2980	3129	2992	3141					
Trowse Newton	1	74	3233	3152	3153	3314	3479	3358	3526	0.02%	5.13%	10.36%	6.52%	11.85%
	2	65	3233	3152	2779	2933	3081	2951	3099					
Widehurst	1	44	3233	3152	2258	2385	2507	2402	2525					
	2	54	3233	3152	2771	2913	3061	2958	3110					
Wilbees	1	69	3233	3152	2984	3142	3299	3175	3350			4.65%	0.72%	6.27%
	2	70	3233	3152	2948	3106	3263	3135	3293			3.51%		4.46%
Woodhouse	1	69	4041	3940	2949	3108	3267	3141	3301					
	2	68	4041	3940	2912	3072	3230	3101	2912					
Wrea Green	1	68	3233	3152	2900	3053	3207	3085	3242			1.73%		2.84%
	2	68	3233	3152	2906	3060	3215	3091	3248			1.99%		3.03%

For ease of reference, I have added the annotations “Q1”, “Q2”, “Q3” and “Q4” into certain column headings, reflecting terminology used at trial, in order to denote the variants from “normal operation” (nominal voltage and unity power factor) that Dr Lockwood has considered.

149. The Claimants submit, however, that the relevant criterion is not the loads calculated as set out above, but rather the *maximum* current that the inverters – from which current flows to the busbars and transformers – could possibly provide, as indicated on their respective data-sheets. The Claimants identify six reasons for that proposition, which I consider in turn.
150. First, the Claimants submit that the sentence “*The equipment shall be considered as being operated at maximum permitted current under normal operating conditions prior to the occurrence of any short circuit current*” in Employer’s Requirements § 4.1 means that the transformers should be able to handle the maximum current which the inverters are in theory able to produce. I do not accept that submission. Clause 4.1 and the standard to which it refers relate to the ability of individual electrical components to deal with short circuit currents and other variations of load and voltage. The “*permitted current*” in that context must refer to each component’s own maximum current capabilities. These provisions are not relevant to the question of how much current the transformers at these solar parks will receive from the inverters: that matter is specifically legislated for in § 4.4.5.
151. Secondly, the Claimants make the point that the equipment data-sheets provided by the inverter manufacturers state essentially two values: the maximum inverter current and the rated output current. Any solar park designer would be expected to have to hand the various equipment data-sheets, along with the EPC Contract requirements and the stipulations of the DNO Connection Agreements. Dr Lockwood accepted that solar farm designers do not necessarily use ERACS power system analysis software or equivalent, and that the whole point of the standards and formulae and explanations is for design to be possible without software intervention. Dr Lockwood accepted he has never himself *designed* a transformer (other than of a very small type which he accepts is irrelevant for present purposes). The Claimants have also made the general point that Wirsol disclosed few documents relating to the design process for the solar parks.
152. The Claimants accordingly submit that:
- “[Dr Lockwood]’s approach offers nothing to assist in relation to design methodology. It is very much an after the fact assessment of capacity and provides no assistance as to how a transformer designer, without the benefit of software intervention with its data-base behind it, and without knowledge of the performance behaviour of the network beyond the parameters stipulated in the Connection Agreements would actually go about carrying out design. Putting matters another way there is no evidence from Dr Lockwood as to how the ordinary solar farm designer (without ERACS and without a performance history of the solar farms) would be able to identify, let alone take into account, the performance behaviour of the network beyond the stipulations set out in the Connection Agreements.”
153. In my judgment the Claimants’ approach is incorrect. The key obligation is that set out in Employer’s Requirements § 4.4.5, which sets out an objective criterion by reference to “*the maximum load curve provided by the PV System*”. Dr Lockwood’s methodology sets out to provide an accurate calculation of that load curve. The fact

(assuming it to be a fact) that a typical solar park designer would not have access to software that would enable it to perform an accurate calculation is neither here nor there. It cannot result in an increase in the contractually required capacity of the transformers. Nor does the obligation to “*design, execute, install, test, Commission and complete the Works in accordance with this Contract ... in accordance with Good and Prudent Practice*” (Conditions of Contract § 4.1(a)) entail an obligation, by reason of the limitations of standard design processes, to use transformers with a capacity greater than that required by the specific requirements of Employer’s Requirements § 4.4.5.

154. I also note that the Claimants’ expert, Mr Halliday, agreed in cross-examination that Dr Lockwood’s approach – viz to analyse the constraints imposed by the power factors and the connection agreement and the number of solar panels and so on – is correct in principle.

155. Thirdly, the Claimants submit that the maximum inverter current is stipulated by the inverter manufacturer as being the correct approach to design. An engineer, Richard Horan, who at various times worked for the Defendants and the Claimants approached Huawei, the exclusive manufacturer of inverters across all sites save for Balcombe, on 23- 24 April 2019 as follows:

“[Q] For rating the equipment between the inverter and the grid should we be using a current of 48A or 43.3A? Are we right to assume 43.3A is the guaranteed figure for a fixed set of conditions but the current could be up to 48A depending on temperature, power factor etc?”

“[A] You should take into consideration the maximum output current which is 48A.”

Wirsol subsequently contacted Huawei about whether the maximum output current stated by the manufacturer could ever be exceeded, but did not seek clarification or qualification of the above communication.

156. I agree with the Defendants that Huawei’s somewhat equivocal recommendation to “*take into consideration*” the 48A figure does not assist the argument. Huawei had no knowledge of, and were not asked to consider, the particular circumstances and potential output of the solar parks in issue. As Dr Lockwood put it in cross-examination:

“That’s what the email says and it’s what any manufacturer would say in the absence of knowledge of the application. If an inverter’s got capability of 48 amps in specification terms, but is put into an application where it can’t reach 48 amps, the application dominates, not what the manufacturer says in terms of the maximum.”

157. Similarly, Mr Halliday’s evidence was as follows:

“Q. So in determining what the solar park’s relevant maximum capacity is you need to look at its characteristics including as we

discussed the layout of the park, the number of panels and the DNO connection agreement?

A. I would say the way – having been involved in a number of renewable projects and doing design of the infrastructure, the size of your infrastructure, you effectively take your connected power, the maximum power the solar farm or wind farm can produce and you calculate that at point 94 volts and point 95 power factor and that’s the worst-case that you have to design for, that’s the worst case of the conditions you need to comply with and if you do that your infrastructure will be sized correctly.”

158. Fourthly, the Claimants suggest that “[a]ll engineers with any transformer design or related experience say that it is the correct approach”. They refer to the views of Mr Ryder, which I consider below. In addition, the Claimants suggest that the engineers at Wirsol and independent engineers contemporaneously all proceeded on the basis that the proper assessment of capacity involved taking into consideration the maximum output current of the inverters stipulated by the manufacturer: Mr Turner, Mr Smith, Mr Van Wyk, 33kV Ltd (Wirsol’s technical advisers) and Low Carbon, all used 48A when assessing that the transformers lacked capacity.
159. I do not accept that submission. None of the email communications relied on by the Claimants contained or purported to contain any kind of considered analysis of the actual output of the PV system in operation. Their choice to have regard to maximum inverter current for their own practical purposes cannot be conclusive, or even necessarily enlightening, as to the effect of the specific requirements of Employer’s Requirements § 4.4.5. Nor does anything in the 33kV report (which Mr Ryder also cites on this point) contain any suggestion that the actual output of the PV system, in operation and connected to the DNO network, will equate to the maximum inverter current. (See further § 293.ix) below regarding 33kV Ltd’s field of expertise.) Similarly, the email of 23 May 2017 from Will Blackler of Low Carbon, which the Claimants cite, refers to Employer’s Requirements § 4.4.5 and states: “*The inverters are currently being capped as the transformers are not able to take the rated maximum output for the ‘PV System’, and is so therefore a defect that is under the EPC liabilities*”. That does not amount to a statement that, as a matter of fact, the maximum load curve produced by the PV system equates to the maximum output of the inverters. If and insofar as it might suggest that the latter output is what matters for the purposes of § 4.4.5, it is not more than an opinion on a question of law. On this point generally, I accept the following evidence given by Dr Lockwood in cross-examination:

“Q. So bearing in mind the information you now know, the internal considerations by Wirsol’s design engineering, in particular Mr Turner, what Huawei say, and your own work most recently this month, would you accept that a good and prudent practice or a conservative good and prudent practice would design on the basis of 48 amps supplied from the inverters?”

A. Not just on that one figure with that analysis, no, I would not accept it.

Q. Do you accept at least that that is one of the design approaches that is valid for an ordinarily competent engineer to take into account?

A. I wouldn't call it a good and prudent approach, no.

Q. Why not? It's the approach that all the Wirsol engineers referred to at the time when analysing the transformers.

A. It doesn't include looking at the whole site."

160. Fifthly, the Claimants and Mr Ryder suggest that operational experience at the sites shows that the use of the maximum output is "*the correct input when carrying out the design*". They cite two examples.
161. The first example comprises current monitoring data at Eckland Lodge between 1 April and 6 July 2020. Mr Ryder states in his second report that the measured current reached or exceeded the inverter maximum current for 60 of the 100 inverters (48A) and the highest inverter current measured was 49.1A. In his third report, Mr Ryder inferred from the fact that Eckland Lodge operates at 0.98 leading power factor, and the measured current of 49.1A, that network voltage must have been "*substantially below nominal, and likely close to the lower limit*" (a point relevant to the power factor issue considered below). Mr Ryder provided the data to the Defendants only in the form of a graph, though he confirmed in cross-examination that he had seen and checked the underlying records. Mr Ryder also demonstrated, in his third report, that the levels of the current measurement could be correlated with data for weather conditions at the two nearest Met Office weather observation locations.
162. However, Mr Ryder also said in cross-examination that he did not know exactly what measuring devices were used to make the inverter current readings. It was suggested to him that the data could not be gathered by the system as installed, so there must have been a manual attempt to gather it. Mr Ryder was unable to help on that point. Mr Ryder agreed that the relevant (Huawei) inverters have a hard limit on current export of 48A. He saw two possibilities: one was that there was some tolerance in the measuring system, and the other was that there was some tolerance in the 48A hard limit. Mr Ryder said he went back to Huawei and tried to check what the tolerance on the 48A limit was, but Huawei did not provide any information on that; Mr Ryder said he was therefore not really able to say which of the two possibilities applied. Mr Ryder accepted that the inverter data sheets indicated a 48A maximum, but noted that they did not state whether there was any tolerance on that figure.
163. Dr Lockwood's evidence was that the data was wrong. He said in re-examination:
- "It's specified in terms of it's a hard limit in the specification and when you look at the manual it indicates that the limit is 48 amps. Modern power electronic equipment is very, very sensitive to over-currents, and the manufacturers are very careful to prevent such hard current limits being exceeded."
164. Based on this evidence, taken together, I conclude that the measurements taken at Eckland Lodge indicating current above 48A were probably inaccurate. That, taken

together with the lack of information about the nature of the measuring process undertaken, leads me further to conclude that the Eckland Lodge measurements do not form a reliable basis on which to conclude that the maximum load curve should be equated to the inverters' maximum output, or on which to doubt Dr Lockwood's loadflow calculation methodology or results.

165. The second example concerns an event at Widehurst on 5 April 2018 where TX2 tripped. The site outage report recorded that the currents supplied by the three phases were 3096A, 3089A and 3096A. There were 54 inverters feeding the substation and transformer, so the average inverter current at the point of tripping was 57.3A, which is very close to the 57.8A maximum inverter current specified by the manufacturer.

166. The Widehurst site operated at a 0.98 leading power factor. Mr Ryder in his third report said:

“32. In my original expert report (item 1, paragraph 76 [G/3/23]), I analysed the report of a trip of transformer 2 at Widehurst solar farm at 13h30 on 5 April 2018. The measured busbar current at the time of the trip was 3096A on two phases and 3089A on the third phase. There are a total of 54 Huawei 36KTL inverters connected to transformer 2. It would follow that the average current per inverter was 57.3A.

33. Calculations using the methods set out by Mr Halladay in paragraph 5.3.1 [G/2/27] and appendix 3 [G/2/73] of his expert report suggest that for the trip to have taken place it would have required the network voltage at Widehurst to be substantially below nominal, and likely close to the lower limit, for 4 to 5 minutes.”

167. Dr Lockwood's loadflow calculations for Widehurst TX2 indicate that a current of 57.3A would be reached only if the grid approached a situation where it required a power factor of 0.95 leading at a voltage 6% below nominal. Dr Lockwood calculated that if that situation were actually reached, the inverter current would be 57.6A, but it is a situation which Dr Lockwood considers should never happen in practice (see subsection (4) below). On his approach, the realistic worst case would be 0.95 lagging power factor with voltage 6% below nominal, with no use of the transformer taps, resulting in an inverter current of 56.7A.

168. Dr Lockwood was then asked about the Widehurst outage report, leading to the following exchanges:

“Q. Now here obviously we have inverter current of 57.3 amps. That's the average current at the time of tripping.

A. Yes.

Q. So in those circumstances, Dr Lockwood, either case Q4 is in play, which is up to 57.6 amps; yes?

A. Go ahead.

Q. Or your model is wrong and the values stated in here are understated.

A. Or there's another difference and the inverters at Widehurst have a slightly different control strategy I understand than the ones in the other sites.

Q. But you have presumably taken that into account in providing the outputs for this model?

A. I didn't look at -- as these are steady state I must admit I did not take that into account in calculating these numbers.

Q. So you would accept that at least so far as Widehurst is concerned, this calculation fails to take into account a relevant factor?

A. Failed to take into account a relevant factor ... yes.

Q. But it also demonstrates, doesn't it, this particular outage, that the maximum inverter current does get indeed very close to the maximum that is specified on the datasheet by Huawei?

A. On this condition -- on this day, yes, it did.

Q. And so any prudent designer would need to take into account and base its design on the maximum current specified by Huawei, as indeed Huawei have said?

A. Either that, or use clipping or something similar to prevent these very exceptional circumstances from causing over currents. My understanding is that it didn't actually get to the limit, and the tripping stopped when they readjusted the protection settings.

Q. But you accept that it got very close to the maximum inverter current on 5 April 2018?

A. Yes, I do.

Q. And that ought to have been reflected in the design, oughtn't it?

A. The logic follows it should be considered in the design, yes.

Q. And so we are -- and if you did the recalculations, we would be in the territory of case Q4 even if not quite at Q4?

A. What we don't know about the conditions on that day was the network voltage and the network voltage could have been very low on that day.

Q. Yes, but indeed you provide for that in your cases, in all four of your alternative cases that is exactly the scenario that you are considering?

A. Yes, true.”

169. However, the questioning returned to Widehurst a little later after a discussion of Eckland Lodge:

“Q. Taking all of that into account, in particular the Widehurst experience –

...

Q. Taking all of these points into account, do you accept now on reflection that good ordinary design practice is to use the maximum inverter current as the basis of design and therefore to assess whether the proposed transformers have adequate capacity?

A. As I've clearly indicated, the last piece of evidence I do not think is at all relevant. So taking everything that you've said into account, that would negate that point.”

and finally:

“Q. Can I ask you, we discussed Widehurst already, Widehurst requires a leading power factor of 0.98 lead.

A. Yes.

Q. And we explored, didn't we, the scenario which took place at tripping on 5 April 2018?

A. Yes.

...

Q. So in those circumstances, you remember we looked at the average amps per inverter being at 57.3 amps?

A. Yes.

Q. So turning to your schedule 2, one has to be in a scenario where there is a leading power factor in fact in the fifth column and the final column of your schedule, G/33/2.

A. Either that or the voltage fell at that time.

Q. Well, the voltage must be very low, I think you accepted that, in order to be at the scenario where the current from the amps is at that figure. It will only be in that scenario.

A. Yes.”

170. It is evident from these exchanges that Dr Lockwood accepted the general proposition that the fact that the Widehurst current on 5 April 2018 got very close to the maximum inverter current ought to have been considered in the design. It is not clear, though, precisely how it would be so considered, bearing in mind that on Mr Ryder’s evidence these were circumstances that prevailed for “4 to 5 minutes” on one day, and on Dr Lockwood’s evidence were “*very exceptional circumstances*” that may have resulted from temporarily very low voltage.
171. The Claimants submit that Dr Lockwood, during this cross-examination, accepted that any prudent designer would need to base its design on the maximum current specified by the inverter manufacturer, or clip to prevent overcurrents. I do not agree. In my view it is clear from Dr Lockwood’s evidence as a whole, including the passages quoted in §§ 156, 159, 163 and 170 above, that he did not consider the maximum inverter current to be the appropriate reference point. Further, he made reference to clipping (changing a setting so as to reduce the power flowing from the inverters to the transformer), but did not suggest that clipping would be necessary as a matter of standard practice. In essence, he regarded this a very unusual event. That is in my view borne out by the fact that (leaving aside the inaccurate Eckland Lodge measurements referred to above), this one brief event at one particular site, Widehurst, lasting a matter of minutes on one day during a period of several years, is the only one capable of lending any support to the Claimants’ hypothesis.
172. The Claimants also submit that Dr Lockwood accepted that either his model is wrong or his final case Q4 “*must have application*”. However, all that Dr Lockwood accepted was that, in the exceptional circumstances that occurred for a few minutes at Widehurst on 5 April 2018, there was a very low voltage at a site with a leading power factor of 0.98 leading. I do not consider that any more general conclusions can be drawn from this event, or were accepted by Dr Lockwood. I agree with the Defendants that the evidence indicates that the Widehurst trip event is a one-off example whereby a site operating at 0.98 leading power factor may have experienced a dip in voltage below nominal (to an unspecified degree). It does not suggest that a 0.95 leading power factor could be established and/or requested where voltage is 94% of nominal.
173. Sixthly, the Claimants submit that Dr Lockwood’s analysis supports the use of the maximum inverter current as the correct design criterion. The Q4 ‘worst cases’ set out in the tables annexed to Dr Lockwood’s third report all have as an input inverter currents within decimal points of the maximum inverter current specified by the manufacturer. Thus, the Claimants say, if the Q4 ‘worst case’ applies, as it must for Widehurst, that is near enough to the maximum inverter current specified by the manufacturer to confirm that the maximum inverter current must be used in any ordinary conservative design process. I do not accept that reasoning. I do not accept that Q4 can be of general application – see section (4) below – and for the reasons explained above, I do not consider that any generalised conclusions can be drawn from the incident at Widehurst on 5 April 2018.

174. Mr Ryder produced theoretical design calculations indicating that the maximum inverter currents could be approached, at the most unfavourable combination of voltage and power factor provided for by the Connection Agreements. His first report appended calculations said to show that maximum inverter current “*will likely be reached*” at a 0.95 leading power factor and 94% of nominal voltage; and his second report appended corrected calculations which he states “*suggests that it is possible to approach or reach inverter maximum current*” in those circumstances. Mr Ryder’s analysis produces figures for inverter voltage and inverter power factor close to those produced by Dr Lockwood’s calculations. For the inverters used at all the relevant sites other than Widehurst, Mr Ryder’s figures imply an inverter current of 47.8A when operating at 94% of nominal voltage and 0.95 leading power factor. Mr Ryder states that Dr Lockwood’s analysis suggests an average inverter current of 47.6A when operating under the same conditions. For the Widehurst inverter, Mr Ryder’s analysis suggests an inverter current of 57.4A under these conditions, compared to 57.5A according to Dr Lockwood’s analysis. The closeness of the figures tends to support the view that Dr Lockwood’s detailed calculations are likely to be soundly based in principle and accurate.
175. Mr Ryder’s calculations included some rounding up, and he accepted in cross-examination that his analysis was slightly simpler than Dr Lockwood’s. In addition, Mr Ryder had taken a figure of 0.9% for cable losses, that being in fact a figure put forward by Mr Hogan for total cable losses in aggregate over the year rather than cable losses at peak output (which is what matters for present purposes). For present purposes, the higher figure of 1.5% is preferable, and Mr Ryder did not appear to contest this. Mr Ryder suggested that the current might be higher than his calculations would suggest, and could reach the inverter maximum current, if the solar park were connected to the network via a long cable, and at farms where the transformers were loaded at less than rated power (reducing transformer impedance). However, Mr Ryder accepted that the cable length point was slightly speculative; and the transformer impedance point is not relevant for present purposes, since the present issue concerns the position where the transformers are fully loaded.
176. For all the reasons set out above, I conclude that Dr Lockwood’s calculations, as set out in Schedules 1 and 2 quoted above and in his supporting site-by-site tables, provide the most reliable and accurate measure of the current that the PV systems will produce in the various circumstances he identifies. I do not accept the Claimants’ submission that one should instead simply use the maximum current that the inverters (taken in isolation) are capable of producing.

(4) Relevant combinations of voltage and power factor

177. The parties disagree about whether the relevant ‘worst case’ scenario in terms of load is:
- i) as the Claimants submit, case Q3/Q4 in Dr Lockwood’s tables, i.e. voltage 6% below nominal and 0.95 leading power factor, or
 - ii) as the Defendants submit, case Q1/Q2 in Dr Lockwood’s tables, i.e. voltage 6% below nominal and 0.95 lagging power factor.

178. Dr Lockwood's evidence is that the combination of voltage 6% below nominal and 0.95 leading power factor is something which the DNO would never in practice request under the Connection Agreement, because (in simple terms) exporting to the network with a leading power factor would exacerbate the problem of the low voltage and tend to push it even lower. He explains the background to, and reasons for, this view in the following paragraphs of his first report, which it is necessary to set out in full:

“Overview of the U.K.’s electrical infrastructure

61. The U.K.’s electrical infrastructure has evolved over many decades and comprises:
- (1) Major sites of power generation from fossil and nuclear fuels.
 - (2) A national high voltage transmission network (i.e. the National Grid).
 - (3) Regional electrical distribution companies currently called distribution network operators (“DNOs”).
 - (4) The introduction of small renewable generation sites, such as wind and solar.
62. The introduction of small renewable generation sites is a recent development. For cost, geographical, and technical reasons, generally these sites are not connected directly to the National Grid but are embedded in the medium and low voltage networks operated by the DNOs.
63. The connection of a renewable energy site in a DNO network gives rise to serious operational and safety issues. It can also affect the DNO’s ability to satisfy its own regulatory obligations. As such, the connection of a renewable generation site, such as a solar park, is governed by a set of strong regulations and requirements.

DNOs

64. The DNO has an obligation to ensure that other customers connected to their network do not suffer damage to their installations nor unacceptable disturbances to their electrical supplies. Such damage or disturbances can be caused through fluctuating voltages. Whilst voltages constantly fluctuate, significant fluctuations are problematic for the safe operation of the network. Therefore, the DNOs have a responsibility to ensure that the voltage in their network is within plus and minus 6% of its nominal value

(Electricity Safety, Quality and Continuity Regulations (ESQCR).

65. There is a mismatch between the standards applying to DNOs, and the standard covering the voltage capability of transformers. The relevant standard for transformers is IEC 60076-11 (clause 8.4) which says that a transformer shall be capable of service without damage of overvoltage by no more than 5%. However, for the purposes of this report, I have applied the 6% figure.
66. In order to manage the potentially disruptive effects of having a solar generation site connected in the network, the DNOs impose rules and requirements on the site operation under the terms of a connection agreement.
67. Connection agreements have standard forms and content. By way of example, the connection agreement for the Outwood site is exhibited at Schedule 4.

Generation, transmission, and distribution of electricity

68. For technical and commercial reasons, the bulk of electrical power is generated, transmitted, and distributed in the form of alternating current (ac) rather than direct current (dc).
69. In dc systems the calculation of power is simply voltage multiplied by current.
70. The calculation of power is more complex in ac systems due to the ‘tidal’ flow of energy into electrostatic and electromagnetic storage in the load network. That causes the “**Apparent Power**” calculated by voltage multiplied by current to be greater than the actual useful power transmitted, termed “**Real Power**”. There are differences between the Apparent Power and the Real Power in both amplitude and timing of the waveform peaks. The differences are termed “**Reactive Power**”. Averaged out, there is no net energy transferred via Reactive Power, only via Real Power.
71. A widely used parameter for describing the behaviour of an ac electrical system is “power factor” (abbreviation “**pf**”) which is simply the ratio of the Real Power divided by the Apparent Power.
72. It follows that the current in the network is related to the Apparent Power and voltage. The electrical power losses in the network are a square function of the current. This means that a low power factor implies

reduced efficiency in the network and increased heating in current carrying components such as cables, transformers, and busbars.

73. In order to limit the variation to voltage in the network, all the connection agreements specify a default power factor at the point of connection to the DNO network. The default values stated in the connection agreements of the sites in this case vary a little but all are specified as unity or near to unity.
74. A power factor of 1 (unity) means that the site does not create Reactive Power, nor does it absorb Reactive Power.
75. If unity is not achieved, power factors can be positive or negative. The terms ‘lagging’ (for positive power factors) and ‘leading’ (for negative power factors) are often used but that can lead to some confusion. In places in this report, I will refer to the generation site ‘exporting’ Reactive Power and ‘importing’ Reactive Power as that helps to indicate the critical point of the effect on network voltage.
76. A generation site exporting Reactive Power (lagging power factor) tends to increase the voltage at the point of connection to the DNO network and a generation site importing Reactive Power (leading power factor) tends to reduce the voltage.
77. As the power factor of the energy generated by the solar park is so critical in affecting the voltage at the point of coupling, the connection agreements contain, by reference to the ‘National Terms of Connection’, high and low bounds by which the DNO can instruct the site to change the default power factor anywhere through a range from 0.95 lagging (exporting) to 0.95 leading (importing).
- ...
79. In the context of this section, it is sufficient to know that exporting Reactive Power (lagging generation power factor) has the effect of increasing the network voltage and importing Reactive Power (leading power factor) has the effect of reducing the network voltage. Therefore, if the voltage at the point of coupling was low for some reason, the DNO might instruct the generation site to have a lagging power factor of up to 0.95 to help boost the local voltage. Similarly, if the voltage at the point of coupling was high for some

reason, the DNO might instruct the generation site to have a leading power factor of up to 0.95 to help reduce the local over voltage.

...

G59 and G99

82. The Energy Networks Association set out the requirements with which generator sites must comply when connected to a DNO.
83. The version current at the time the sites in this case were designed and constructed was Engineering Recommendation G59 (Issue 3, Amendment 2, September 2015 entitled ‘Recommendations for the connection of generating plant to the distribution systems of licensed distribution network operators’).
84. The recommendations were updated in 2019 and the current version is Engineering Recommendation G99, Issue 1 (Amendment 6, March 2020, ‘Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019’).
85. G59 is explicit that at extreme voltages, the power factor should be within the range of +/- 0.95 but not the actual power factor (clause 9.3.7). However, it lacks clarity on the voltage levels at which the DNO can require the extreme power factors of +/- 0.95.
86. G99 is much more explicit and codifies the practices that were carried out under G59. G99 identifies 4 generation types. All of the sites in this case are of Type B having a capacity of 1 MW or greater but less than 10 MW. Table D.4 of G99 summarises the power factor requirements for Type B generation sites. It says “*Must be capable of continuous operation anywhere within the range ± 0.95 Power Factor at Registered Capacity*” but indicates that is with respect to a voltage range of “*Nominal voltage only*”. That clearly indicates that the requirement to run at the extremes of power factor does not apply when the voltage is significantly different from the nominal (100%) voltage.
87. Type C generators are defined as being between 10 MW but less than 50 MW. They have the same range of power factors as the smaller, Type B generators, but that range can be required over a wider voltage range.

88. The power factor requirements for this class of generator connected at 33 kV or below like the solar parks in this case are set out in clause 13.5.5 in the form of figure 13.2 reproduced below.

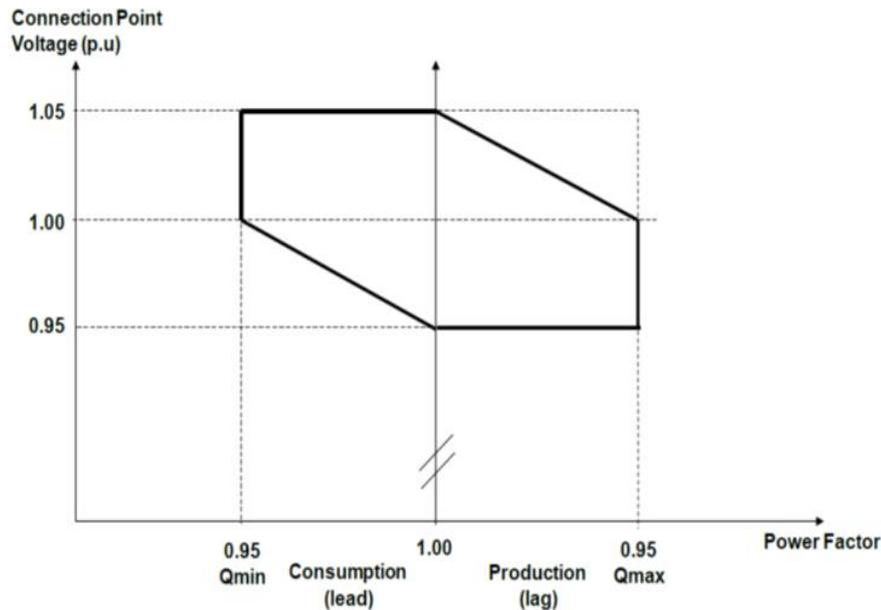


Figure 1 : Figure 13.12 of G99 – “Reactive Power capability requirements (Power Park Mod-ules operating at Registered Capacity, voltage at or below 33 kV)”

89. It is noteworthy that the voltage limits in G99 as illustrated in the figure are +/- 5% rather than the statutory limits on voltage of +/- 6%. The difference is related to the fact the anomalies between the supply regulations and the standards for equipment such as transformers. It illustrates that the 6% figures are the extreme limits and there would never be a requirement for sustained operation at the limits.
90. The diagram also illustrates that the DNO would not allow a lagging power factor when the voltage was higher than nominal nor allow a leading power factor when the voltage was below nominal. Therefore, it would not permit a power factor of 0.95 leading with an undervoltage of 5%, or 0.95 lagging with an overvoltage of 5%. This is important in the context of this case for the reasons I will come on to explain below.”
179. Mr Ryder in his second report does not appear to take issue with Dr Lockwood’s explanation for why, as a matter of electrical engineering, the DNO would never ask for 0.95 leading power factor in combination with voltage 6% below nominal. He indicates that he cannot agree with Dr Lockwood “*as this combination of voltage and power factor falls within the range required by the Connection Agreement*”.

180. The Connection Agreement for Five Oaks, for example, states:

“The Customer is required to operate the generation plant in a constant power factor mode within the range 0.95 lead to 0.95 lag.

To cater for times where there is an operational need [the DNO] and National Grid plc. reserve the right to request you to operate at a specific power factor that are within the capability of your plant.”

The Connection Agreements for Eckland Lodge, Home Farm, Moorhouse, Otherton, Widehurst and Woodhouse require 0.98 leading power factor as the default.

181. Mr Ryder was asked about this topic in cross-examination:

“Q. Well, let’s come to the terms in a moment but as a practical matter you’ve never seen a voltage network operating at 94 per cent of nominal where the DNO requested a leading power factor of point 95, have you?

A. There is operational experience, my Lord, that suggests that two of the solar farms which are operating at point 98 lead are experiencing voltage significantly below nominal.

Q. We’ll come to those, don’t worry. But just as a sequencing point I think what you are saying is they were operating at point 98 lead, not point 95 and in fact experienced voltage below nominal, but if the DNO’s network is operating below nominal, say it operates on average at 97 per cent, the DNO is not then going to request a leading power factor, is it, because that would make the current situation worse not better?

A. The DNO, my Lord, are entitled to do so under the terms of the connection agreements.

Q. But you’ve never seen it done?

A. I’m afraid I can’t recall.”

182. The operational experience referred to in the first answer quoted above was the incidents at Eckland Lodge and Widehurst which I discuss above. For the reasons given there, I do not consider that any generalised conclusions can be drawn from them. Briefly, the Eckland Lodge readings are likely to have been inaccurate; and the Widehurst episode (assuming the readings to have been accurate in that case) does not establish more than that a site operating on a 0.98 leading power factor was for a period of a few minutes on a particular day experiencing low network voltage.

183. Mr Ryder was also asked about the code of practice G99 to which Dr Lockwood referred in §§ 84-88 of his first report, quoted above. He made the point that G99 does not apply retrospectively. In response to the suggestion that G99 simply spells out and codifies what everyone in the industry always understood applied, he referred to

changes in “*the structure of the industry, the way power flows through the networks, the way power is used and the way power is generated*” during the period between the publication of G59 and G99. However, he did not identify any specific changes that would have changed the relationship between power factors, or the use thereof, and voltage.

184. There is no evidence of any of the sites ever having experienced the combination of voltage 6% below nominal and 0.95 leading power factor; nor of any sustained period of both significantly low voltage and leading power factor.
185. I conclude that, for the reasons Dr Lockwood gives, the combination of 0.95 leading power factor and voltage 6% below nominal is not one that any DNO would in practice ask for. The circumstances in which a leading power factor would be sought are inconsistent with network voltage 6% below (or otherwise significantly below) nominal.
186. So far as concerns the terms of the Connection Agreement:
- i) The facility for the DNO to ask for a specific power factor arises at “*times where there is an operational need*”. The evidence does not suggest there could be any circumstances in which a DNO would have an operational need for a 0.95 power factor when voltage was 6% below nominal.
 - ii) In any event, the “*the maximum load curve provided by the PV System*” within Employer’s Requirements § 4.4.5 is, in my view, the load curve actually provided, not that which could in theory be provided in circumstances that in reality will never arise.
187. As a result, the ‘worst case’ combination for the purposes of assessing the capacity of the transformers and busbars is voltage 6% below nominal and 0.95 lagging power factor.

(5) Voltage variations and use of transformer taps

188. Each of the transformers has taps which can be used to vary the number of turns in the HV winding by plus or minus 5% in steps of 2.5%. This has the effect of changing the ratio between the input and output voltage of the transformer. The tap connection is changed by moving a bolted link on the exterior of the transformer, which requires the substation to be disconnected and a safe system of work put in place. The taps enable the transformer to respond to changes in the HV side, i.e. the voltage of the network to which it is connected, whilst keeping the LV side (here, the supply of power from the inverters to the transformer) closer to its pre-existing level.
189. Employer's Requirements § 4.4.5, quoted earlier, requires each transformer to be able to operate “*without injurious heating at its rated output for the maximum load curve provided by the PV System under the Site Conditions and for the transformer on any ratio operating with daily cycling*” (my emphasis).
190. Dr Lockwood considers the words “*on any ratio*” to refer to the transformer turns ratio, which depends on which (if any) of the tap settings is being used. Mr Ryder considers them to refer to the voltage ratio, i.e. the ratio between the input and output voltage.

The voltage ratio and the turns ratio are the same when the transformer is not loaded. When the transformer is loaded, the two may differ, because of the effect of transformer impedance, with differences between larger at higher loads. Neither party put forward any basis on which this particular difference of view matters, nor sought to quantify the difference.

191. If “*on any ratio*” means on any tap setting, then one conceivable reading of § 4.4.5 could be that the transformer is to operate with any turns ratio, i.e. on any tap setting, even if that setting would be inappropriate for the prevailing conditions: for example, using the +5% tap at times of sustained low network voltage, when the -5% (if anything) would be appropriate. In fact, a similar point could arise even if “*on any ratio*” refers to the voltage ratio, since that ratio is itself closely linked to (even if it can differ from) the tap setting. Either way, the clause in my view clearly cannot have that meaning. It would be absurd to require the transformer to operate on an inappropriate tap setting. Rather, the effect of § 4.4.5 in my view is that the transformer must be able to operate in accordance with the other stipulations of the clause (without injurious heating at its rated output for the maximum load curve provided by the PV System under the Site Conditions operating with daily cycling) on whatever tap setting the network conditions make it appropriate to use. Thus, for example, if network voltage conditions make it appropriate to use the -5% tap setting, then the transformer must be suitable for operation on that setting in accordance with the other stipulations of § 4.4.5.
192. Dr Lockwood in a report in September 2015 relating to a very similar transformer expressed the view that “*Tap connections are the single biggest cause of failure in transformers and rarely serve a useful purpose*”. He elaborated on this view in his oral evidence in the present case:

“Q. But going back to this issue of changing of taps, I think what you are saying is it's only in the circumstances of longer term variations as you describe them that you might change the taps?

A. Longer term variations within the plus or minus 6 per cent, which is part of a connection agreement.

Q. Your view on taps more generally is that their use should be avoided, isn't it?

A. It is.

Q. And perhaps we could go to --

A. Sorry can I qualify that?

Q. While you are qualifying could we get up K11/2043.

A. If you have taps on a transformer you can use them in my view, you might as well. Because all of the risks of having a transformer with taps are physical risks within the transformer. Taps add complication to the design and in particular to the construction of transformers, and I have been saying for a long time it will be best if systems were designed, particularly in the

UK where the voltage hardly ever varies, transformers should be designed without taps to avoid the reliability and complexity issues that come with having transformers with taps.

Q. Yes, your view is that you should really try to avoid these use of manual taps --

A. Not the use --

Q. -- as much as possible.

A. If you've got them use them. If you are designing a system if at all possible design the need for them out.

Q. And that's because tap connections are the single biggest cause of failure in transformers?

A. That's widely accepted.

Q. They rarely serve a useful purpose?

A. In the UK they rarely serve a useful purpose.”

193. Dr Lockwood agreed that it is not appropriate to use the transformer taps to address short-term variations in voltage occurring over the course of an hour, a day or a week. However, he considered that they could appropriately be used for sustained variations in voltage.
194. Mr Ryder expressed the view in his first report that using the -2.5% tap, and especially the -5% tap, would not be in accordance with good and prudent practice, because it would increase the risk of exceeding the limits on over-excitation set out in IEC 60076-1 § 5.4.3. That paragraph requires transformers to be capable of continuous operation at no load with 110% of rated excitation (voltage divided by frequency), or at rated power with 105% of rated excitation. Assuming constant frequency, this is equivalent to continuous operation at no load with 110% of rated voltage or at rated power with 105% of rated voltage.
195. Dr Lockwood pointed out, however, that the -5% tap would be used in conditions of sustained low network voltage, particularly the extreme of 94% of nominal voltage envisaged by the Connection Agreements. In those circumstances it is very unlikely that voltage could rise as high as to exceed 110% without there being time to change the tap setting back. It would be a remarkable and dangerously unstable DNO network in which a voltage change of that order could happen; and in fact there are automatic systems to prevent such changes. Dr Lockwood said that *“Apart from short term major network catastrophes, changes in network voltage are limited to a few percent in the short term. Any major swings would take time to evolve and would never be as extreme as 12%”*.
196. Mr Ryder in his third report expressed the view that Dr Lockwood’s suggestion involved (by operating the taps) using fewer HV turns than intended by the manufacturer for the distribution network voltage, which would increase magnetic flux density in the transformer core and could exceed the IEC limits. However, what Dr

Lockwood was in fact envisaging was not using the taps so as to make the turn ratio inappropriate for the network voltage but, rather, to use the taps in response to sustained changes in network voltage.

197. I do not therefore accept that Mr Ryder's points constitute a valid objection to the use of the transformer taps in order to respond to sustained network voltage changes within the +/-6% voltage range stipulated in the Connection Agreements.
198. I also do not accept the Claimants' objection to the use of taps based on certain evidence from Mr Ryder to the effect that changing tap connections is time-consuming and prone to human error. On the basis that the taps would be changed only for periods of sustained low (or high) voltage, which would be relatively infrequent, I am not persuaded that the site operator could not be expected to change the taps with due care on the occasions when it is required, nor that the downtime involved on these occasions would have any material effect on overall power production, nor that the occasional need to change tap settings is inconsistent for the requirement to the sites to involve minimum maintenance.
199. The other issue is the extent to which network voltage changes in the short term, i.e. within a period of hours, days or weeks, those being changes which cannot practicably be addressed by altering the transformer tap settings.
200. As noted above, Dr Lockwood's evidence is that, short-term catastrophes aside, network voltage changes are limited to a few percent in the short term. Mr Ryder in his first report referred to the +/-6% range referred to in the Connection Agreements, and stated that voltage typically varies on both a daily and a seasonal basis, but did not explicitly suggest that short-term voltage changes could in practice be as great as +/-6%. In his second report, he disagreed with Dr Lockwood's statement that a combination of 94% voltage and 0.95 power factor constituted "extreme conditions" *"as this combination of voltage and power factor falls within the range required by the Connection Agreements"*, i.e. again relying on the Connection Agreements as distinct from what could realistically be anticipated in practice. In his oral evidence, Mr Ryder said as follows:

"The voltage at the inverters is known to vary on a daily basis at some sites by up to 9 per cent but that's not the same as the network voltage varying by that amount because of, you know, voltage drops or rise through cables and the transformers but the voltage variation on the system is at some of the sites certainly not of the order of 1 per cent.

Q. What do you say it's of the order of?

A. My estimate based on that experience will be 5 to 6 per cent.

Q. Well, I'd suggest to you, well, there's obviously no data on this, I don't think the claimants have provided any although they are in control of the sites, but I suggest to you that is excessive, it is in the order of 1 to 2 per cent, perhaps either side of nominal

--

A. I have to say that I don't think that that's the experience at some of the sites. I will add a further caveat that it will depend quite a lot on what the network is like around the site. A big smelting plant is obviously going to affect things quite a lot."

201. It therefore appears that Mr Ryder's estimate of short-term network voltage changes is deduced from uncertain experience of inverter voltage variations, rather than empirical data or experience in relation to network voltage variations. It is not entirely clear which experience at some of the sites Mr Ryder had in mind. To the extent that it includes the Eckland Lodge and Widehurst experiences I discuss earlier, I do not consider it to provide a reliable guide to the level of short-term network voltage variations. The smelter example, of course, concerns long-term rather than short-term voltage variations.

202. Dr Lockwood also elaborated on this matter in cross-examination:

"Q. But if the tap is set at minus 2.5, because conditions are in general circumstances what that suits long-term sustained voltage, that voltage in itself can move up and down, can't it?

A. In the short-term by a smaller amount; in -- but not by, for example, going from minus 6 to plus 6 per cent.

Q. But it might go minus 6 or it might go plus 6, that's in the range of what is required both by the connection agreement and by regulation?

A. It would not do so in the short-term. You would have time to change the taps. And you must remember that in operation, in terms of connection to the DNO, longer term movements in voltage and the requirements of the DNO for reactive power, go hand in hand. If the voltage was low in a sustained manner, the DNO might -- would tend to request a lagging power factor to help compensate for the low voltage; if the voltage was sustained high the utility might ask for a leading power factor to help lower the voltage.

But you just don't get plus and minus 6 per cent swings in the short-term."

203. As the Defendants point out, the Claimants have produced no data demonstrating substantial short-term swings in network voltage, and none of the three electrical engineering experts gave evidence of having seen such swings in practice in their own experience. In all the circumstances, I accept Dr Lockwood's evidence that short term network voltage swings are in practice limited to a few per cent and do not reach or approach +/-6% of nominal; and that the operator would be able to use the transformer taps in the event of sustained network voltage variations at or approaching those levels.

204. The Claimants nonetheless contend that as a matter of contract the transformers had to be able, without the use of taps, to deal with voltage variations of +/-6%, because the contract required the design and the works to be in accordance with *inter alia* the

technical specifications and requirements to the Connection Agreement. However, whilst the Connection Agreements require the transformers to be capable of dealing with network voltage swings of up to +/-6% of nominal, they do not require the transformers to do so without the use of taps. Based on the conclusions I have reached in the preceding paragraph, what is necessary is for the transformers to be able to deal with those levels of voltages making use of the taps as required.

205. A further question might be whether the possibility of more minor short-term network voltage variations might mean that more of the transformers lack capacity than would otherwise be the case. Dr Lockwood in cross-examination accepted in principle that variations of a few per cent would in all likelihood mean that a number of transformers lacked capacity. However, the Claimants neither produced evidence of which transformers might be affected in this way, nor any supporting calculations. Nor did the Claimants put to any of the Defendants' witnesses (expert or otherwise) any specific case as to which, if any, additional transformers might lack capacity by reason of the possibility of minor short-term voltage variations. There is no evidence on which, having rejected the case that short-term network voltage variations of up to +/-6% can realistically be anticipated in practice, I can properly make any findings as to what level of variation can be anticipated. As noted above, no data has been put in evidence about such levels. Accordingly, insofar as the alleged defects are based on the possibility of short-term variations in network voltage, in relation to which the use of the transformer taps would be impracticable, the Claimants have not proven their case.
206. There remains, of course, the question of which transformers lacked capacity even with the appropriate use of taps. That depends on the further sub-issues which I consider below.

(6) Transformer ratings

(a) General

207. The Claimants contend that the capacity of each transformer must be assessed solely by reference to the rating stated on its rating plate, even where the transformer is designed for use with both natural and forced air cooling, and even where other documentation indicates that a greater rating applies where forced air cooling is used. As appears from the evidence discussed below, transformer capacity is commonly treated as being around 40% higher when forced air cooling is used. In consequence, the Claimants say, each of the transformers lacked sufficient capacity.
208. A table set out in the Claimants' written closing argument suggests that, whether before or after allowing for a 2.5% safety margin, the transformers' ratings in numerous instances fall short by a considerable margin below that required on Dr Lockwood's 'worst case' (-6% network voltage, 0.95 lagging power factor, -5% tap in use). For example, it is said that for ten transformers the sole applicable rating, before safety margin, is 2309A whereas the 'worst case' current is of the order of 3000A (ranging from 2889A to 3142A). Indeed, a rating of 2309A is well below the current calculated by Dr Lockwood for *normal* operation for those ten transformers (which ranges from 2737A to 2984A).
209. The Defendants note, by way of context, that the Claimants' own actions appear inconsistent with any genuine belief in the contentions outlined above. Thus:

- i) The Claimants have been using the transformers for four years, and continue to use them. If the transformers were operating constantly far above their rating, one would expect to see (as Dr Lockwood put it) “*a record of serious, frequent and repetitive operational issues such as tripping and alarms*”. There have been no such widespread issues. Only one transformer has failed (Cranham), and that failure is attributed by the Claimants to humidity issues.
 - ii) Mr Spencer (of Toucan) said in an email of 23 May 2018 that the absence of formal documentation in relation to the capacity of the transformer at Five Oaks was an “*obviously minor*” issue. Any issue relating to documentation for the other transformers is presumably now even less substantial, given the manufacturers’ datasheets and confirmations that do exist for those transformers.
 - iii) The transformers are, as a matter of fact, factory fitted with cooling fans. That strongly suggests that the ordinary forced air cooling rating uplift in such circumstances applies.
 - iv) On 31 March 2020, Mr Spencer requested that clipping be applied across ten sites at specified percentages. In oral evidence, Mr Spencer said the level of clipping he requested was designed to keep the inverter output below the manufacturer (Burnell)’s recommended setting of 3000A. For example, Mr Spencer asked for clipping at 86.81% for the inverters feeding the Five Oaks TX2. The single line diagrams which the Claimants inherited from the Defendants stated that transformer to have a capacity of 3,456A. 86.81% of 3,456A is almost exactly 3,000A.
 - v) However, on the Claimants’ approach to the present case, as indicated in Mr Ryder’s third report, the rating plate power for the Five Oaks TX2 (1600kVA) corresponds to a current of only 2,309A at 40°C, 2,251A at 45°C, or 2,195A net of a 2.5% safety margin. To reduce the current to 2,195A would have required clipping the inverter output to about 63% rather than the 86.81% clipping which the Claimants actually applied. It is evident that by clipping so as to reduce the transformer current to 3,000A rather than 2,195A, the Claimants have proceeded on the basis that the transformer capacity is not limited to that indicated on the rating plate. Nor is there any evidence that the Claimants have altered their approach to clipping in the light of Mr Ryder’s reports.
210. As to the principles, the Claimants base their asserted approach on the language of IEC 60067-11, with which transformers are required to comply, and the evidence of Mr Ryder.
211. IEC 60076-11 § 8 provides as follows in respect of rating:
- “8.1 General
- The manufacturer shall assign ratings to the transformer, which shall be marked on the rating place, see Clause 9...
- 8.2 Rated Power

The transformer shall have an assigned rated power for each winding which shall be marked on the rating plate. The transformer shall be fully rated when supplied in an enclosure. The rated power refers to continuous loading. This is a reference value for guarantees and tests concerning load losses, temperature rises and short-circuit impedance.

NOTE A two-winding transformer has only one value of rated power, identical for both windings. When the transformer has rated voltage applied to the primary winding, and rated current flows through the terminals of that winding, the transformer receives the relevant rated power for both windings.

The rated power corresponds to continuous duty; nevertheless, dry-type transformers complying with this standard can be overloaded and guidance on overloads is given in IEC 60905.”

212. IEC 60076-11 § 9.1 states that each transformer shall be provided with a rating plate, complying with specified requirements, and stating specified information including “*rated power for each kind of cooling*”.
213. IEC 60076-12 § 4, which is specifically concerned with loading and over-loading of dry-type transformers, makes reference to loading and overloading exclusively by reference to the “*nameplate rating*”.
214. The Claimants accordingly submit that the rating as stated on the plate is the exclusive source of information about a transformer’s rating.
215. I do not accept that submission. IEC 60076-11 § 8.1 requires the manufacturer to “*assign ratings to the transformer, which must be marked on the rating plate*”. Two distinct steps are involved: the assignment of a rating, and its statement on the rating plate. Taking the Home Farm TX2 as an example, the rating plate indicates that the “*type of cooling*” used is “*AN/AF*” i.e. ‘air natural’ and ‘air forced’ cooling. Only a single power rating is stated on the plate, viz 1600 kVA. However, the manufacturer, SEA, has produced a datasheet for this model of transformer (referred to on the rating plate and the datasheet as “*TTR-A AoAk*”). The datasheet sets out information about the transformer in more detail than appears on the rating plate. The datasheet, like the rating plate, states the “*cooling*” as “*AN/AF*”. However, the datasheet states the “*rating power*” as “*1600/2240*”. The second figure, which is 40% higher than the first, relates to the position where forced air cooling is used.
216. Dr Lockwood said in cross-examination that an uplift of 40% for forced air cooling is quite general in the industry, and it is the same uplift as appears on the rating plates for the TMC transformers at Outwood and Trowse Newton. Pursuant to IEC 60076-11 § 9.1, the rating plate should have stated the “*rated power for each kind of cooling*”, but in fact it gives only a single rating. Nonetheless, the datasheet indicates that the manufacturer has assigned a rating of 1600 when natural air cooling is used and a rating of 2240 when forced air cooling is used. The omission of the latter figure from the rating plate does not prevent it from being a rating which the manufacturer has assigned.

217. Mr Ryder's evidence was that if the rating plate were said to be incorrect or incomplete, then one could not proceed on the basis of any other or additional rating without seeing an original temperature rise certificate from the manufacturer. A temperature rise certificate follows a temperature rise test, which (as Dr Lockwood confirmed) is one of the 'type tests' required by standard IEC 60076-11 § 23: the standard distinguishes between characteristics that are required to be the subject of routine tests, type tests and special tests. Type testing is done for each model of transformer, whereas factory or 'routine' testing is done on each individual transformer. There is no reason to believe that a manufacturer producing a formal datasheet, setting out alternative ratings for use with and without forced air cooling, would have based the former but not the latter on appropriate type testing including temperature rise testing. In any event, a rating stated on a manufacturer's datasheet is, in my view, a rating assigned by the manufacturer for the purposes of IEC 60076-11, whether or not the manufacturer has complied with the further requirement that the forced air cooling rating be stated on the rating plate. More generally, there is no reason to believe that a manufacturer's datasheet should represent anything other than an authoritative statement of the product's capabilities, and I note that the Claimants themselves placed reliance on the inverter datasheets in the context of their argument based on maximum inverter currents.
218. It is also notable that in a short report dated 11 April 2016 headed "*Transformer tripping on Wirsol sites*", Mr Hann of 33kV Ltd said "*Transformers are all nominally 1600kVA with normal air cooling. However, when they have fans designed to produce air cooling they can be rated higher – in this case – either rated at 2240kVA or 2400kVA depending on the manufacturer. ...*"

(b) SEA transformers

219. Turning to the groups of transformers at issue in the present case, the transformers at Eckland Lodge, Home Farm, Moor House, Otherton, Widehurst, Woodhouse and Wrea Green were all manufactured by SEA. (I include Eckland Lodge and Woodhouse for completeness, notwithstanding my earlier conclusions about the lack of any admissible capacity claim in respect of those sites.)
220. Each of the transformers at Eckland Lodge, Home Farm TX 2, Moor House and Otherton is a SEA transformer Type TTR-A AoAk whose rating plate states a rated power of 1600 kVA. The rating plates state the cooling type to be AN/AF, apart from the Moor House transformers which state AN only. In each case, however, the manufacturer's datasheet states "*Rating power: 1600/2240*" and "*Cooling: AN/AF*".
221. The documents also include declarations of conformity with IEC 60076-11 and other standards, which contain only the 1600A rating. I was not, however, shown for comparison any corresponding declarations of conformity for those transformers whose rating plates show both an AN and an AF rating (viz the transformers at the Outwood and Trowse Newton sites, manufactured by TMC). The Claimants also cited quotations from Burnell (for the substation equipment as a whole) referring to a rating of 1600/2000 kVA. I do not consider either of those documents to detract from the point that the manufacturer has, as indicated on its datasheet, assigned a rating of 2240kVA for forced air cooling use. Moreover, the email from Burnell dated 14 April 2016 referred to in § 293.iii) below indicates that the reason for the rating stated on the quotation was simply that Burnell did not recommend that the transformers be run at maximum for prolonged periods of time. The transformers would not, though, be

- operated at the extreme of Dr Lockwood's 'worst case', because (a) there is no reason to consider those network conditions would subsist for prolonged periods, and (b) the transformers would always operate a reduced capacity at night and during cloudier conditions.
222. The fact that each transformer is, Dr Lockwood stated, factory fitted with cooling fans further supports the view that it is designed for use with either natural or forced air cooling, with a higher rating applicable in the latter case.
223. Reference was also made at trial to an email exchange with an employee of SEA, Sr Nori, in July 2020 in which Wirsol sought confirmation of the position. In response to a request to confirm the ratings of the listed transformers and their capabilities with AF cooling, Sr Nori responded "*We confirm that all the transformers of your list are with force cooling for 40% to increase the rating occasionally*". The Claimants themselves suggest that this communication can be given no weight as probative evidence. In my view, SEA's datasheet states the ratings which it has assigned, including the rating when using AF cooling. I would not, therefore, regard Sr Nori's use of the word "*occasionally*" as any form of authoritative qualification of the datasheet ratings. (See, further, my observation in § 227 below regarding the datasheets for the Wrea Green transformers.) In any event, as the Defendants point out, the maximum air forced rating will not be engaged more than occasionally at a UK solar farm in any event, given the daily and seasonal changes in power output from the solar panels.
224. In some of these cases there are also routine factory test certificates, which refer only to the 1600A rating. However, as noted earlier, I have accepted Dr Lockwood's evidence that ratings (and hence temperature rise) are tested as part of type testing, rather than factory testing. I consider the reference to the rating in the factory test certificate likely to have been for identification only.
225. The Claimants rely on certain answers given by Dr Lockwood in cross-examination, accepting that differences between the datasheets, rating plates and declarations of conformity were "*anomalies*", so that the prudent thing would have been to approach the manufacturer to resolve them. The Claimants add that the approach in fact made to Sr Nori of SEA, referred to above, produced a response which either has no probative value or does not support forced air cooling for continuous use. I am unpersuaded by that line of reasoning. The question, ultimately, is what the rating of the transformers is. In the present case, the manufacturer or its agent has produced a datasheet confirming both that the transformer is suitable for both natural and forced air cooling; and the datasheet states a rating for forced air cooling that is 40% above the natural air rating: precisely as one would expect (see § 215 above). In those circumstances, the evidence clearly indicates the ratings which the manufacturer has assigned.
226. Turning to Widehurst, each of the transformers is a SEA Type TTR-D AoAk 1600kVA dry-type transformer. Each of the rating plates states the cooling type to be "*AN/AF*" but gives only one rating power. However, SEA's datasheet states the rating power as 1600/2240 kVA and cooling as AN/AF. The Claimants point out that only one datasheet has been produced, and that it is not clear to which of the two transformers it relates. However, since both appear to be of precisely the same type, the rating information in the datasheet, which will have derived from type testing, will be applicable to both. I also note in this regard Dr Lockwood's view expressed in cross-examination, that there is a sufficient number of the 1600/2240 kVA SEA transformers

to make a judgment on them as a family. The manufacturer has thus assigned ratings of 1600kVA and 2240kVA for use with natural and forced air cooling respectively, and it makes no difference that the declaration of conformity and factory test certificate refers only to the first of those ratings.

227. The two transformers at Wrea Green are SEA Type TTR-D AoAk 1600kVA dry-type transformers, i.e. the same type as used at Widehurst. The rating plates contain the same information as to cooling type and rating power as the Widehurst transformers. (Indeed, almost all the rating plate information is the same, apart from certain data – in particular, short-circuit impedance – that will have been measured as part of factory testing of the individual units.) A datasheet was provided by the manufacturer’s UK agent, Power Supplies Limited (on notepaper bearing the logos of both the agent and SEA). In the absence of any doubt about the agent’s authority to issue the datasheet, there is in my view no reason to treat it differently from one issued by SEA itself. The datasheet states the type of cooling as “AN/AF”, and the “*Rated power at continuous service*” as 1600kVA – 2240kVA for the primary winding and 1600kVA for the secondary winding. It is common ground that the rating of both windings must be the same, and since the transformer is designed for both natural and forced air cooling (and, moreover, is of the same type as the Widehurst transformers), the obvious inference is that the manufacturer has assigned ratings of 1600kVA and 2240kVA for continuous use with natural and forced air cooling respectively. Moreover, the fact that both ratings are said to be for “*continuous use*” lends supports to the view that Sr Nori’s reference to the use of forced air cooling “*occasionally*” (see § 223 above) should not be regarded as an authoritative qualification on the ratings. There is a declaration of conformity stating only the AN rating, as to which my earlier comments again apply.
228. The transformers at Woodhouse and TX1 at Home Farm are SEA Type TTR-A AoAk 2000kVA dry-type transformers. Each of the rating plates states the cooling type to be “AN/AF” but gives only one rating power. However, the datasheets issued by Power Supplies Limited state the type of cooling as “AN/AF”, and the “*Rated power at continuous service*” as 2000kVA – 2800kVA for the primary winding and 2000kVA for the secondary winding. My comments above in relation to Wrea Green apply again. There are declarations of conformity stating only the AN rating, and, for Woodhouse, a quotation from Burnell offering two transformers rated at 2000/2400 kVA. However, it is in my view the datasheet that reflects the ratings assigned by the manufacturer.

(c) GBE transformers

229. The two transformers at Wilbees were made by a different manufacturer, GBE. The rating plates refer only to “AN” cooling and give only a single rating of 1600kVA. However, the manufacturer’s datasheets state the rated power for both air natural and forced cooling, being 1600kVA and 2240 kVA respectively. Burnell’s quotation referred to “*1600/2000kva*” transformers. In an email exchange in July 2020 between Wirsol and a director of GBE, Mr Flanagan, Wirsol sought confirmation of the ratings. Mr Flanagan initially responded by attaching a drawing and saying “*They are fitted with forced cooling fans, as per the GA drawing. The rating plate will be stamped at 1600 kVA AN as that is [what] all characteristics are based on*”. The exchange continued:

[Wirsol] "... We really need to clarify the uplift rating for the AF, I appreciate that all characteristics are based on the AN value of 1600kVA.

Most transformer manufacturers offer a 40% uplift when force cooled.

Basically, I am needing to ask you to confirm that the data sheet (attached) is correct at 2240kVA AF despite the nameplate being stamped AN 1600kVA?"

[Mr Flanagan] "Yes I can confirm that these transformers are designed to run at 40% over AN rating with the forced cooling fans. These are designed at a short time rating. Running constantly running at + 40% does affect the life span of the transformer."

230. Asked about that exchange, Dr Lockwood rejected the suggestion that it meant the AN rating was for short-term rating only. Rather, he said, Mr Flanagan was saying that running the transformer at 40% (meaning, I infer, at the full 2240kVA power) would affect the lifetime, but Dr Lockwood anticipated that the AF cooling would allow continuous running at above the AN power rating, though no figure was given.

231. However, Dr Lockwood then accepted the proposition that Mr Flanagan's answer meant that "*40 per cent above AN rating is a short time rating only*". It was pointed out to Dr Lockwood that, in his Schedule 2, the Wilbees transformer's ratings less a 2.5% safety margin (shown in the column headed "*protection threshold for transformer*") were 3152A, which is only slightly above Dr Lockwood's 'worst case' (-6% network voltage, 0.95 lagging power factor, transformer tap used) current figures of 2984A and 2948A for the two transformers respectively. The following exchange then occurred:

"Q. If you bring that down even by a decimal point of a percentage point, on this analysis both these transformers lack capacity; yes?"

A. If --

Q. Prudently regarded as lacking capacity.

A. In terms of steady state rating, I agree that with the evidence we've gone through then that -- that row or those two rows actually, I think no, just one row, would need to be changed.

Q. Thank you."

232. I find it difficult to understand the logic of this apparent concession. First of all, it is not clear which row of Schedule 2 Dr Lockwood considered would, on this hypothesis, need to be changed. Secondly, the dividing line between Mr Flanagan's references to "*short time rating*" and "*[r]unning constantly*" is unclear. Even on Dr Lockwood's 'worst case' scenario, the transformer would not be running constantly at 2240kVA, if

only because of night-times and day-to-day changes in sunshine. Equally, as the Defendants point out, it is obvious that running a transformer constantly at higher levels will reduce its lifetime, but that does not detract from its ratings. The fact remains that GBE on its datasheet assigned a rating of 2240kVA for forced air cooling, representing the industry standard 40% uplift seen in relation to numerous other transformers in this case, and I conclude that that is the rating which should be adopted for present purposes.

(d) Imefy transformer

233. The transformers at Five Oaks were manufactured by Imefy. The ratings plates refer to “AN/AF” cooling, but give only a single rating of 1600kVA for both windings. The manufacturer’s datasheet also states only that single rating.
234. On 22 May 2018, Mr Young of Burnell wrote to Wirsol: “*Please see attached datasheet, although it does not directly state 1600kVA-2240kVA as per other manufacturers or 11kV version from Imefy. Basic rating is 1600kVA (AN) 2240kVA is achievable by (AF)*”. Burnell’s original quotation was for a 1600/2000 kVA transformer, though it did not identify any particular manufacturer or type.
235. The evidence in relation to this transformer is not entirely satisfactory. It is clear that the transformer is designed to use either natural or forced air cooling, and it would appear unlikely that the rating using forced air cooling would be the same as when using natural air cooling. It is possible that the manufacturer did not perform the necessary type tests in order to assign a rating for forced air use, or that both the rating plate and the datasheet are incomplete.
236. However, taking into account Burnell’s email, including the reference to a ratings uplift for the 11kV Imefy, I do not consider the Claimants to have proven (on the balance of probabilities) that the rating assigned by the manufacturer for the Five Oaks transformers is limited to 1600kVA; I consider it more likely than not that, like other transformers involved in this case and (it appears) Imefy’s own 11kV model, a 40% uplift to 2240kVA (the figure mentioned in the Burnell email) applies when using forced air cooling.

(e) Hammond transformer

237. Finally, the original Cranham transformer (now replaced) was made by Hammond Power Solutions. Its rating plate referred to only “AN” cooling and gave a single rating of 2500kVA. Hammond’s datasheet, on the other hand, stated the cooling type as “AN/AF” but still stated only a single rating of 2500kVA. A letter dated 31 July 2020 from Hammond following an approach by Wirsol stated: “*The power rating, when operating the fans can be increased 15% above the nameplate rating. This equates to 2875 kVA when operating within a 40C ambient max and 30C average in a day.*” Again, the evidence is unsatisfactory, but on balance I consider it more likely than not that the Cranham transformer was rated at 2875kVA when using forced air cooling.

(7) De-rating for Site Conditions

238. The Claimants contend that by operation of IEC standard 60076-11, taken with the terms of the EPC, each transformer’s rating must be ‘de-rated’, given that for design

purposes (as, in fact, reflected in operating conditions) the transformers are required to operate outside the normal service conditions assumed by the standard.

239. Employer's Requirements § 4.4.5 provides “*Each transformer will be suitable in all respects to operate without injurious heating at its rated output for the maximum load curve provided by the PV System under the Site Conditions...*” (my emphasis).

240. Site Conditions are defined at § 2.17 as:

“The range of climatic conditions to be used as the basis for the design...of plant is summarized in the following table....Maximum Ambient Temperature: 45° C”

241. IEC 60076-11 § 4.2.1 states:

“Unless otherwise stated, the service conditions in 4.2.2 to 4.2.6 apply. When transformers are required to operate outside the normal service conditions, de-rating in accordance with 11.2 and/or 11.3 applies.”

242. § 4.2.3 states:

“The temperature of cooling air not exceeding:

40 °C at any time

30 °C monthly average of the hottest month

20 °C yearly average

...” (my emphasis)

243. § 11.2 states:

“Reduced temperature rises for transformers designed for high cooling air temperatures or special air cooling conditions.

When the transformer is designed for service where the temperature of the cooling air exceeds one of the maximum values specified in 4.2.3, the temperature rise limits shall be reduced by the same amount as the excess. The values shall be rounded to the nearest whole number of K.

Any site conditions that may either impose restrictions on the cooling air or produce high ambient air temperatures should be stated by the purchaser.”

244. The transformers were all designed for use in a maximum ambient temperature of 40 °C, according to their respective datasheets. Accordingly, de-rating under the above provision applies. Mr Ryder explained in his first report two methods by which the contractually mandated de-rating is to take place, adopting the more conservative de-

rating of 2.6% for the purposes of his subsequent analysis. Dr Lockwood did not in his second report criticise that approach as a matter of calculation, or provide an alternative calculation.

245. The 2.6% is also comparable to the approach set out in the SEA manual, which includes the statement that:

“It is possible to use a transformer dimensioned for a maximum ambient temperature of 40°C even with higher temperatures: in this case, the power will have to be reduced, as indicated in the following table.”

The table and accompanying graph indicate that at an ambient maximum temperature of 45°C the power has to be reduced by 3%.

246. Dr Lockwood suggested in his first report that such a de-rating “*would only be applied if the ambient temperature were at 45° C all the time and the load was steady.*” However, § 4.2.3 of the standard clearly distinguishes between average temperatures on the one hand and, on the other, the criterion “*40 °C at any time*”; and applies independently of loading. The standard therefore points inescapably to the need for de-rating in the circumstances of the present case.

247. The Defendants point out that the SEA manual also states:

“The transformer lifetime particularly depends on the duration of its insulation, which is, in turn, strictly connected to the load cycle to which it is subject.

However, some overloads are allowed and they do not compromise the operation and life of the transformer, if they are compensated by a normal load lower than the nominal power.”

248. The Defendants say that indicates that operation at higher temperatures is permitted, even if that would mean the transformer operating above the rating it would originally have been given had it been rated for that temperature, provided this is compensated for by periods of lower loading. The transformers in the present case fall within that category – not least because they are subject to no load during the night time – and there is no serious basis for suggesting that any of their lifetimes will be affected (noting that Mr Ryder’s own analysis suggested that all the transformers in dispute have sufficient lifetimes to last long over 25 years even on the assumption there are no clouds).

249. However, the passage quoted above from the SEA manual does not deal with temperature de-rating specifically, but with overloading in general. I declined to give the Defendants permission to make a late amendment to allege that the transformers could be overloaded without entailing any breach of contract. The quoted passage does not in my view detract from the provisions of the standard concerning de-rating.

250. I also do not accept Dr Lockwood’s view that the standard or the EPC does not address the ambient temperature inside the substation, as opposed to external temperature. It is

the ambient temperature in the substation, surrounding the transformer itself, that matters.

251. I conclude that there needs to be a 2.6% reduction in the rating of each transformer when assessing its capacity.

(8) Safety margin/protection settings

252. Dr Lockwood assumes a safety margin between the inverter current and the busbars/transformers of 2.5%, and his calculations as to capacity assume that figure.

253. The Claimants contend that that figure is simply based on tolerances of measurement devices and is not a ‘safety’ margin at all. They submit that the appropriate safety margin is 5% being nearer to the Burnell stipulated protection settings, arguing that:

- i) the protection settings at 3000A (save for Cranham and one of the transformers at Home Farm) were configured by Burnell and tested by Burnell in the factory as reflected in the Burnell O&M Manuals;
- ii) Burnell confirmed that *“We set our protection to 3000A...this sets the transformer from not running at 100% to prevent stressing. We would warrant keeping the current set points to the factory settings”*;
- iii) Burnell stated on 11 April 2017, after being instructed to change the protection setting to 3160A, that they *“cannot take responsibility for any further issues as these settings are way higher than what we recommend”*; and
- iv) permission is required from the manufacturers if there are to be changes from the factory settings, in order to maintain warranties.

254. I do not accept the Claimants’ contention.

- i) It was established at the outset of the trial that the margin of error in the protection settings should be established by reference to the rated output of the equipment (meaning the 3200A rating of the busbars, or the rating of the transformers, whichever is lower).
- ii) The Claimants’ defects expert, Mr Halliday, proposed a safety margin of 2.5%, which the experts agreed was appropriate, reflecting the margin of error in the equipment.
- iii) The Burnell O&M manual does not state 3000A to be a mandatory setting, nor that the factory settings could not be changed, as Mr Halliday accepted in cross-examination.
- iv) The Claimants suggest that Dr Lockwood accepted, as a general proposition, that permission was required from the manufacturers before changing factory settings in order to maintain warranties. In fact, however, Dr Lockwood’s evidence was that he had not seen the warranties in the present case. The suggestion which he was willing to accept was merely that *“it wouldn’t surprise you, experienced in the wider power field, that if you are to change from the factory settings in order to maintain your warranty you need permission”*; to

which Dr Lockwood replied “*In broad terms, yes. I don’t know the details in this case.*” It is unimpressive for the Claimants to seek to rely on an exchange of that nature as a substitute for advancing a case on the actual contents of the relevant warranties.

- v) The warranty states that Burnell “*shall not be liable under the above warranty unless the equipment has been stored, installed, operated and maintained in accordance with [Burnell’s] instructions or, in the absence of such instructions, in accordance with current good practice.*” I do not consider setting a protection at a level 2.5% below the rating of the equipment, reflecting its margin for error, to be inconsistent with good practice, or therefore that a setting of 3120A breaches the warranty. There is no reason to believe that that setting level fails to provide adequate overcurrent and fault protection. Dr Lockwood’s evidence was that although in principle increasing the setting from 3000A to 3120A compresses the length of time before there is a trip (automatic circuit-break), the difference would be immaterial. For example, there would still be an instantaneous trip if current reached 4000A, in order to detect serious short circuits; and the category of over-current where the changed setting would make any difference would occur perhaps once or twice in the lifetime of the transformer and make no measurable difference.
- vi) Burnell itself changed the protection settings at Newton, Five Oaks and Outwood to 3100A in April 2016 at Wirsol’s request, without any disagreement or cautionary comment. That contrasts with the position when Wirsol requested a change to 3160A in April 2017, which Burnell was reluctant to do, and where it expressly noted (as quoted above) that the change would be contrary to their recommendation. I note that according to an internal Wirsol email of 11 April 2017, 3100A was “*the max setting that Jim/Kev [of Burnell/33kv] were happy for us to apply*”. However, it is not possible to conclude from that conversation (assuming it occurred) that an increase to 3120A would amount to a breach of the warranty.
- vii) I agree with the Defendants that any suggestion that lower protection settings were required sits uneasily with the fact that the Claimants did not, for at least 18 months after termination, reduce the settings put in place by the Defendants back to 3000A. It emerged from Mr Spencer’s cross-examination that the settings of the Woodward relays at the four affected sites were changed some time during spring 2020.

255. Accordingly, I conclude that a 2.5% protection threshold (or ‘safety margin’) should be applied.

(9) Conclusions in relation to busbar capacity

256. In the light of my conclusions under subheadings (3)-(5) and (8) above, the required capacity of the busbars is to be determined by comparing (a) each busbar’s rating, minus a 2.5% protection threshold, with (b) maximum current based on Dr Lockwood’s ‘worst case’ scenario of -6% network voltage, 0.95 lagging power factor and transformer taps in use. That comparison is in effect between the currents in the 5th (‘protection threshold for busbars’) and 7th (‘ML -6%V 0.95 lagging pf -5% tap’) columns of Schedule 1 reproduced in § 148 above.

257. On that basis, as indicated in the 12th column of Schedule 1, the busbars attached to Five Oaks TX2, Outwood TX1, Trowse Newton TX1 and Wilbees TX1 lack sufficient capacity (very marginally in the latter case).

(10) Conclusions in relation to transformer capacity

258. In the light of my conclusions under subheadings (3)-(8) above, the required capacity of the transformers is to be determined by comparing (a) each transformer's rating, minus a 2.5% protection threshold, with (b) maximum current based on Dr Lockwood's 'worst case' scenario of -6% network voltage, 0.95 lagging power factor and transformer taps in use, subject however to two provisos:
- i) the rating of the former transformer at Cranham should be taken to be 2875kVA rather than 3500kVA, with a commensurate reduction in the assumed rating in terms of current; and
 - ii) each transformer needs to be 'de-rated' by 2.6% for site conditions.
259. I shall invite further submissions if appropriate as to the impact of those adjustments. Provisionally, it appears to me that:
- i) adjustment of the assumed rating of the former Cranham transformer in the respects identified in (i) and (ii) makes no difference to the outcome; and
 - ii) de-rating for site conditions will mean that, in addition to the three transformers which the Defendants now accept lack capacity (Five Oaks TX2, Outwood TX1 and Trowse Newton TX1), a further three transformers lack sufficient capacity: Moor House TX1, Wilbees TX1 and Wilbees TX2.

(11) Remedy

260. The parties' experts agreed that, if the current transformers are required to be replaced, then they should be replaced with outdoor oil-filled transformers. According to the priced remedial solution of the Defendants' quantity surveying expert Mr Andrew:
- i) the individual cost of purchasing each transformer varies slightly between sites (as the transformers are required to have different capacity) but is approximately £25,000 per substation (excluding installation);
 - ii) the total cost for replacing each individual transformer, including all installation costs, is approximately £86,000 per substation (with the exceptions of Cranham at £94,343, Otherton TX 1 at £92,321 and Balcombe TX 1 at £95,264); and
 - iii) depending on how many transformers must be replaced, the total cost per site can simply be aggregated to give the final figure.
261. There is a dispute as to whether replacement transformers should be priced on the basis they will comply with regulations that come into force in July 2021, which would raise the cost involved significantly. The difference turns on whether Tier 1 or Tier 2 transformers are used. It is common ground that Tier 2 transformers will be required under Commission Regulation (EU) No 548/2014 of 21 May 2014 coming into force on 1 July 2021.

262. The Claimants make the points that the Defendants have not pleaded any failure to mitigate, and that Mr Andrew accepted that it is perfectly ordinary that a company will invest in infrastructure replacement when it has the capital funds to do so.
263. The Claimants submit that they will not be in funds until well into 2021, after judgment has been given and satisfied. There is a planning and project management phase, and the Claimants will reasonably wish to obtain planning approval before proceeding to place the order for the transformers. Mr Andrew accepted that planning typically would take about 3 months. The transformer quotations obtained have a lead in period of 14-16 weeks. Mr Andrew ultimately accepted that it would be unsafe to purchase and order Tier 1 transformers and that, therefore, Tier 2 transformers will be required if the works are going to be carried out in these time periods.
264. The issue is in my view not merely one of mitigation but concerns the date of assessment of loss. Loss is *prima facie* to be assessed as at the date of breach, unless that would be unjust. Authority supports the view that an evidenced lack of funds can on occasion make it reasonable to delay works until after judgment: see, e.g., *Alcoa Minerals of Jamaica Inc v Herbert Broderick* [2002] 1 A.C. 371 (PC), distinguishing *The Liesbosch* [1933] AC 449.
265. However, the Claimants have not adduced any evidence that they could not have repaired before judgment the defects that I have found to exist. Moreover, as the Defendants point out, the Claimants made a call on the performance bonds provided by the Defendants in August 2018 in the aggregate amount of £2,995,716, on the basis of the defects now alleged (including the capacity defect).
266. It follows in my view that the loss should be assessed as at the date of the breach, at which time Tier 1 transformers would have been acceptable. The additional cost of the Tier 2 transformers (approximately £9,000 per transformer) which the Claimants are now bound to need to purchase does not fall on the Defendants.
267. It will be necessary to leave to the parties, in relation to this and other defects, to work through the actual costs to remedy the particular breaches I have found to exist (in this case, the need to replace certain transformers and busbars), in the light of the rulings made in this judgment on the issues of principle. I shall deal in due course with any matters that cannot be resolved between the parties.
268. It appeared from the parties' opening submissions that there was also a dispute as to the solution for any defect relating to the capacity of the busbars: the Claimants saying that new busbars are required, and the Defendants that the existing busbars could be upgraded by increasing the number of copper bars deployed. However, as I understand it, no dispute remains. Mr Andrew's priced remedial solution for this defect is for their replacement with busbars of a sufficient and higher capacity, the cost of which he prices as falling between £10,611 and £11,513 (including installation costs).
269. The Claimants assert that any requirement for new or expanded busbars will require a new substation, because larger busbars with sufficient capacity will not fit in the existing substations. Dr Lockwood's evidence was to the contrary. In any event, the substations where I have found busbars to lack capacity are all substations where the transformer requires to be replaced. Based on the parties' proposal for the replacement transformer to be outdoors, it is clear that sufficient room will exist for larger busbars.

Moreover, Mr Andrews pointed out that the new substations the Claimants propose are actually smaller than the existing installations.

(12) Postscript

270. It is appropriate to note at this stage that the Claimants, in their submissions, mounted a wholesale attack on Dr Lockwood’s professionalism. I deal with aspects of this where they arise. In relation to the capacity issue in general, the Claimants submitted that Dr Lockwood “*bases his entire analysis of the transformer capacity issue, as confirmed by him under questioning*” on the view that there was no contractual requirement for transformer rating other than the need to comply with (i) the Guaranteed Performance Ratio (ii) an operational life of 25 years and (iii) safety requirements. This, it was suggested, “*colours the entirety of Dr Lockwood’s evidence on issues of capacity blinding him from analysing the position properly and objectively*”, and:

“Even putting aside the real and proper doubts as to Dr Lockwood’s relevant expertise, independence and impartiality, his assumption as to the meaning of the EPC contracts led him into assuming the finishing point of the analysis, that the transformers have adequate capacity, and to in-fill his reasoning to that pre-determined conclusion.”

271. It is true that Dr Lockwood expressed the view in his reports that, as a matter of contract (as he saw it), it was sufficient for the transformers to comply with the three criteria indicated above, and that (albeit with some hesitation) he confirmed that view in cross-examination. However, as will be clear from the foregoing analysis, Dr Lockwood went on to consider in his report, in great depth (and in significant respects more depth than the Claimants’ experts), the current which the transformers would be required to handle and the circumstances (in terms of voltage and power factor) in which they might lack capacity. On that basis, as well as on the basis of my impressions of Dr Lockwood’s oral evidence given over the course of some two days of cross-examination, I find the Claimants’ submissions to be unfounded.

(G) LOSSES CAUSED BY CAPACITY DEFECTS: CAPPING OR ‘CLIPPING’ OF INVERTERS (Scott Schedule Item 2)

(1) Introduction

272. The Claimants allege that at four of the ten solar parks – Five Oaks, Outwood, Trowse Newton and Widehurst – it was necessary for Wirsol (and, after the acquisition, the Claimants) to ‘clip’ or ‘cap’ the current from the inverters; and that that led to loss of revenue. The Claimants claim for lost revenue at those four sites during the period prior to the termination of the EPC Contracts.

273. The Claimants say the clipping was done in response to the problems created by the busbars and transformers lacking sufficient capacity to cope with the load placed on them by the PV System, in order to prevent overloading and trips.

274. The alleged need for clipping is said to be a symptom of the breaches of contract involved in the lack of capacity of the transformers and busbars, and contrary to (in particular):

- i) the “*Good and Prudent Practice*” obligations in §§ 4.1 and 5.3 of the Conditions of Contract and § 11 of the O&M Contracts;
- ii) the obligations in Conditions of Contract § 2.1 relating *inter alia* to producing a power plant capable of continuous, efficient and reliable operation with minimum maintenance;
- iii) Employer's Requirements § 3.2 as regards safety margins;
- iv) Employer's Requirements § 4.1 on design and operational requirements;
- v) Employer's Requirements § 4.4.5 on transformer capacity;
- vi) § 2.6.17 of Schedule 7 (Employer's Requirements Testing and Commissioning), which provides that, following Performance Tests, the Contractor shall not in any way adjust “*the Plant, its control system or any equipment in any way which, in the good faith opinion of the Employer, could: - Reduce output from that tested during the Performance Tests*”; and
- vii) the additional requirement in Conditions of Contract § 9.6, during the Defects Notification Period, that Wirsol must notify the Employer if it wishes to make adjustments to the Works to improve performance or availability, and permission has to be sought. There is an absolute discretion provided for the Employer as to whether to agree to such proposals, and it may impose such conditions as it thinks fit. If the work of remedying any defect or damage “*may affect the performance and/or availability of the Works, the Employer may require the repetition of any of the tests*” described in the EPC Contracts, including the Tests on Completion. The Claimants say no permissions were sought from the SPVs for the clipping.

(2) Extent of clipping

275. Dr Lockwood, based on information received from Wirsol, provided the following table setting out the extent and period of clipping of the inverters at the four sites in relation to which the claim is made:

No.	Site	TX	Adjustments												
1.	Five Oaks	TX 1	96% 20/4/16	100% 29/4/16	96% 28/6/16	100% 5/7/16	96% 11/4/17	100% 3/5/17							
		TX 2	85% 20/4/16	100% 10/5/16	85% 28/6/16	100% 20/8/16	85% 11/4/17	90% 29/4/17	94% 4/5/17	100% 15/6/17	90% 31/3/18	95% 17/5/18	90% 31/5/18	95% 8/6/18	100% 18/6/18
2.	Outwood	TX 1	88% 4/4/16	93% 20/4/16	94% 4/5/17	100% 14/7/17	93% 21/4/18								

No.	Site	TX	Adjustments								
		TX 2	96% 4/4/ 16	100% 19/4/16							
3.	Trowse Newton	TX 1	91% 20/4/ 16	90% 28/6/16	100% 28/2/ 17	90% 13/4/17	92% 4/5/17	91% 1/7/17	100% 20/3/1 8	91% 21/4/ 18	
4.	Widehurst	TX 2	95% 21/4/ 18	100% 23/4/18							

The red (darker) shading is said to denote occasions where the software inadvertently reverted to a 100% setting.

276. The Defendants note that the inverter restrictions at Five Oaks were lifted by Wirsol in May 2017 (TX 1) and June 2018 (TX 2) and at Widehurst transformer 1 in April 2018. On termination of the EPC Contracts in September 2018 only Outwood TX 1 and Newton TX 1 remained clipped. During cross examination, Mr Spencer confirmed that this was the case.
277. The Claimants point out that, in addition to the occasions listed in the table, account should be taken of two periods during which inverters were switched off. Specifically:
- i) Five Oaks had one fuse switch at the LV Switchboard switched off from 29 March 2016, isolating four or five inverters before alternative capping was introduced on 20 April 2016; and
 - ii) Trowse Newton had eight (out of 74) inverters shut off from 13 April 2016 until clipping was put in place on 20 April 2016.
278. The Defendants say this has never been a pleaded complaint: the Scott Schedule explicitly says that the complaint is that the output of the inverters was limited, not that they were turned off. As Mr Hogan said, “*this is specifically showing the clipping of the inverters*”. In my view, this is essentially a semantic point. Switching off a number of inverters has the same substantive effect on overall current as clipping the inverters as a whole. The Scott Schedule states in item 2 that “*in order to limit the power produced by the inverters from passing to the busbars ... the Defendants have capped or ‘clipped’ the output from the inverters limiting that output*”. Turning off a subgroup of the inverters connected to a busbar and transformer in my view falls within that wording.
279. The Claimants also submit that there is no documentary or factual basis for the shaded boxes in either Mr Hogan or Dr Lockwood’s table that are said to denote where “*the software inadvertently reverted to a 100% setting.*” Mr Hogan in cross-examination gave an explanation of this, and said he believed there would be internal emails on this topic, though none have been highlighted to me. It is unclear in certain respects how to reconcile the table with an internal Wirsol email of 1 December 2017 from Mr Turner to Messrs Smith and Van Wyk, which said:

“Over the last couple of years, Rob and myself have tried to up the settings to their highest possible.

I believe the last push was to try these settings (Below) and this seems to have been ok and we are no longer seeing shutdowns for overcurrents due to the undersized TX’s.

Inverter Limited

Outwood	Newton	Five Oaks
TX1 94%	92%	100%
TX2 100%	100%	94%

...”

280. This email seems to proceed on the basis that (among other things) the Five Oaks TX2 and Outwood TX1 inverters had remained clipped at 94% during the period up to the date of the email (1 December 2017), whereas according to Mr Hogan’s and Dr Lockwood’s table, they had reverted to 100% on 15 June 2017 and 14 July 2017 respectively. The Defendants did not call Mr Turner, so it was not possible to explore in evidence whether he had overlooked the inverters reverting to 100%, or whether he did not mean to suggest that the inverters had remained at 94% throughout the period up to the date of the email (as opposed to the time of the “*last push*” to which the email refers).
281. On the other hand, as the Defendants point out, the Claimants as the owners of the solar parks were in a position at the time of termination, and have been since, to obtain this information from the online monitoring system or communication with Mind4Energy if they considered Wirsol’s figures to be inaccurate, or to produce their own alternative set of figures.
282. Ultimately it is for the Claimants to prove their case on this issue on the balance of probabilities. I am not persuaded that they have proven clipping of the inverters save to the extent set out in Dr Lockwood’s table, plus the periods identified in § 277 above when some of the inverters at Five Oaks and Trowse Newton were switched off.

(3) Guaranteed Performance Ratio

283. The Defendants submit that the Claimants’ claim for lost revenue is inconsistent with the scheme and express terms of the EPC Contracts. The Claimants have no right to an absolute level of performance: they are entitled to performance at the Guaranteed Performance Ratio, and can claim liquidated damages if the solar parks’ performance falls below that level. Such claims were brought in respect of the two solar parks where the performance of the sites actually fell below the Guaranteed Performance ratio (Five Oaks and Balcombe) and those claims were settled.
284. I do not accept that submission. The right to performance at the guaranteed level is not inconsistent with, and does not preclude, the Claimants having a right to claim damages for any lost revenue caused by the lack of transformer/busbar capacity that I have found to exist.

(4) EPC clause 17.6

285. The Defendants submit that any loss of income resulting from clipping of inverters is irrecoverable by reason of clause 17.6 of the EPC Contracts:

“Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract, loss of revenue or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with this Contract, other than under [*clauses not applicable to the present claims*].

This Sub-Clause 17.6 shall not limit liability in any case of fraud, bribery, corruption, deliberate default (including abandonment), gross negligence or reckless misconduct by the defaulting Party.”

286. The Claimants plead in their Reply that in circumstances where the Defendants were aware of the defects in the design and/or construction of the solar parks, it was deliberate default and/or gross negligence for Wirsol to have committed and/or failed to remedy the said defects.

(a) Scope of clause 17.6

287. The Claimants suggest that the clause excludes only liability for losses that do not arise naturally and directly from the breach, and hence does not exclude direct losses falling within the first limb of *Hadley v Baxendale* (1854) 9 Ex. 341. Thus, it is suggested, the clause does not apply to lost income or refinancing losses of the kind at issue in the present case.

288. I do not accept that submission. First, clause 17.6 expressly excludes “*loss of revenue*”. It makes no difference whether or not the wording later in clause 17.6 relating to “*indirect or consequential loss or damage*” is or is not intended to approximate to the second limb of *Hadley v Baxendale*. Secondly, the refinancing losses (the claim for which I consider later) are plainly a form of indirect and/or consequential loss falling within the express words of the clause. The Claimants point out that the BLB financing was in place at the date of the SPAs, was the funding vehicle via which the construction costs were being funded and the SPVs were the sources of money to service the funding; and suggest that in the natural course of things, breaches of the EPC contracts necessitating termination, with the impact on the income stream and the accompanying panoply of actual or potential Events of Default and lenders’ entitlement to call in the funding, mean that losses caused by the need to re-finance are direct and arise within the first limb of *Hadley v Baxendale*. That is a convoluted and unrealistic contention which I have no hesitation in rejecting.

(b) Deliberate default

289. The expression “*deliberate default*” was considered by Edwards-Stuart J in *De Beers UK Limited v. Atos Origin IT Services UK Limited* [2010] EWHC 3276 (TCC), 134 Con. LR 151:

“Fraudulent misrepresentation obviously involves dishonesty. Wilful misconduct refers to conduct by a person who knows that he is committing, and intends to commit a breach of duty, or is reckless in the sense of not caring whether or not he commits a breach of duty (see *Romer J Re City Equitable Fire Insurance Company Ltd* [1925] 1 Ch 407). Deliberate default means, in my view, a default that is deliberate, in the sense that the person committing the relevant act knew that it was a default (i.e. in this case a breach of contract). I consider that it does not extend to recklessness and is therefore narrower than wilful misconduct (although the latter will embrace deliberate default).” (§ 206)

290. That decision was followed by Coulson J in *Mutual Energy v Starr Underwriting Agents* [2016] EWHC 590 (TCC) § 27, citing it as an example of case law holding that a ‘deliberate’ breach or default means an intentional one, i.e. one which the party knew at the time he committed the relevant act to be a breach or default.
291. Edwards-Stuart J in the passage from *De Beers* quoted above distinguished deliberate default from ‘wilful misconduct’ (the words considered in *City Equitable Fire Insurance Company*), which can include recklessness. That distinction reflects the ordinary meaning of ‘deliberate’, which as Coulson J noted in *Mutual Energy* at § 25 is ‘carefully thought out, studied, intentional, done on purpose’. For the same reason, ‘deliberate default’ is not the same as ‘wilful neglect’, the concept considered in *Circle Freight v Medeast Gulf Exports* [1988] 2 Lloyd’s Rep 427. I therefore do not accept the Claimants’ submission that recklessness is sufficient to constitute deliberate default.

(c) *Gross negligence*

292. Gross negligence goes beyond mere lack of reasonable care, and requires “*serious disregard of or indifference to an obvious risk*”: see *Red Sea Tankers Ltd v. Papachristidis* (“*the Hellespont Ardent*”) [1997] 2 Lloyd’s Rep 547, 586, per Mance J.

(5) Application of EPC clause 17.6

293. The Claimants rely on communications discussed below as indicating that the Defendants knew of the alleged defects as a whole. I consider, after setting out my understanding of them, to what extent they support the view that the clipping of the inverters at Five Oaks, Trowse Newton, Outwood and Widehurst resulted from deliberate default or gross negligence such as to disapply § 17.6.
- i) On 22 March 2016 Mr Hogan wrote to Burnell, following an outage at Outwood, saying that there were too many instances of parks tripping out and not auto-closing, which if it continued would cause massive fiscal loss. (This led to an inconclusive series of emails about transformer capacity.)
 - ii) On 13 April 2016 Mr Smith of Wirsol indicated that ‘Kev’ (Kevin Hann of 33kV Ltd) had mentioned that warranties on transformers might be avoided as a result of changes in protection settings. Mr Smith said:

“Not sure how warranties can be voided when they state 2240. They are not operating at 100% and they are or should be designed to operate at 100%.

Lets also bear in mind that these transformers, for the majority of the time, do not run anywhere near 100%.

I think we need to either push back on Burnells and get them to commit to their design or get them to update the transformers ...”

Mr Hann responded that ‘*The design output IS being exceeded*’ and suggested a face to face meeting with Burnells. Mr Hogan agreed it would be best to have a ‘*face-to-face meeting*’ before anything else was purchased from Burnell.

- iii) Burnell on 14 April 2016 indicated that the transformers had a maximum rating of 2240kVA but did not recommend that they be run at maximum for prolonged periods of time “*and for this reason we offer in our quotation the rating of 2000kva*”. They were happy for Wirsol to increase the loadings on the transformers to 2200kva ‘*but would stress this is a maximum, there is the obvious fact that these transformers won’t be working at full capacity 24 hrs a day due to daylight hours available*”.
- iv) Mr Barnes of Wirsol observed in reply that “[*o*]n future projects we need to be a little tighter on the design and perhaps have a 2,400kva transformer so we do not experience this”. However, that comment followed Mr Barnes having made the points that the transformers were likely to be at full load for only around 3-4 hours a day at most in the peak months, and only in perfect sunshine conditions, which according to Met Office data would be about 19.12% of the year. Even that was a worst case, as 100% capacity for 19.12% of the year would result in twice the income actually achieved; and “*thus operating at 100% for 19.12% of the year – in my opinion – should not overly stress the inverters – especially as this is their design maximum.*”
- v) An email from Mr Turner of 17 April 2016, at which point only three sites had been built (Five Oaks, Trowse Newton and Outwood) stated that Wirsol were “*guilty of...using undersized transformers and switchgear*” and that Wirsol should definitely be using two 2.4MVA transformers in the design for each farm. Mr Turner said “*We have too many panels per string and therefore too many panels per inverter, then we are running 5 inverters (5x48A=240A) to go through 250A cartridge fuses to a transformer that doesn't like to be run an full load, but the oversizing configuration of the solar farm means we are likely to run at full power every day for about 6 months of the year*”. He concludes that the design is “*the equivalent of switching off 4,000 solar panels in the summer months just to get a little extra during grey times...I think these problems stem from the electrical oversizing decisions made in the very first step of the design. I thought this would change once the pressure is off and more time can be given to the electrical design, but I see with Cranham and Wrea Green we are guilty of making the same mistakes*”. Mr Turner made the point that the problem stemmed from the electrical design being done *after* the layout, and that Wirsol’s approach of trying to fit the electrical specification of kit ordered into

a design was the wrong way round. Mr Turner added that on the two single line diagrams he had created (for Cranham and Wrea Green), he had stated total nominal watts rather than total kVA, since *“If I start putting the total amps or total kVA on the SLDs then surely OST will flag it and make us change it... we don't want OST to pick up on this”*. OST were conducting the technical audit on behalf of BLB.

It should be noted, however, that Mr Turner's comments were based on the power calculation in an email from Mr Smith of Wirsol of 14 April 2016, made by simply multiplying the number of inverters by the maximum output per inverter. Thus for Outwood, he multiplied 138 inverters by 33kVA maximum inverter output to reach 4554kVA, equating to 6573A (across the two transformers). That approach is in my view (and, as he made clear in evidence, in Mr Hogan's view) flawed, for the reasons given in section (F)(3) above. Mr Hogan added that Wirsol was Mr Turner's first employer.

The Claimants suggest that on that basis, Mr Smith and Mr Barnes, to the extent that they accepted Mr Turner's view, must also have been wrong, yet no-one responded to say the wrong parameters had been used. The Claimants invite the inference that those involved, including Mr Hogan, accepted that the calculations were correct, with the consequence that the transformers were undersized to their knowledge. I do not accept that inference. For the reasons I have given, Mr Turner's approach was incorrect, and cannot form a reliable basis on which to infer knowledge of such capacity defects as I have concluded did in fact exist.

- vi) In relation to Wrea Green, an exchange of emails in June 2016 indicates that lead time pressures led Wirsol to compromise on transformer size. On 8 June 2016 Wirsol wrote to Burnell referring to an order for substations placed in March for the Wrea Green project, which had been delayed due to grid connection problems. Wirsol wished to use those substations on the forthcoming Wilbees project and asked about lead times. Wirsol said on 9 June: *“ideally we would have had the larger transformers – but I understand from Jim that this will extend the lead times? One point Jason in cc made was that we would like the Woodward limit set to 3100A if possible to stop them tripping under normal condition”*. Burnell confirmed the following day that larger transformers would increase the lead times by 10-12 weeks minimum. Wirsol (Mr Richmond) replied *“Ok no worries about the larger transformers, we will proceed as planned with the standard 2240KVA transformers @ Wilbees”*.
- vii) Mr Hogan in an email of 11 October 2016 to Burnell said he was not entirely sure that the system was working satisfactorily as there seemed to have been further issues over the weekend. He stated *“We MUST find a solution as with these continued tripping we may find ourselves with extended outages and the site owners (Bluefield) calling on the bond!”*, meaning the performance bond. Mr Hogan also expressed concern at the *‘technical resilience’* of the product (including *‘Transformer Ratings’* and *‘Cooling Fans’*), stating that he wanted these items addressed to the satisfaction of the *‘technical folks’* for long term reliability and site up-time.

- viii) Mr Turner in an email of 19 October 2016 produced data gathered from single line diagrams for Cranham, Home Farm, Moor House, Otherton, Widehurst, Wilbees, Woodhouse and Wrea Green, which he said indicated that “*some sites needed upgraded transformers fit for their purpose*”. However, the maximum current figures assumed again do not reflect the actual current expectations which Dr Lockwood has calculated and which I accept.
- ix) A report dated 21 October 2016 from 33kV Ltd, sent to Mr Hogan, noted that as Wirsol’s mainland sites had been purchased, an order had been placed with Burnell “*to produce Sub Stn’s based on standard high voltage AC designs to ensure programme delivery dates are met*”. 33kV Ltd indicated that in their opinion transformers at Widehurst, Moor House, Wrea Green and Wilbees would be overloaded, with the effect of driving the busbars past their design limit and raising “*the temperature of the transformer to a point where the in situ Over Temperature Protection will trip – to protect the transformer, and part and/or the whole site will shut down... the likelihood that such events will occur is not in question*”. The covering email summarised the problem as a “*high likelihood of nuisance tripping on days of high irradiation – as the limits on the Busbars and Transformers will be exceeded*”.

The 33kV Ltd report appears to have been based on maximum inverter output calculations. Mr Hogan said in cross-examination:

“Q. But 33kV are experts?

A. As your high voltage experts. So their expertise is in connecting to the grid. They have -- they are senior authorised personnel within their team. Kevin Hann used to work for SSE, he knows the grid very well. Their expertise, and that's what they were engaged with us to do the harmonic distortion, flicker and voltage reports and various earthing reports, that's their expertise. Their expertise was the umbilical cord from the site, the DNO substation to the grid.”

and:

“Their experience is not in solar. They're connecting -- they're connecting a solar park one day, a gas peaking system another day, a factory another day, that's what they do. They connect high voltage up to 33KV and they've subsequently got accreditation up to 32KV to grid. That's what they do.”

I accept Mr Hogan’s evidence on this point. Mr Hogan added that he did not at the time pay too much attention to the report, having not been involved in the detailed design of the solar parks (as opposed to the supply chains) but passed it on to his team an hour or so later.

- x) On 11 April 2017 Mr Turner recorded in an email that Trowse Newton had tripped for overcurrent and that, with increased protection settings, Wirsol must “*monitor the transformer...to determine how much we are pushing the transformer and whether we should be concerned with damaging the*

transformer and invalidating the warranty.” In a further email on 11 April 2017 Mr Turner noted that the sites did not have the hardware to monitor the transformer temperatures.

- xi) On the same day, Mr Smith in an email to Mr Turner about the Woodward relay limits being raised noted that 3100A was the maximum setting that Burnell was happy for Wirsol to apply and that he “*would be surprised if Burnells will warranty the TX if we increase further (surely it will be at out risk, warranties void?) and technically, busbar current could exceed maximum busbar design current (I believe this was the main issue in addition to the TX capacity)*”.
- xii) Also the same day, Mr Humphreys of Burnell, referring to the request to increase the Woodward setting at Trowse Newton to 3160A, said “*at these settings we cannot take any responsibility for any further issues as these settings are way higher than what we recommend*”.
- xiii) On 28 April 2017, Mr Blackler of Low Carbon emailed Mr Estell of Wirsol, noting that the capping at Five Oaks would mean a rough loss of revenue of £15,000 a year and that “*the inability of the transformers to operate at the maximum inverter load is actually a defect under the EPC contract.*”
- xiv) Wirsol’s internal Live Issues tracker includes an entry in the ‘Low Carbon’ tab, dated 1 May 2017 (24 days prior to the SPA), stating “*EPC design fault at Five Oaks, Newton and Outwood of undersizing the transformer and related equipment mean the inverters have to [be] capped throughout the summer.*” The Low Carbon comment box recorded that there were a “*range of options for reducing the need for capping. Likely time offline 7-10 days if site replacement*”. The Wirsol comment box said “*Wirsol to provide feedback from Electrical engineering side to investigate options*”.
- xv) On 23 May 2017, two days prior to the SPA, Mr Blackler of Low Carbon emailed Mr Estell of Wirsol referring to Employer’s Requirements §4.4.5 and stating that “*as the SPV holds the contract, it needs to enforce this onto the EPC contractor to provide a solution to fix the defect, which currently involves chasing Burnell if a solution is not found then the owner will need to in some form make a decision that they will not press the EPC and will need to record that decision in some form. This decision needs to be in a form that can be audited at a later date by others including any potential owners*”. The Claimants suggest that it is inconceivable that – even if Mr Hogan and other relevant individuals at Wirsol (including those referred to in SPA clause 17: see further below) were otherwise unaware of the defects up to that date – this email did not come to their attention, or would not have done on careful enquiry.
- xvi) An internal Wirsol email of 1 December 2017 from Mr Turner to Messrs Smith and Van Wyk, referred to in § 279 above, went on to say:

“As Rob has mentioned, Fundamentally there is too many inverters connected to the transformer, or the transformer is undersized for the design. (Whichever way you want to look at it.)

There is many reasons for this, mostly based around costs and lead times and so the decision was made during the design stage to accept the lower rated transformer and just limit the inverters where needed.

The limiting of the inverter only has an effect when the output reaches the limit and has no effect when the inverter power is less than the set limit.”

It is not easy to assess the significance of this email. The particular comment quoted above is non-specific as to sites. As indicated in subparagraph (vi) above, there had been one particular compromise of capacity for lead times in relation to Wrea Green: it does not follow that the same approach was taken across the board. However, the comment quoted above appeared in an email setting out data for Five Oaks, Trowse Newton and Outwood, and would naturally be understood as referring at least to those sites.

Mr Turner’s comments may have been influenced by his assumption (seen in earlier communications discussed above) that the transformers needed to cope with the inverters’ maximum output. Nonetheless, a decision taken at the design stage to accept smaller transformers “*and just limit inverters where needed*” involved consciously taking the risk of the transformers being too small for the *actual* output from the inverters.

In addition, as the Claimants point out, the Defendants chose not to call Mr Turner to give evidence, and there is a case for drawing inferences against them in the event of doubt.

- xvii) An email from Mr Turner on 24 May 2018, after the SPA but referring back to the design period, said: “*no one would design a site and put a transformer in that is too small for the job on purpose...so it is not an electrical design decision that determined why we have transformer slightly undersized but a financial procurement decision.*”
 - xviii) The Claimants also rely on the (alleged) lack of documentation supporting the transformer ratings Wirsol set out in its SLDs, which were higher than (among other things) the ratings stated on the rating plates. The Claimants say Wirsol, and Mr Hogan and Mr Turner in particular, must have known at the time that the transformers in question did not have adequate capacity or capacity at the levels that Wirsol set out in SLDs.
294. In considering these matters it is relevant to note, first, that they post-date the design and procurement of (at least) the transformers and other substation equipment for at least the Five Oaks, Trowse Newton and Outwood sites. By the time of the first communication referred to above, those sites had already been built (as evidenced, for example, by an email of 19 April 2016 regarding clipping of the inverters at those sites). Moreover, the Claimants have not pleaded, at least clearly, any general case based on failure to remedy as opposed to the commission of the relevant breaches in the first place. The RRRAPoC plead *inter alia* the obligations to remedy defects set out in Conditions of Contract §§ 3, 4, 5, 7, 11 and 15 (the latter clause relating to obligations to remedy arising from defect notices served by the Employer under the EPC).

However, the section of the RRRAPoC dealing with Wirsol's breaches of the EPC Contracts (§§ 20-33) does not allege failure to remedy. Failure to remedy is alleged only in § 44 of the RRRAPoC, namely failure to comply with defect notices served on Wirsol. As indicated later, those notices did not complain 'at large' about capacity, but made specific complaints based on an alleged need to cater for maximum inverter output. An allegation of failure to remedy was also made in the Claimants' Reply, in response to the clause 17.6 argument, but that is not sufficient in my view to make good the absence of any particularised allegation in the RRRAPoC.

295. Nonetheless, the Turner email referred to at (xviii) above suggests that Wirsol took a conscious risk at the *design* stage in relation to Five Oaks, Trowse Newton and Outwood that the transformers would be slightly undersized, so that it would be necessary to clip the inverters from time to time. I do not conclude that Wirsol knew it was thereby breaching the EPC Contracts, but I am narrowly persuaded that it amounted to indifference to an obvious risk so as to constitute gross negligence for the purposes of EPC clause 17.6.
296. The position is different in relation to Widehurst. I have concluded that there was no lack of transformer capacity at that site. Moreover, Dr Lockwood's calculations indicate that the transformers do not come close to maximum capacity even on his 'worst case' scenario and even after a 2.6% temperature de-rating. There is insufficient evidence on which to conclude that there was any deliberate default or gross negligence in relation to the transformers there.

(6) Remedy

297. So far as rectification is concerned, the Defendants point out that:
- i) clipping can be removed at will: see the Claimants' expert's statement in the Defects' Experts' Joint Memorandum that "*Capping or clipping of inverters can be removed if busbars and transformers are sized as per remedial work outlined in Scott Schedule Item 1*"; and
 - ii) removal of clipping can be done quickly and for a trivial sum. Mr Andrew, the Defendants' expert quantity surveyor, has designated this item of remedial work RS5 and estimated a cost of £111 per substation site for two hours' work to reprogramme the inverters remotely. The Claimants' quantity surveying expert, Mr King, did not consider the costs of removing the clipping in his evidence, presumably because it is trivial.

Thus once the relevant transformers and busbars have been replaced by items of sufficient capacity, the clipping can easily be removed.

298. The Claimants also claim lost revenue resulting from the clipping at Five Oaks, Trowse Newton, Outwood and Widehurst, and hence indirectly resulting from lack of transformer and/or busbar capacity at those sites. I have, however, concluded that no claim lies in respect of Widehurst (see § 296 above) and therefore consider the three remaining sites.

299. The solar asset valuation experts have identified three potential sources of lost revenue arising from potential defects. In their Joint Memorandum, they agreed that “*the loss of income as a result of the alleged breaches prior to their remedy... arises from*”:
- i) “*any reduced generation revenues due to the ‘capped’ or ‘clipped’ output from the inverters at a number of the solar parks...*”, i.e. the loss of revenue associated with the transformers being limited to a lower level of power production in conditions of very high insolation;
 - ii) “*any reduced generation revenues owing to loss of generating hours as a result of forced and planned outages due to the alleged faults and related maintenance and inspection*”; and
 - iii) in light of the defects experts’ reports, to loss of revenue due to any efficiency losses of the forced air cooling system.
300. Mr Johnson on behalf of the Claimants calculated losses in the sum of £221,814.61 per year, or £887,258.44 for the four years from 25 May 2017. The latter figure was nearly double the amount he had set out in the Joint Memorandum (£474,646). Mr Slark on behalf of the Defendants evaluates the losses over the period in the sum of £75,183 in aggregate. Both sets of figures include estimates of losses caused by both clipping and forced air cooling.
301. In the light of my findings as to transformer and busbar capacity at Five Oaks, Trowse Newton and Outwood, potential claim (i) above can in principle be brought for these sites and I consider it below.
302. As to (ii), lost generation volumes attributable to outages resulting from breaches of contract could in principle be claimed, but the Claimants have not advanced evidence specifying the number, duration and cause of outages said to be caused by the alleged defects. Not every (or indeed most) outage(s) will be due to the alleged defects: for example, Mr Spencer identified various outages of sites where busbars had overheated, which turned out on analysis to have been caused by loose busbar bolts and misapplication of cooling paste, rather than any capacity issues for which the Defendants are arguably responsible. These were outages for which no claim can be made against the Defendants. The Claimants have not advanced evidence as to loss caused by particular outages said to have been caused by defects. This potential claim therefore falls away.
303. As to (iii), I conclude in section (H) below that the use of forced air cooled transformers was not a breach of contract. No claim for loss of revenue can therefore be advanced. Mr Johnson refers in his first report to “*inefficiencies in the design (such as the forced air cooling) causing greater losses and therefore reduced output*”. However, lost revenue cannot be claimed in the absence of a pleaded and proven breach of contract.
304. The approach of the Claimants’ expert, Mr Johnson, to calculating losses caused by clipping was in substance as follows:
- “7.4.1 The performance ratio for power plants shows actual output compared to theoretical output. A lower performance ratio leads to lower output. It is therefore a good indicator of

overall losses caused by the defects. Mr Kirk notes the example of Five Oaks, with a performance ratio c3% below what was expected over the year from 31 July 2017.

...

7.4.3 I have received from Toucan a summary from their performance reporting software showing the difference between 8 plants built by Wirsol and 8 plants of a similar size built by others for the full year from June 2019-May 2020. The screenshots are shown as Exhibit 1. What can be seen is that the performance ratio for the Wirsol sites is 80.9% and for the non-Wirsol sites is 84.9%, a difference of 4.0%.

7.4.4 I consider 4.0% as a reasonable estimate of annual losses as a result of the issues described above...”

305. Mr Johnson considered the data provided to him by Mr Spencer for a twelve month period; compared the performance ratio at the eight relevant Wirsol sites with eight non-Wirsol sites of the same size and having similar exposure to sunlight; and took into account evidence from Mr Blackler, one of the Asset Managers, and the evidence of Mr Hogan.
306. I agree with the Defendants that this approach is fundamentally flawed. It assumes that any difference in performance ratio between a Wirsol site alleged to be defective, and a similarly sized non-Wirsol site without known defects, is attributable to the specific breaches of the EPC Contracts alleged by the Claimants and which the court has found to exist. That assumption is unsafe for several obvious reasons.
307. First, not all the defects alleged by the Claimants (e.g. forced air cooling) have been found to be breaches of contract.
308. Secondly, as the Defendants’ expert Mr Slark explained:
- “... the PR is determined by a wide range of site-specific features, including the characteristics of the electrical components utilised, their age, the layout deployed, the physical topography of the site and the degree of shading... each of which can influence a site’s specific PR and by up to 3.67%.”
309. In addition to such technical and design features, a site’s performance ratio might be affected by extraneous events interfering with site performance, such as weather damage or equipment theft, or other reasons.
310. Mr Johnson accepted that the site-specific features identified by Mr Slark affect performance ratio. However, he suggested that they are “*already taken account of in terms of the target performance ratio*”. The Claimants make the point that Mr Johnson took into account actual sunlight exposure at both sets of sites, and that the Performance Ratios are set taking into account the geography and locus of the site, and are a function of anticipated performance against potential performance. The anticipated performance limb of the performance ratio takes into account the idiosyncrasies of the site. It is for

this reason that it is a particularly useful forensic tool when considering the impact of defects that are excluded by such an exercise. In other words everything else is taken into account.

311. However, there are two problems with that approach. The first is that so far as one can tell from Mr Johnson's report, his assessment is not based on a comparison of the variance between actual and target performance ratios, but on a comparison between actual performance ratios: hence he says in his report that "*the difference in performance ratio between these [Wirsol] plants and those without such issues has been 4%*". Secondly, and in any event, Mr Johnson has not provided any analysis of the target performance ratios for the non-Wirsol sites or how they have been set: for example, whether conservatively, realistically or ambitiously for the sites in question. Thus even if Mr Johnson were looking at target performance ratios, there is no evidence that a like-for-like comparison is being made.
312. Thirdly, there is insufficient evidence on which to conclude that the eight non-Wirsol sites to which Mr Johnson has compared the Wirsol sites' performance are properly comparable. The eight sites appear to have been selected by Toucan, and the criteria for the selection have not been fully explained. The rationale behind their selection from among the 56 solar parks owned by Toucan is that they are said to be of comparable size to the Wirsol comparators. Mr Johnson confirmed in evidence he did not consider the other sites under Toucan's control in order to ascertain whether they, too, might represent relevant comparators.
313. Fourthly, there is no reason to assume that any variation in the performance of the Wirsol sites themselves is due to the defects identified. Mr Johnson's approach assumes that every kWh of production by which the Wirsol sites' performance fell below the level of the 8 non-Wirsol sites is attributable to a specific defect for which Wirsol is liable. That is in my view another assumption too far. It ignores the different plant characteristics discussed earlier. It takes into account matters where no breach has been found (e.g. outages not arising from defects for which the Defendants are liable). Further, Mr Johnson discounted the possibility of damage or theft, or any other reason for the variation of performance of the Toucan sites versus the Wirsol sites, on the basis that he was not aware of any such events. Mr Johnson's approach exposes the analysis to a wide variety of factual variables, many of which are likely to be unknown and of which there has been no analysis.
314. The Claimants make the point that the assessment of loss is not a science: it involves value judgements and opinions and, when projecting into the future, experts and the court have to do the best they can – and that Mr Johnson's approach had the merit of using empirical data and used 'sense checks' (e.g. referring to Mr Blackler of Low Carbon's assessment of potential losses of £15k per site per year). The Claimants' general point is correct. However, the flaws in the methodology adopted are so significant as to mean Mr Johnson's calculation does not in my view provide even a useful starting point for calculating loss.
315. Moreover, the £15k figure from Mr Blackler was set out in an email from April 2017 relating to Five Oaks which referred to "*high level calculations*" and "*rough numbers*", but no details are given of how they had been approached. In particular, there is no indication of whether they took into account the important point noted below about the limited circumstances in which clipping has any actual effect on output. Mr Halliday

was unable to say whether Mr Blackler was qualified to carry out an assessment of loss of this nature. He agreed that the issue was “*primarily a matter for expert evidence*”, which he had not himself carried out on the basis that “*the actual loss analysis is covered by other personnel, other experts*”. He also agreed that the figures for losses given by Low Carbon were unsupported by any calculations or underlying data. Further, I agree with the Defendants that the Low Carbon email is insufficient to draw the conclusions the Claimants have sought to reach, even if there was a proper basis to substantiate Low Carbon’s figure:

- i) the figure relates to a period of nine days in April (spring being the period of highest power production) at one site. The 1.7% loss cannot be extrapolated to the rest of the year at Five Oaks, let alone to the rest of the sites; and
- ii) only two of the nine days in the sample of data exceeded the clipping threshold: the other days also showed a significant reduction in anticipated performance, indicating that the drop in performance could not be caused solely (or even mainly) by clipping.

316. Equally, Mr Hogan’s remark in the course of an answer given in cross-examination that:

“... we told them about the tripping, we told them about the various things, they did the site visits and these observations were made known to them. ... and one year later they make -- on Five Oaks Toucan made the call on the bond for £200,000 and, yes, there would have been about £15,000 worth of revenue lost in that year. By the time -- by the time they terminated the contracts Five Oaks was running above EPC guaranteed performance ratio”

evidently related to shortfall versus Guaranteed Performance Ratio (the basis on which the bond was called) and does not evidence the level of loss specifically caused by clipping (even if Mr Hogan were qualified to make such an assessment).

317. The Claimants suggest that Mr Johnson approached matters on a conservative basis, because, as he pointed out, the Wirsol sites had greater exposure to sunlight than the non-Wirsol sites, up to 1.4%, and thus the 4% differential used by Mr Johnson could indeed have been greater – 5.4%. That suggestion overlooks the point that a performance ratio (actual or target) assesses the level of performance achieved for the given level of sunlight actually received. As Mr Slark explained:

“A. ... I think the performance ratio is the relationship between the amount of irradiance, the sunlight, and the level of generation that is achieved. So –

Q. But it doesn’t matter –

Mr Justice Henshaw: Can we have the rest of that answer please?

A. So it follows that the calculation has already taken account of that.”

318. I therefore turn to the approach taken by Mr Slark, which was to seek to calculate the specific reduction in generation volumes attributable to the identified instances of clipping.
319. A key point in this context is that clipping only causes lost production during periods in which the solar park's output would exceed the clipping applied. During other periods it has no effect at all. To establish losses due to clipping it is therefore necessary to (a) model the extent of production that the unclipped solar park would have, based on plausible assumptions regarding insolation and periods of peak production and (b) assess the extent to which the clipping would reduce that production.
320. Dr Lockwood sought to do this. He made a detailed analysis for the most heavily loaded site, Trowse Newton, and calculated the annual losses due to clipping as being 0.03% at 5% clipping and 0.18% at 10% clipping. His approach in essence involved comparing the raw data for output with the limit of power implied by the clipping in place: for example, a 2% clipping level means that any available power will be held to 98% of maximum power when, but only when, the available power would have exceeded that level. The total impact on revenue in a year at Trowse Newton was calculated as being less than £1000, even clipping output at 10%. The low figure results from the very limited periods for which solar farm production exceeded the clipping levels applied. Mr Halliday accepted that this was the right approach in principle, and anticipated that other experts would perform this analysis on behalf of the Claimants:

“A. The actual losses, my understanding of the process was that there was other experts who do the quantum losses.

Q. So you would expect to see another expert performing an analysis similar to Dr Lockwood's. That's what you were anticipating, were you?

A. Yes.”

321. The only evidence before the court as to the degree of clipping in fact implemented and likely to be implemented is the table of clipping data set out in Dr Lockwood's report quoted in § 275 above. Applying the approach to assessing clipping losses set out in Dr Lockwood's report, and the extent of clipping thus set out by Dr Lockwood, Mr Slark calculates the impact of clipping on production volumes as 1.6MWh at Five Oaks, 8.1MWh at Outwood, 17.4MWh at Trowse Newton and 0.1MWh at Widehurst over the period 25 May 2017 to 31 August 2021. Applying that lost generation to an agreed unit income of £109.43MWh, he assesses the losses attributable to clipping at £2,981.25.
322. The Claimants make a number of criticism of this approach. They point out that Mr Slark's calculation depends on the data set out by Dr Lockwood, which Dr Lockwood obtained from Wirsol and did not independently verify. Further, they suggest that the fact that the data does not include periods when some inverters were switched off. As set out under subheading (2) above, I agree with the Claimants that those latter periods need to be included, but (subject to that modification) the evidence set out in Dr Lockwood's report is the best evidence available. The Claimants have not established any further instances of clipping.

323. The Claimants also criticise Mr Slark for volunteering purely/truly subjective opinions based on the impact of the defects on loss of production, said to be based on his own experience as a director of a community solar park, which was not set out in his reports and thus could not be scrutinised by Mr Johnson. Had this experience been relevant Mr Slark would have been bound by his duties as an expert to include it in his report. The criticism is in my view unfounded, and in any event is certainly overstated. In response to a question about what sense-checking he applied, Mr Slark said that he had access to various solar data including from a solar farm of which he is a director, and could therefore take a very good and informed view on the extent to which clipping would affect generation volumes. He did not refer to that information in his report because he relied on Dr Lockwood's data in terms of the numbers and approach. Pressed on the point, Mr Slark said the site he was involved in was similar in size and general concept to those at issue in this case, but was a single site in isolation and different in that it has an exterior oil cooled transformer. He did not consider that individual data from that site would necessarily add to insight in relation to the present case, though he felt that the broad concepts were transferable. It would have been preferable for this to have been set out in Mr Slark's report for completeness, but I find his explanation to be coherent and do not consider that this matter undermines the reliability of his evidence.
324. I therefore conclude that damages should be based on the assessment performed by Mr Slark subject, however, to adjustment in order to take account of the periods which the Claimants identified at trial when inverters had been switched off, which I take to be those referred to in § 277 above.

(H) USE OF FORCED AIR COOLED TRANSFORMERS (Scott Schedule Item 4)

(1) Whether there was a breach of Employer's Requirements clause 4.4.7

325. Transformers need to be cooled because of relatively small losses of power which create heat, particularly when the transformer is under load, caused mainly by the resistance of the winding conductors. Dry-type transformers are cooled either by natural air circulation (given the designation "AN" under IEC 60076-11, paragraph 10.2) or by forced air cooling ("AF"). Forced cooling requires fans to be used to circulate the air through the transformer, and especially the windings, triggered by a thermostat. As discussed earlier, a transformer can be rated to a particular power level for natural air cooling and to a higher level with forced cooling.
326. It is common ground that the thirteen solar parks using dry-type transformers were cooled by forced air cooling. These include the eleven sites where the Claimants allege insufficient transformer and busbar capacity, together with Balcombe and Eckland Lodge. The forced air cooling comprised:
- i) ventilation of the substations as a whole, with air being drawn into the substation via intake vents and removed through extract vents fitted with extractor fans; and
 - ii) direct cooling of the transformers, via 'snail' fans fitted to the transformer assembly.

327. The Claimants allege that this was a breach of Employer's Requirements § 4.4.7, which they say required the transformers to be cooled by natural air cooling only.

328. Clause 1.5 of the Conditions of Contract states:

“The documents forming this Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

the Contract Agreement;

the Conditions of Contract;

Schedule 1 (Employer’s Construction Requirements);

The remaining Schedules other than Schedule 8 (Contractor’s Proposals); and

Schedule 8 (Contractor’s Proposals).”

329. Clause 2.2 of the Employer’s Requirements, headed “*Interpretation*” includes the following:

“The Parties have agreed the details of the Contractor’s scope of works and specification and other documentation contained in the Contractor’s Technical Proposal and the Parties agree and acknowledge that, subject to necessary design development and the provision of all works, plant and materials necessary to enable the works as described in the Contractor’s Technical Proposal to be constructed and completed, the documents forming the Contractor’s Technical Proposal set out the agreed scope of works and specification of the Works to be provided by the Contractor.

Subject to the requirements of the preceding paragraph where the Contractor’s Technical Proposal does not address a particular requirement set out in these Employer’s Requirements (which is not a requirement under English Laws (as such term is defined in the Conditions of Contract) and compliance with such requirement would cause the Contractor to incur additional cost or cause delay to the Works, then the Parties shall seek to agree (acting reasonably) whether based on the negotiations between the Parties and the scope of works and specification as set out in the Contractor’s Technical Proposal and the fact that the Contractor is an experienced contractor in solar photovoltaic installations the requirement is one which the Contractor should reasonably be expected to comply with having regard to specific site conditions and requirements. If the Parties agree that the Contractor should reasonably be expected to comply with the relevant requirement then the Contractor shall comply with such

requirement. If the Parties agree that the Contractor should not reasonably be expected to comply with the relevant requirement then he shall not be bound to comply with the same and the relevant requirement shall be disregarded unless the Employer instructs a Variation with regard to such compliance. Any dispute or failure to agree shall be referred for determination in accordance with clause 20 of the Conditions of Contract. If the failure of the Contractor's Technical Proposal to address a particular requirement set out in these Employer's Requirements is not discovered during the carrying out of the Works the principles set out in this paragraph shall apply to determine whether the Contractor is liable under this Contract in respect of the failure to comply with the relevant requirement of the Employer's Requirements. In the event of any inconsistency between the Contractor's Proposals and these Employer's Requirements, these Employer's Requirements shall prevail."

330. The "*Contractor's Technical Proposal*" is defined in § 1.1 as meaning the proposal set out in Schedule 8 to the EPC Contract. Except for Balcombe, this states that the transformers will be "AF" (i.e. 'air forced'), and that the transformers will be "*each with forced air cooling*". The Proposal in the Balcombe EPC refers in the section on "*System Components*" to "*2 x 2,240kVA TMC Eco-Friendly 11kV Cast Resin Transformers ... 2,240kVA(AF) 111kV/0.4kV*". Whilst the Balcombe proposal does not include the further statement "*each with forced air cooling*", the reference to "AF" makes clear that it too is a proposal for a forced air cooled transformer.
331. Clause 4.4.5 of the Employer's Requirements provides:
- "All transformers will be of the three phase with one LV winding for each inverter – vector group Dy11y11, of the specification attached in Schedule 8 and supplied and manufactured by the same approved subcontractor as listed in Schedule 12."
332. Clause 4.4.7 of the Employer's Requirements sets out general requirements for dry-type transformers:
- "All dry-type transformers shall be mounted indoors and shall be installed in purpose designed and built housings. Housing shall be designed to allow adequate ventilation of the transformer but to prevent inadvertent contact will live metalwork. As a minimum the protection class of transformer housing shall be IP32. All dry type transformers shall be designed for natural air cooling."
333. The Claimants submit that in considering the meaning of the contractual terms it is important to bear in mind that for dry-type transformers there are only two alternatives, natural air cooled or forced air cooled in the sense that the forced air cooling is triggered when the transformer reaches a certain temperature. They say there is an inconsistency between Employer's Requirements § 4.4.7 and the Contractor's Proposals, and that the former must prevail by operation of Clauses 1.5 of the Conditions of Contract and 2.2 of the Employer's Requirements. Further, the provision in clause 4.4.5 of the

Employer's Requirements, to the effect "[a]ll transformers will be of the three phase with one LV winding for each inverter ..., of the specification attached in Schedule 8", does not alter the analysis, as it says nothing about how the transformer is to be cooled. Even if the reference in § 4.4.5 to the specification attached in Schedule 8 applies to the transformer, rather than just the winding, there is still a positive requirement in the Employer's Requirements that the transformers are designed for natural air cooling, which must prevail over the inconsistent provision in the Contractor's Proposals that the transformers are designed for forced air cooling.

334. The Defendants point out, first, that Employer's Requirements § 2.2 indicates that the parties regarded the Contractor's Proposals as forming a key part of their contract, as shown in particular by the language "[t]he Parties have agreed the details of the Contractor's scope of works and specification and other documentation set out in the Contractor's Technical Proposal" and that the parties agree that "the documents forming part of the Contractor's Technical Proposal set out the agreed scope of works and specification of the Works to be provided by the Contractor". The "Contractor's Technical Proposal" is defined in § 1.1 as meaning the proposal set out in Schedule 8 to the EPC Contract, which as noted above specifically indicates that the transformers will use forced air cooling.
335. Secondly, the language of Employer's Requirements § 4.4.7 may be contrasted with that of the immediately preceding clause, § 4.4.6, which sets out requirements for Oil Immersed Transformers. The latter clause provides that if such transformers are located in enclosures they "shall be designed of the ONAN type (oil natural or air natural cooling) such that no forced ventilation or air conditioning of the enclosure is required." Thus the parties expressly excluded the use of 'forced ventilation' where that was the intention.
336. Thirdly, ten of the thirteen EPC Contracts were agreed after the substations had been installed. It would have been objectively evident to both the SPV and Wirsol, who shared common directors at the time of the EPC Contracts, that the solar parks had been designed on this basis. The Defendants rely on this point in support of an alternative claim for rectification, but in my view it can reasonably be regarded as part of the factual context in which the contracts were made. It seems inherently unlikely that the parties to those contracts intended the newly-supplied transformers to be immediately replaced. By extension, it seems unlikely that the parties intended a materially different position to obtain in relation to the other three EPC Contracts. Nor is there evidence of any complaint in relation to any of the thirteen sites until spring 2018, a year after the Claimants bought the companies owning the solar parks. (For the avoidance of doubt, I accept the submission by the Claimants, who bring the defect claims as assignees of the SPV who were employers under the EPCs, that the Claimants' state of knowledge at the time of the SPA is irrelevant in the present context.)
337. In these circumstances I am persuaded that Employer's Requirements § 4.4.7 should not be construed as precluding the installation of transformers capable of use with either natural air or forced air cooling, as the transformers were in the present case. There is force in the contrast between §§ 4.4.6 and 4.4.7, and the latter can and should be interpreted as not precluding the use of transformers capable of functioning both with natural air cooling and forced air cooling. Further, I consider that the reference in § 4.4.5 to the "specification attached in Schedule 8" relates to the transformers in general, not merely the windings, and incorporates into the body of the Employer's

Requirements the parts of Schedule 8 of each EPC that deal with transformer specifications.

(2) Rectification for common mistake

338. The Defendants plead an alternative claim (Defence § 19(2)(c)) for rectification of Employer's Requirements § 4.4.7 so as to permit the use of forced air cooling. They note that substations using forced air cooling were installed at most sites before the EPC Contracts were executed, and this was evident to the parties' common directors, who must have intended this to be permissible. The contract can therefore be rectified to reflect their common understanding: see *FSHC Group Holdings Ltd v. GLAS Trust Corpn Ltd* [2019] EWCA Civ 1361, [2020] Ch 365 at § 176. In slightly more detail, the Defendants submit as follows:

- i) The parties had a common intention that the sites could use forced air cooling which (on this hypothesis) the contract did not accurately record. So far as concerns the ten EPC Contracts agreed after the installation of the substations, those contracts were agreed in circumstances where the (shared) directors of each party knew or must have known of the use of forced air cooling, and clearly approved thereof – or they would not have agreed the relevant contracts. So far as concerns the three EPC Contracts agreed before the installation of the substations, those contracts were agreed in circumstances where the (shared) directors of each party knew or must have known of the use of forced air cooling at sites with materially identical designs.
- ii) There was an outward expression of accord on this issue in the form (at least) of the prior installation at most sites of substations that did use forced air cooling, which was clearly considered by their common directors to be permissible.
- iii) There is no lack of clarity as to the term to be rectified or the nature of the required rectification. The relevant paragraph of the Defence is clear in this regard:

“Alternatively, if, which is denied, paragraph 4.4.7 of Schedule 1 of the EPC Contracts is to be interpreted to require that the transformers use only natural air cooling, the said paragraph was the product of a common mistake... and should be rectified also to permit the use of forced air cooling...”.
- iv) To the extent necessary, each of the EPC Contracts can therefore be rectified to reflect the parties' common understanding.

339. Leggatt LJ in *FSHC Group Holdings* summarised the requirements for rectification thus:

“... before a written contract may be rectified on the basis of a common mistake, it is necessary to show either (1) that the document fails to give effect to a prior concluded contract or (2) that, when they executed the document, the parties had a common intention in respect of a particular matter which, by mistake, the document did not accurately record. In the latter

case it is necessary to show not only that each party to the contract had the same actual intention with regard to the relevant matter, but also that there was an “outward expression of accord”- meaning that, as a result of communication between them, the parties understood each other to share that intention.”

340. The Defendants must produce “*convincing proof*” of each aspect of the legal test, including that each EPC was not in accordance with the parties’ true intentions at the time of their execution, but that the proposed form does accord with their intentions. The extent of the rectification must be clearly ascertained and defined by evidence contemporaneous with or anterior to each EPC Contract.
341. The Defendants’ witness evidence does not establish a common intention or outward expression of accord as regards the use of forced air cooling. The Defendants’ case in substance rests on the fact that both parties knew, by the time most of the contracts were made, that forced air cooled transformers had already been bought and installed. As noted above, I accept that that is a factual circumstance relevant when considering the terms of the contract actually made. It makes it less likely that the parties intended, by their contractual language, to achieve a radically different solution. However, I do not consider that it could really be said to amount to an ‘outward expression of accord’ so as to found a claim for rectification.

(3) Employer's Requirements § 2.1

342. The Claimants also seek to contend that the use of forced air cooled transformers was contrary to the statement in Employer's Requirements § 2.1 that “*[t]he intent of the Specification is to procure for the Employer a modern, functional, well-designed solar power plant capable of continuous, efficient and reliable operation with minimum maintenance*”.
343. There is in fact no pleaded case to that effect, though other provisions of the Conditions of Contract and Employer's Requirements are alleged to have been breached. I consider the point nonetheless because the arguments advanced overlap with those put forward in relation to materiality and remedy. The following considerations arise.
344. First, it is relevant at least by way of context that forced air transformers are widely used in the industry. Dr Lockwood’s expert report records that “*the use of air-forced-cooled transformers is widespread in the solar park industry and the vast majority of sites that [he has] seen used such units*”. Dr Lockwood said he had been to over twenty solar parks (including five Wirsol sites), all but two of which used forced air cooling; and is currently working on a project reviewing the asset base of a major solar park asset owner, in respect of which about 65% of the 25 solar parks use forced air cooling. Further, Dr Lockwood records that Burnell have confirmed that the majority of the 180 transformers they have installed in the UK are forced air transformers.
345. Mr Ryder put forward evidence to the contrary based on a sample of four solar farms, and based on promotional materials from transformer manufacturers. Mr Ryder’s evidence at trial included the following:

“Mr Justice Henshaw: Well, I think he is asking, if I’ve understood correctly, do you agree that indoor dry type forced air cooled transformers are widely used in the market?”

A: It would appear that they are widely used – it would appear that they are used, especially it would appear by Burnell if we are to believe Dr Lockwood’s evidence.”

346. Although it is not necessarily possible to extrapolate from Dr Lockwood’s experience to the industry as a whole, nor to conclude that forced air cooled transformers are the industry standard, I am satisfied that they are an industry standard and are widely used.

347. Secondly, the experts agreed in the joint memorandum that:

“Transformers with forced air cooling are less efficient than transformers of similar design and construction with natural air cooling. This is partly owing to the energy consumed by the fans but mainly owing to the inherent characteristics of transformers.”

348. The first point here is the energy consumed by the fans. The second is that, as accepted by Dr Lockwood, the load losses, or “*copper*” (Cu) losses, are about 40% higher for forced air cooled transformers of the same output rating as natural air cooled transformers, with an overall difference in efficiency of 0.3% when at full load.

349. However, an efficiency differential of 0.3% is in reality very small, and in my judgment falls far short of amounting either to a defect or a ground on which any breach could be regarded as material.

350. Thirdly, the experts agreed in the joint memorandum that:

“The use of fans increases the complexity of the system and this has the potential consequence of reduced reliability and availability. Assuming this protection is functioning correctly, it should minimise the consequences for any fan failures for equipment life and also any risk of fire.”

351. The Claimants contend that on the subject sites the use of fans has led to complications every year, causing reduced reliability and availability:

- i) Five Oaks tripped on 19 July 2016 because Burnell had left the fan controller at its default setting;
- ii) in June 2017 there was a failure of the centrifugal fan under the middle core of the transformer at TX1 of Wilbees; and
- iii) in August 2018 there were repeated failures of the VRT200 units that control the fans at three sites, Outwood, Wilbees and Wrea Green.

352. Dr Lockwood was asked about these events. He understood from the documents that no transformer fans had failed, though there had been issues in terms of fan controllers suffering problems in the early stages, which had apparently not recurred. The 2016

problem at Five Oaks had been rectified so that the over-temperature would not recur. The 2017 site report relating to Wilbees indicated that the author was ‘concerned’ that there ‘may be’ a problem with the fan, but Dr Lockwood had seen no documents confirming that there had in fact been any fan failure. In August 2018, there were fan control failures at three sites. Dr Lockwood accepted that that was a problem that needed to be fixed, and which he assumed had been fixed. He accepted that fans increase complexity and have potential consequences, but did not consider there to be a systematic issue across the whole fleet of transformers. The use of forced air cooling had, he said, both advantages and disadvantages.

353. The evidence adduced by the Claimants from Mr Ryder and Mr Spencer dwelt in some detail on a visit by Burnell to Outwood in June 2019 after raised transformer core temperatures had occurred. Mr Spencer highlighted a statement by Burnell in its 4 July 2019 letter that the *“reason that high temperatures were recorded on TX2 was because the fans were not working”*. However, that was a selective quotation, as the full sentence read *“The reason that high temperatures were recorded on TX2 was because the fans were not working, the filters are dirty and the fitting of nonstandard cowls to output fans”*. Mr Spencer also quoted Burnell’s comment that Outwood was *“not getting the correct airflow to the transformers”*. The full passage read:

“Please be advised that there is still a major concern by us regarding the cooling of these transformers, you are correct in that we have set up the fans on substation 2 and this has gone some way in reducing the transformer temperatures however the bigger issue that appears to be being overlooked is that you are not getting the correct airflow to the transformers and as per our report this is because the bag filters need changing and the additional fan cowls need removing and the proper fan cowls need to be fitted this is detailed in the last paragraphs of our report, until these actions are carried out you will continue to see a reduced airflow which will result in high temperatures on the transformers.”

Burnell returned to this point towards the end of their letter:

“We reiterate that we are very concerned about the lack of knowledge or the correct operation of the equipment, the lack of maintenance and general cleanliness of the substations...”

354. I conclude that the Outwood problem resulted from lack of maintenance rather than a problem with the equipment.
355. Fourthly, the experts agreed in the joint memorandum that:

“The use of forced ventilation may result in some additional ingress of dirt and other fine solid contamination via the air intakes compared with what might otherwise have been expected.”

356. Dr Lockwood in his oral evidence said this would be a problem only if the transformer is not properly maintained, by checking and replacing the filter frequently. I agree with

the Defendants that the need to change the filters and keep the substations clean is not a breach of the requirement for “*minimum maintenance*”.

357. Fifthly, the Claimants suggest that this alleged disadvantage is recognised in the standards, specifically IEC 61936-1, the standard for all power installations exceeding 1 kV a.c.. Paragraph 7.5.7 states under the heading “*Air conditioning and ventilation*”:

“Indoor climate conditions shall be established e.g. by adequate cooling, heating, dehumidifying, ventilation or by adequate design of the building.

It is preferable to use natural ventilation for transformer rooms.”

358. The Claimants contend that this standard shows an industry wide design preference in favour of natural air cooled transformers.

359. Dr Lockwood made the point during cross-examination that this provision related to the ventilation of rooms rather than the cooling system of transformers. The Claimants say in their written closing that that was “*an entirely spurious distinction*” made by Dr Lockwood in order “[t]o avoid having to agree with this proposition when this part of the standard was put to him”. They pray in aid the fact that both Dr Lockwood and Mr Ryder have sometimes used the expression “*forced ventilation*” in the joint memorandum as meaning with forced air cooling.

360. In my view, Dr Lockwood is probably right on this point. IEC 61936 relates to power installations above 1kV alternating current in general, covering *inter alia* substations, electrical installations on masts etc, power stations, and the electrical systems of factories, agricultural, commercial and public premises. The installations it covers include a wide variety of apparatus including transformers. Part 7 is headed “*Installations*”, and part 7.5 is headed “*Requirements to buildings*”. It includes provisions relating to load-bearing structures, walls, windows, roofs, switchgear rooms, and doors. Section 7.5.7 as a whole reads:

“7.5.7 Air conditioning and ventilation

Indoor climate conditions shall be established e.g. by adequate cooling, heating, dehumidifying, ventilation or by adequate design of the building.

It is preferable to use natural ventilation for transformer rooms.

Forced ventilation systems (permanent or mobile) shall be designed to take into consideration smoke removal from the building.

Monitoring of the operation of a permanent fan is recommended.

Ventilation openings shall be designed so as to prevent any dangerous proximity to live parts and any dangerous ingress of foreign bodies.

Coolants and heat transfer media shall not contain mechanical impurities or chemically aggressive substances in quantities or qualities which may be hazardous to the correct function of the equipment in the installation.

Filters or heat exchangers shall be provided, if necessary.

Mechanical ventilation systems shall be so arranged and placed that inspection and maintenance can be carried out even when the switchgear is in operation.”

361. These provisions in my view relate to the room in which an installation, including a transformer, is placed. They do not focus on forced air cooling forming part of the transformer unit itself. In any event, even if the preference stated in the standard were for natural air cooled transformers, it would not follow that the use of forced air cooled transformers was a breach of the standard or a breach of the EPC Contracts. Further, I accept Dr Lockwood’s evidence given in cross-examination that forced air cooled transformers are not more prone than natural air cooled transformers to humidity problems.
362. The allegation I refer to in § 359 above is a serious allegation of bad faith made on slender and inadequate grounds. The suggestion that Dr Lockwood deliberately set out to avoid the question by means of a spurious distinction was baseless and should not have been made. Moreover, it is not an allegation that was put to Dr Lockwood, as it would have needed to be if the point were to be made in closing.
363. It is difficult to avoid the conclusion that the forced air cooling complaint is, as the Defendants submit, a thoroughly opportunistic one. It must have been the Claimants’ understanding, at the time when they acquired the solar parks, that the sites were permitted to use forced air cooling. The Claimants’ technical experts, Mr Baber and Mr Bennett, inspected the sites before the SPA was executed. Mr Kavanagh’s witness statement stated that “[a]s the site visit reports clearly show, we were not aware of the forced air cooling which had been integrated into the design”. However, the air intake vents required for forced air cooling are clearly visible in the photos taken by Mr Baber in the course of his site visits. Mr Baber, as a technical expert, would immediately have appreciated the significance of the vents. Moreover, the use of forced air cooling was stated clearly in the OST Lenders Reports, which Mr Kavanagh himself claims to have relied upon. I therefore reject Mr Kavanagh’s evidence.
364. The suggestion that forced air cooling was a defect, or not permitted by the EPC Contracts, appears to have been first raised in spring 2018 (a year after the purchase) at a time when the parties were in dispute. Mr Spencer, the Claimants’ technical director, stated at trial that he knew of the use of forced air cooling having “reviewed the documents” when he first joined Toucan in February 2018; but considered it to be a defect only when he reviewed the EPC Contracts as part of his “review of the capacity defect” in April 2018.
365. I conclude that the Claimants have failed to establish that the use of forced air cooled transformers was a breach of Employer's Requirements § 2.1. They have also not established that any breach (whether of § 2.1 or § 4.4.7) was a material one.

(4) Remedy

366. I have concluded that the use of forced air cooled transformers was not a breach of the EPC Contracts. I therefore comment only briefly on the question of remedy. I do so only on the hypothesis that I am wrong in my conclusion about the effect of Employer's Requirements § 4.4.7 but otherwise correct in my factual conclusions on this topic.
367. The Claimants submit that forced air cooled transformers suffer a number of real disadvantages being (i) less efficient, (ii) more complex and prone to reliability and availability problems including, therefore, an associated risk of damage to equipment and personal injury and (iii) more likely to suffer from contamination and humidity problems. The Claimants say the issue between the experts is the extent of those disadvantages, but not that they do not exist. In those circumstances a remedy of replacement of the existing transformers by the transformers that the SPV bargained for is an entirely reasonable remedy. The Claimants draw an analogy with bargaining for a Tesla car of a given performance, but instead receiving a hybrid car whose performance is propped up to almost the level of the Tesla by the use of both an electrical battery, but also an engine: the engine being less efficient and prone in operation to problems with additional maintenance and associated risks. The SPVs bargained for a modern, functional, well-designed solar power plant capable of continuous, efficient and reliable operation with minimum maintenance, and the forced air cooled transformers provided do not meet those requirements.
368. However, based on my earlier factual conclusions, forced air cooled transformers do not suffer from any material disadvantages compared to natural air cooled transformers. Any breach was (on the hypothesis I mention in § 366 above) an entirely technical one. The efficiency losses caused by forced air cooling are minimal and could (assuming for present purposes there to be a breach) be compensated in damages. Complete replacement of the transformers would be disproportionate to the advantage that would thereby be gained, and result in greater compensation than merited by any reasonable assessment of the Claimants' real loss (cf *Ruxley Electronics & Construction v Forsyth* [1996] 1 A.C. 344, HL).
369. So far as lost revenue is concerned, for essentially the same reasons as set out in section (G) above, I would have preferred the approach taken by Mr Slark, of seeking to calculate loss based on the available data for these sites, rather than the comparator approach used by Mr Johnson. The only expert evidence before the court as to the efficiency differential between forced air and natural air cooled transformers is that of Dr Lockwood. Mr Slark applied the efficiency differential of 0.3% calculated by Dr Lockwood across the thirteen sites at which forced air cooled transformers are installed to arrive at a total figure for loss under this head of £72,202. Had I found there to be a breach, and in the absence of any pleaded mitigation defence, I would have used that figure as the appropriate basis for damages.

(I) SUBSTATION HUMIDITY (Scott Schedule Item 5)

(1) Introduction and relevant standards

370. The Claimants alleged that there is excessive humidity in the substations, creating the conditions for corrosion and loss of equipment life, and that corrosion consequential upon the effects of humidity is already taking place. They say that in multiple solar

parks water has condensed on the surface of the coils and water droplets formed on the windings resulting in damaging and potentially dangerous corrosion to transformer cases.

371. In addition to the general design and construction obligations referred to earlier, the key contractual obligations are to ensure compliance with:

- i) IEC 60076-11 § 4.2.6, a provision of the part of the standard dealing with dry-type power transformers, which provides: *“The relative humidity of the surrounding air shall be less than 93%. No drops of water shall be present on the surface of the coils”*; and
- ii) IEC 61936-1 §. 4.4.2.1(e), which forms part of the general standard for electrical installations referred to in § 360 above, and concerns normal conditions for indoor installations. The paragraph reads:

“The average value of the relative humidity, measured over a period of 24 h, does not exceed 95 %.

For these conditions condensation may occasionally occur.

NOTE 1 Condensation can be expected where sudden temperature changes occur in periods of high humidity.

NOTE 2 To avoid breakdown of insulation and/or corrosion of metallic parts due to high humidity and condensation, equipment designed for such conditions and tested accordingly should be used.

NOTE 3 Condensation may be prevented by special design of the building or housing, by suitable ventilation and heating of the station or by the use of dehumidifying equipment.”

(2) Design of the substations

372. The Claimants alleged that the design and construction of the substations is deficient and provides for excessive humidity. In particular, they say:

- i) The internal design of the substation is separated into an HV room, a transformer room, and an LV room. They have no humidity controls as such (e.g., Mr Ryder mentioned, silica gel or cold traps). In an email exchange on 2 October 2018 Mr Barnes of Wirsol asked various Burnell personnel, *“do you have information on how the tx stations control humidity? We need this for Toucan claims”*, to which Mr Young replied *“the Burnell PV substations do not have humidity control, they only control the temperature inside the substation.”*
- ii) The anti-condensation heaters are mounted high on the walls of the HV and LV rooms close to the access doors, on the opposite wall and as far from the HV blast relief pit entrance as it is possible to be while being in the HV room. No design rationale has been provided for their location and they are ineffective.

- iii) The blast vents through the floor next to the HV switchgear allow air carrying moisture into the substation. The same must be regarded as the case for the cable entry points.
 - iv) The use of unlined pits under the HV rooms, unsealed cable entries, combined with the poorly positioned anti-condensation heaters, promotes entry of cold and humid air into the HV room, resulting in condensation within the HV cable entries and HV switchgear.
 - v) So far as the transformer room is concerned, the temperature is determined largely by the no-load loss of the transformer and air flow provided by any ventilation. The anti-condensation heaters do not materially contribute. The ventilation is limited due to the small size of the substation by reference to the transformer, as a result of its design for forced air cooling. It is Mr Ryder's understanding that the guidance in IEC standard 61936-1 that "*it is preferable to use natural ventilation for transformer rooms*" is stated because of the risks of excessive condensation associated with the design of forced air cooled transformer substations. Mr Ryder has calculated that the transformer room will be just 2.8K to 4.6K higher than the outdoor ambient temperature, but at least 5K is normally considered to be necessary to avoid condensation.
 - vi) The painting system deployed on most of the subject transformers is inadequate to cope with the chronic effects of excessive humidity and condensation. In the words of Mr Ryder, "*The chronic effects of humidity, especially corrosion, would normally be managed by application of a suitable painting system or equivalent to steel parts of the transformer including the core and the housing if supplied with the transformer.*" There was no specification by Wirsol of the paint system to be deployed by manufacturers of the transformers and each, therefore, simply applied their standard paint system. The transformers supplied by SEA and TMC, in particular, have inadequate paint systems as supported by the reports of paint specialist, Tim Blythen, working under the supervision of Mr Ryder. Mr Ryder draws his conclusions by reference to international standards based on the findings of Mr Blythen that SEA and TMC transformers will have an expected life of paint system of either up to 7 years or between 7 and 15 years. This is in specific breach of clause 3.8 of the Employer's Requirements, as well as the design life obligations. This inadequacy of the protection against excessive humidity is relevant to Eckland Lodge, Home Farm, Moor House, Otherton, Widehurst, Woodhouse and Wrea Green (SEA) and Newton and Outwood (TMC).
 - vii) The thermal insulation provided is inadequate. The as-built drawings show "*roof and walls insulated to 0.45W/m2 (50mm Celotex)*". However, Mr Hogan accepts that Celotex was not used in the substations, but that 50mm of mineral wool insulation was used instead. It is common ground that Celotex is flammable and therefore inappropriate for use. However, mineral wool insulation does not have the same thermal insulating properties as Celotex. To achieve equivalent thermal insulation performance, insulation of 75mm is needed.
373. Dr Lockwood explained the mechanism for humidity control in the substations in the following paragraphs of his second report, which it is useful to set out in full:

- “151. As the substation ventilation system runs all the time there is a continuous influx of outside air into the substation. To avoid condensation, particularly during changes in temperature, it is necessary to keep the temperature inside the substations above the exterior air temperature. The margin between the interior temperature and the exterior should be 5°K or higher.
152. There are three main sources of heat within the substations. Two of those are temperature-controlled fan heaters similar to domestic fan heaters, the other being the transformer losses.
153. When running, transformers generate heat in two ways. There are power losses associated with the cyclic changing of the magnetic flux in the transformer. Those losses are primarily created in the transformer iron core and are commonly called or “**No-Load Losses**” (or sometimes iron-losses). Under load, the current creates losses in the windings due to the resistance of the conductors. These are called “**Load Losses**” (or sometimes copper losses).
154. No-Load Losses are effectively constant while the transformer is energised. Load losses are proportional to the square of the current. It follows that the transformer losses are lowest when the solar park is not generating; that is at night.
155. The transformers in this case have No Load losses of around 2.2 kW to 2.5 kW. The fan heaters are each rated at 2 kW so the total heating in the substation at night would vary from a minimum of 2.2 kW if the substation temperature was above the fan thermostat setting to a maximum of 6.2 kW if the room was colder than the thermostat setting.
156. The substations have three zones down their length: the HV switchgear zone, the transformer zone, and the LV switchgear zone. The separators between the zones are formed of a coarse wire mesh as can be seen in Figure 7. That mesh offers negligible impediment to air flow.
157. The fan heaters are wall-mounted in an attitude in which the warm air is propelled downwards (Figure 7).



Figure 7 : HV switchgear zone showing location of the heater

158. One heater is positioned in the HV switchgear room, as in Figure 7 and the other is in the LV switchgear room at the far end of the substation. Therefore, each zone in the substation has in the order of 2 KW heating when needed.
159. Mr Ryder carried out calculations aimed at identifying by how much heating would increase the air temperature in the substation (§5.20 and his Exhibit 5-9). He concluded that:
- “Making reasonable assumptions it can be shown that the temperature of the transformer room will be between 2.8K to 4.6K higher than the outdoor ambient temperature. A temperature difference of at least 5K is normally considered to be necessary to avoid condensation.”*
160. For reasons Mr Ryder does not explain, he did not include the 4 kW contribution of the fan heaters. He had earlier said that his opinion was that the heaters were

mounted too high on the wall (I disagree on that point) but I do not think that that is sufficient excuse to neglect their presence.

161. As noted above, he arrived at the figure of 2.8 °K to 4.8 °K (i.e. lower than the 5 °K required to avoid condensation).

162 When the calculations are repeated factoring in the heaters they show clearly that the temperature rise would be 8 °K which would be more than sufficient to prevent condensation. I have included my calculations alongside Mr Ryder's calculations in Exhibit 2 (calculations documents)."

374. As noted in the passage quoted above, Mr Ryder set out in his report calculations whose basis Dr Lockwood did not understand. In cross-examination, Mr Ryder volunteered that his own initial calculations showed that the amount of heating in the substation should have prevented excessive humidity from forming. However, the result did not accord with his perception of operational experience, so he recalculated the position ignoring the effect of air flow within the substation and the heaters in the HV and LV compartments. The following exchange occurred:

"A. What I did, my Lord, when I prepared the calculation is initially I prepared a calculation for the whole substation building, so two heaters, three fans, one air inlet, plus whatever gets lost through the walls.

And if I looked at the substation as a whole I got one answer which did not seem to explain what was the substation and seeing for example there's a very large busbar assembly which is separating the transformer room from the LV room, and actually quite a large HV switchgear assembly which largely blocks the entrance between the high voltage room and the transformer room, I decided to break the substation into three rooms and analyse each one independently.

Q. That's a fascinating answer. So you originally did a calculation that treated the substation as a single room and you say you didn't get an answer that explained what was happening. Does that mean that your answer would suggest that substation as a whole would be sufficiently warmer than outside? That it would not in fact experience condensation while the transformer was switched on, is that what you meant?

A. My Lord, that is exactly what I meant. What I felt was that as my calculation was clearly not calculating what was being experienced operationally there must be something wrong with my calculation. I suppose the alternative is there's something wrong with the operational experience.

Q. I am going to suggest to you, Mr Ryder, that that is the exact position, that in fact you have misinterpreted the operational experience and we'll come to that. But that actually your first approach, which properly took into account the heaters and the fact that actually there's no significant impedance on airflow between the three parts of the substation was correct and you got the right answer?

A. I understand why counsel has suggested that, my Lord, but the reason I changed my mind and I changed my calculation was precisely because I felt that the results of my calculation were not reflecting operational experience, and I felt as a good practical engineer it was my responsibility to calculate what was happening, and to fit my -- if you like to fit my calculation to what I was observing, and not my observations to what I was calculating.

Q. So your calculation was intended -- was -- I don't mean to put this pejoratively -- retrofitted on to operational experience. It wouldn't have any, I suggest to you, independent validity if in fact your analysis of the operational experience was mistaken, because you changed your view in order to try to make sure the two matched up.

Is that fair?

A. My Lord, I think it is fair to say, it is fair for counsel to suggest to me that I changed my mind in the light of operational experience and I agree I changed my mind in the light of operational experience.”

375. It thus appears that Mr Ryder, like Dr Lockwood, initially concluded that the level of heating and airflow within the substation should have prevented any humidity issue arising. He changed his mind in light of the fact that his understanding of operational experience suggested there must be a humidity problem. Mr Ryder cannot be criticised for reconsidering his theoretical approach on the basis of the facts as he understood them to be: to do so accords with the scientific method. However, the validity of the revised approach at least arguably depends on the reliability of the information on whose basis Mr Ryder assessed the factual position, i.e. the operational experience which I consider later in this section.

(3) Humidity monitoring data

376. The first source of information about operational experience was humidity monitoring. The Claimants rely on:

- i) Data measuring relative humidity in the substations collected by Quintasenergy at Home Farm, Otherton, Moor House, Newton and Wrea Green between 1 October 2019 and 31 January 2020, extracted by Mr Spencer in his first witness statement and summarised in the following table:

Site	TX1 hours maximum relative humidity > 93%	TX1 hours maximum relative humidity > 93%
Home Farm	1,760	1,494
Otherton	968	n/a
Moor House	380	57
Newton	23	285
Wrea Green	56	80

I assume that the right-hand column should in fact refer to “TX2”.

- ii) Data collected by the Claimants from 1 January 2019 to 29 April 2020 at 30-minute intervals. These suggest that the maximum relative humidity in 18 of 20 transformer rooms exceeded the limit of 93% at least once, and that for nine substations it exceeded 93% for at least 10% of the time (1.5 months).
377. The data referred to in (ii) above is set out in an Excel spreadsheet and summarised in a table annexed to the Claimants’ opening submission. A note to the table states that “[o]nly records registering humidity have been used to calculate the average relative humidity and the time with relative humidity $\geq 93\%$ ”. It is unclear why that is the case. Taking as an example the figures for the transformer where the greatest humidity is recorded (Home Farm TX2), data (figures between 26 and 100) is recorded in 19,160 of the 23,259 rows, of which 7725 (40.3%) have a figure of 93 or greater. There are another 4099 rows recording a figure of 0, and if these are counted then the 40.3% figure drops to about 33%. The table may somewhat overstate the position, or it may be that the rows recording zero reflect absence of data rather than zero relative humidity (as the jump from 0 to 26 may suggest). For present purposes I proceed on the basis that the table accurately records the data.
378. The Defendants make the points that:
- i) for two substations the sensor never exceeds the 93% threshold;
 - ii) for six substations the sensor exceeds 93% less than 0.2% of the time;
 - iii) for three more substations the sensor exceeds 93% less than 5% of the time; and
 - iv) for only nine substations (less than half the total) does the sensor exceed 93% more than 10% of the time.
379. As a result, they submit, it is vital to know how accurately the sensors, given their positioning, are recording the temperature surrounding the transformer. In particular, the Defendants submit, it is necessary to distinguish between humidity in the air surrounding the transformers and humidity in the substation generally:

- i) The IEC standards are far more permissive as regards humidity in the substation generally (average humidity of 95% over 24 hours is permissible) than for the air surrounding the transformer (an absolute maximum of 93%).
 - ii) The Claimants' sensor data only relates to the area near, not the air surrounding, the transformers. The Claimants provide no data for the HV switchgear room or the remainder of the substation. Moreover, their own explanation of why their data is relevant – viz that the air entering the substation flows directly over the transformer with no significant mixing with other air – inevitably means that the sensors detect no useful information regarding humidity in the wider substation.
 - iii) If the transformers are replaced with outdoor oil filled transformers, due to a capacity or forced air cooling defect, then at that point the intake and extract vents can be sealed. The principal source of entry of any humid air would then be eliminated. Mr Ryder accepted this, noting that it would have “*a lot of advantages for minimising remedial works and improving conditions inside the substations*”. The Defendants add though, as set out further below, that there is no basis to assume humid air is entering through the blast vents: but say that even it were, it is inconceivable that the average humidity in the substation would be affected to such a degree that it would exceed 95% if the intake/extract vents were sealed.
380. The Claimants submit that the reference in IEC standard 60076-11 § 4.2.6 to “*the relative humidity of the surrounding air*” contains no limitation as to what constitutes the surrounding air or where that is to be measured within the substation (which is not in the present case a very large space anyway). It does not, as Dr Lockwood suggested, need to be measured close to the transformer.
381. I do not accept that submission. On its natural meaning, the “*surrounding air*” means the air immediately surrounding the transformer itself, rather than the air in some other part of the room or substation in which it sits. That interpretation is also consistent with the obvious purpose of the standard, namely to regulate the humidity of the air coming into contact with the transformer, and may damage it.
382. The humidity sensor stick used to collect the Claimants' data was attached to a vertical metal strut roughly half way between the air intake for the transformer room and the transformers themselves, directly in line with the air intake. (Its position is best seen from a photograph exhibited to Mr Ryder's report found at trial bundle page G/22.45/3). Mr Spencer said the transformer was perhaps a foot and a half away from the air intake. He said the intake was about three feet above the ground, and that the sensor was probably in the best place and was “*measuring the air that's being directly used to cool the transformer*”. Mr Spencer added that it was in probably the only place where it could be put in the transformer without touching the electrical equipment.
383. The sensor that detects humidity was at the end of the stick facing the intake vents rather than the end facing the transformer. Mr Spencer suggested that the sensor stick could be attached pointing in any direction, but was attached in the way it was because of the way the cables ran down the strut. However, as the sensor stick was simply attached to the strut with cable ties, it seems probable that it could have been attached pointing in any direction. Mr Ryder said he did not know the precise specification for the sensor,

but that many of them were omnidirectional so that it did not matter which way it was pointing. He agreed that the sensor was positioned “*essentially in the air stream between the air intake and the transformer*”.

384. I find it difficult to accept that the sensor could not usefully have been placed anywhere else in the substation. For example, the photograph shows another strut, behind the one to which the sensor is attached, which is towards the corner of the room containing the transformers and not in a direct line with the air intake. There may also have been places under, above, or the other side of the transformers where the sensor could have been placed.
385. Whether or not the sensor could have been placed anywhere else, the difficulty about its actual location is that (whether or not it is omni-directional) it is likely to have been measuring the humidity of the air entering the substation rather than the air surrounding the transformers. As air flows through the substation it will mix with the (warmer) air already heated by the transformers and the heaters in the HV and LV room. Further, when the fan speed is low (as it would be at night, when the humidity issues are most likely to arise), the reduction in air flow is, Dr Lockwood explained, the square root of any reduction in fan speed: for example, if “*the fan runs at a quarter speed the air moved by the fan is about a 16th of full speed.*” It seems inevitable that the air that has just entered through the vent, being measured by the sensor, will not yet have been affected by the heating sources in the substation, including the transformer itself.
386. At the very least, there would be bound to be *some* temperature rise, and fall in relative humidity, between the air entering the intake and that which reaches the transformer. Otherwise, any heating or other dehumidifying measures would be in vain. However, data collected by Dr Lockwood suggested that the Claimants’ humidity data for Home Farm very closely correlated with the humidity of the outside area in a nearby location where Met Office data is collected (Gloucester Airport). Indeed, the measured humidity levels in the substation were generally higher than the ambient humidity at the airport, which is surprising given that there would be at least 2.2kW of heating in the substation at all times, and much more during the middle of the day when the transformers were operating under load. Moreover, Dr Lockwood noted one particular period (from 11am to 6pm on 31 March 2019) when the weather conditions and time of day would suggest the site was generating at about 50% of capacity, resulting in the transformer producing about 10.6kW of losses i.e. heat. Despite this, the humidity in the substation was recorded as being just as high as the outside air: suggesting that the sensor was merely measuring the humidity of the outside air.
387. The Claimants criticise Dr Lockwood for using humidity records for that particular location, 6 miles away from Home Farm, for a period of just 7 days. They suggested to Dr Lockwood in cross-examination (and invite the inference in closing) that he chose Gloucester Airport and the 7-day period in question simply because it was “*the best sample that suited your purposes to demonstrate a correlation*”. The Claimants did not, however, put to Dr Lockwood, nor explain in submissions, how the selection of that location and that 7-day period was in any way unrepresentative. On the contrary, this is in my view an example of a serious allegation – to the effect that Dr Lockwood deliberately set out to depart from his duties as an expert – made without any proper basis. In my view the correlation Dr Lockwood observed is exactly what one would expect, given the positioning of the sensor, for the reasons given in § 385 above.

388. The Claimants also suggest that Dr Lockwood should, rather than criticising their data, have obtained his own humidity data. Dr Lockwood responded in cross-examination that getting permission to visit the sites was quite difficult, and that he did not believe taking his own data was an opportunity available to him. He did not think taking a spot measurement of humidity would be worthwhile, and *“I didn't think to ask for permission to do continuous monitoring. The general environment was that such a request would not have been honoured”*. I accept that explanation.
389. For these reasons, I do not find the Claimants' data to be a reliable basis on which to draw conclusions about the humidity of the air surrounding the transformers.
390. Moreover, the data does not purport to relate to the humidity anywhere else in the substations. The Claimants have provided no humidity data for the HV compartment of the substation. I agree with the Defendants that there is no basis to conclude that humidity in that compartment (or anywhere else in the substation) exceeds the 95% average figure required by IEC 61936-1 § 4.4.2.1(e):
- i) Even on the Claimants' data, humidity did not exceed 95% on average over the period as a whole figure for any substation: the maximum average figure was 83%, for Home Farm TX2, and most figures were much lower.
 - ii) The spreadsheet did indicate that humidity averaged more than 95% for some 24-hour periods. However, the air in the HV compartment would probably have lower relative humidity than the area immediately in front of the intake vents, given the presence of a further heater in that compartment. Whether or not the heaters in the HV compartment warmed up the air in the transformer compartment, they plainly would have warmed the air in the HV compartment itself. That should (on both Mr Ryder's original analysis and Dr Lockwood's analysis) prevent excessive humidity in that compartment.
 - iii) Dr Lockwood accepted in his evidence that the blast vents under the HV switchgear were a means by which moist air could rise into the substation. On the other hand, when considering the unlined cable pit under the substation Dr Lockwood said that cold, humid air would not rise into the warmer substation. Mr Ryder's own analysis of airflow within the substation assumed that air was not being drawn through the blast vents into the substation: that is the basis on which he felt able to conclude that airflow at the extract vents of the substation should be assumed to be the same as airflow at the intake vents, as the substation would otherwise become de-pressurised.
 - iv) Mr Ryder appeared ultimately to accept that cold humid air would not in fact rise through the blast vents in to the warmer substation, though he suggested that humid air must be entering from another source:

“Q. Right. Well, I'd suggest to you that absent the fans pulling air in through the cable entries, cold humid air from outside is not in fact going to rise into the warmer substations. That's a basic point of thermodynamics, isn't it?

A. (Pause)

I'm just considering my answer, my Lord.

It is true that large amounts of condensation have been observed in the HV cable entries. It may be that my understanding or my explanation of the mechanism through which it's caused is a little clumsy.

Q. Okay, well we'll come to the cable entries themselves. The point I'm making to you is that absent any sensor data, absent any cogent reason to think air that is humid and cold is rising through the cable entries there's no reason to assume and indeed no basis for suggesting that humid air is entering the HV area of the substation via that route?

A. Mm ... in which case -- yes, in which case presumably the condensation must have a slightly different course.

Q. Well we'll come to whether there's actually any condensation but are you accepting that proposition?

A. For the time being, yes.”

391. As the Defendants point out, these considerations indicate there should in any event be no humidity problem in any substations where the transformers are replaced and moved outside, so that the intake and extract vents can be sealed. Where that step is taken the requirement for humidity to remain below 93% in the air surrounding the transformers will become redundant. Any humidity defect would exist only if average humidity exceeded 95%. That is not established on current evidence, still less so if the transformers are replaced, and the principal source of humid air into the substations is sealed.

(4) Operational experience

392. The Claimants alleged that the impact of humidity and water ingress upon the electrical equipment has been significant and damaging. Focussing at this stage on humidity, the Claimants' points (over and above their humidity data discussed above) may be summarised as follows:
- i) **Cranham.** TX 1 catastrophically failed during routine switching on 25 April 2019. An independent operational report on the failure described the causes as “*severe heat*” and “*excessive moisture*”. Mr Ryder expressed the view that the excessive moisture was highly likely a direct result of excessive levels of humidity and condensation.
 - ii) **Eckland Lodge.** The Live Issues Tracker noted spots of corrosion on transformer substation 1 and the cover of the LV busbars, and that earthing cables were not sealed where they entered the floor on either the HV or the LV side. Failures of voltage transformers within the HV switchgear adjacent to the HV cable entries on 25 February 2019 are likely in Mr Ryder's view to be a result of the effects of excessive humidity and condensation.

- iii) **Five Oaks.** Suffered from trips and excessive humidity. A RINA report recommended cable trenches be pumped free of water to avoid high humidity levels inside cabin.
- iv) **Home Farm.** Failures of voltage transformers within the HV switchgear adjacent to the HV cable entries on 3 January 2018 and 12 July 2018 are likely in Mr Ryder's view to be a result of the acute effects of excessive humidity and condensation. A Wirsol internal email about '*Home Farm humidity levels (1 of 2)*' attached photographs showing evidence of moisture. Email (2 of 2) recorded:

“TX 1 7.0° @95.8% Relative Humidity – wet puddle under sub

TX2 6.7° @ 90.2% Relative Humidity – Dry sand under sub”

An email from Wirsol asked for remedial work to be put “*on hold at the mo*” as “*acknowledging there is water under the subs, but by pumping it away, the humidity level of the moist/cold/damp environment under the subs will alter little.*”

Later, a PSH report dated 15.10.19 included photographs where “*moisture is evident*” in cable boxes below switchgear cells and “*high levels of standing water in void below switchgear*”.

- v) **Moor House.** In addition to corrosion to the transformer cores caused by the water ingress, Mr Ryder identified corrosion on the door to the transformer room and to the frame supporting the transformers, which he describes as a further example of the chronic effects of excessive humidity. Mr Ryder has had the corrosion assessed in accordance with the relevant international standard. The extent of corrosion was Ri 3 or Ri 4, massively above the Ri 1 it ought to be after 10 years' service. Mr Blythen identified corrosion on all parts of the core.
- vi) **Newton.** A RINA report recommended that cable trenches be pumped free of water and cable entries sealed to avoid high humidity levels inside cabin. A PSH report into failure of HV switchgear said “*The issue was due to a microswitch which was sticking in the closed position*”. Mr Ryder concludes this was very likely due to corrosion caused by excessive humidity and condensation.
- vii) **Otherton.** There was condensed water at the bottom of the switchgear, plainly a result of excessive humidity, as indicated for example by a report dated 20 November 2018 showing moisture in the cable termination compartment. Later, a 25 October 2019 report into failure of voltage transformers within the HV switchgear adjacent to the HV cable entries said: “*The switchgear was very damp internally this may have been because there was no power within the substation for over a week and might have absorbed moisture within the cable box and switchgear*” and “*The termination cable box incoming from WP D and from the Transformer were very condensated and dirty within*”. A PSH Schedule of Condition noted “*signs of historic presence of water*”; “*signs of water staining around the door and below air intake louvres*” in the LV and spare containers, and TX enclosure. A PSH report detailed remedial work

required because “*At the point of cable entry the hole has not been sealed allowing moist air to rise up inside the cubicle, during the right conditions this would cause condensation.*”

- viii) **Outwood.** Corrosion to both transformers at Outwood was identified by Dr Lockwood, and is attributed by Mr Ryder to excessive humidity. Mr Ryder has had the corrosion assessed in accordance with the relevant international standard. The extent of corrosion was Ri 3 or Ri 4, massively above the Ri 1 it ought to be after 10 years’ service. A technical report by Tim Blythen on paint coating tests showed corrosion to upper yokes of both transformers. A RINA report recommended cable trenches be pumped free of water and cable entries sealed to avoid high humidity levels inside the transformer substation.
- ix) **Widehurst.** Corrosion to the transformer cores at Widehurst prior to termination was caused by water ingress. Rusting in the substation at Widehurst was identified by Dr Lockwood. Mr Ryder also identified corrosion on the cores of the transformers at Widehurst which he considers to be a result of the chronic effects of excessive humidity. Mr Ryder has had the corrosion assessed in accordance with the relevant international standard. The extent of corrosion was Ri 3 or Ri 4, massively above the Ri 1 it ought to be after 10 years’ service. Widehurst also suffered from corrosion of the springs inside the microswitches in the HV switchgear, making the HV switchgear inoperable.

Mr Ryder expressed the view that the cause of the corrosion was excessive humidity and condensation. An email dated 2 May 2018 attached photographs showing moisture to the transformer and equipment and recording corrosion to the transformer. A Low Carbon report to Wirsol in May 2018 flagged the issue with corrosion to the transformer core, with accompanying photos. Wirsol confirmed an outage at substation 1 to treat rust spots.

In 2019, a Quintas report following a visit in July 2019 included photographs of condensation, water ingress and corrosion. Mr Ryder took a photograph of condensation in cable entries on 3 October 2019, and observed “*heavy condensation in the HV cable entries of substation 1*”. A video shows condensation being wiped from cable entry box in the base of the HV switchgear on the same day. Mr Blythen identified corrosion on all parts of the core. A Quintas report following a visit in July 2019 included photographs of condensation, water ingress and corrosion.

A PSH report into the microswitch remaining closed when it should have returned to its open state said “*the spring within the device has corroded to the point where it would not operate reliably*”, and recommended that these devices be replaced ‘en masse’.

- x) **Wilbees.** Suffered from trips and excessive humidity. A BayWa Schedule of Condition noted “*Evidence of water ingress in stations coming from 3 main areas: Extraction fans, Filters and double doors. HV cable entries not sealed under switchgear – Access for moisture and vermin.*”
- xi) **Woodhouse.** Corrosion to both transformers at Woodhouse was identified by Dr Lockwood. Water ingress and corrosion were noted in the Low Carbon

reports from November 2017. A recent failure of the voltage transformer within the HV switchgear adjacent to the HV cable entries on 26 June 2020 is due to water ingress and excessive humidity. PSH's report warned that there was a present risk of serious personal injury, and included the following passages:

“water ingress and corrosion were noted on the reports from November 2017”

“Schedule of Condition on 17 September 2018...noted signs of water ingress in all compartments”

“Our technicians arrived on 10 October 2018 to undertake the repair to the forced cooling. During this visit a significant level water ingress was found and severe enough to be reaching the transformer connections... This was of sufficient concern that we sourced quotes for cowls to mitigate this form of water ingress in November 2018...The cowls were installed in February 2019....

Humidity sensors have been installed and the humidity readings within the substations at Woodhouse have remained volatile and consistently above 93%. This is despite the installation of cowls”.

“As we know that Woodhouse suffered persistent and significant water ingress and the fitting of cowls has not improved humidity we have to take this into account. There is substantial corrosion on the transformers and around the switchgear casing which SSE have documented.... The risk of equipment failure remains higher than we are comfortable with.”

- xii) **Wrea Green.** Wrea Green suffered from corrosion of the springs inside the microswitches in the HV switchgear, making the HV switchgear inoperable, as set out in a PSH report. Mr Ryder expresses the view that the cause of the corrosion was excessive humidity and condensation.

393. Under the corrosion assessment system used (ISO 4628-3:2016(E)):

- i) Ri 0 means 0% of the area in question is rusted;
- ii) Ri 1 means 0.05% rusted;
- iii) Ri 2 means 0.5% rusted;
- iv) Ri 3 means 1% rusted;
- v) Ri 4 means 8% rusted; and
- vi) Ri 5 means 40-50% rusted.

394. I consider the position on a topic by topic basis below.

(a) Cranham transformer failure

395. As noted above, the Claimants allege that the Cranham transformer failed due to excessive moisture and heat.

396. However, the contemporaneous reports from PSH, who were present when the transformer failed, make it clear that they considered the transformer failed due to an internal failure within the core of the transformer:

“On visual[] inspection of the TX, it is apparent that the centre core may have suffered an internal fault within the laminated windings”, “Issues identified - Potential systemic fault with the TX, internal fault on core 2”.

397. Similarly, a report by BayWa stated: “*it is clear at this point the transformer had suffered an internal failure*”. Dr Lockwood noted that this suggests that the problem was a manufacturing fault within a part of the transformer that could never be exposed to humidity.

398. The only arguably contrary evidence is an undated report from J&P (Johnson & Phillips), which I have carefully considered. The photos in the report include one of a crack in the transformer casting. The report states that:

“There was a significant enough heat which damaged the above transformers L2 core resulting in core failure. The result of the damage caused the delta winding to fail and open circuit. The compounding effect of this caused severe imbalance in the delta MV transformer winding this then caused very high currents which caused significant heat stress on the connecting power connections and copper bus-bars. The result of this then caused the Power Protection to trip. All 3 windings have failed.

•It was found the transformer had suffered severe damage from the resultant heat and moisture.

...

•The conclusion reached by both parties, the transformer delta winding was damaged from excessive heat.”

and:

“Johnson & Phillips established the transformer issue was due to a poor design assembly causing severe heat & moisture this influence was beyond the client control.

Our tests concluded a breakdown or disruption in the delta partition of the transformer. This caused a severe imbalance and introduced high and excessive neutral current to the Star Point LV partition of the transformer leading to failure.”

The report does not constitute persuasive evidence that the incident was caused by humidity around the transformer or in the substation, as opposed to an internal fault.

399. I conclude that the Cranham transformer has not been shown to have been destroyed as a result of humidity, or in any event by humidity for which the Defendants are responsible.

(b) Corrosion of transformers

400. There was some evidence of corrosion to transformers at Eckland Lodge, Moor House, Outwood, Widehurst and Woodhouse. The key question for present purposes is whether such corrosion as has been found indicates a general humidity problem at the substation in question.
401. Dr Lockwood's evidence was that the areas of the transformers on which corrosion had been observed could not have sustained damage while the transformers were energised. That is because the relevant parts of the transformer will inevitably be significantly hotter than the surrounding air. Mr Ryder was more equivocal on the point, but accepted that condensation would "*in general*" not form on transformers while energised, and "*certainly not on the cores*".
402. At Eckland Lodge, some "*spots of corrosion*" were noted on TX1 and the LV busbar covers in March 2018. However, the same record refers to signs of water ingress into the substation, so there may be a link between that factor and the corrosion observed. Even on the Claimants' sensor data referred to above, the humidity of the air entering the transformer room was 93% or higher only 0.1% and 0.01% of the time for the two transformers respectively. There is insufficient evidence on which to conclude that this site suffers from a general humidity problem, as distinct from one of water ingress (as to which see section (J) below).
403. Moor House has experienced significant amounts of water ingress, according to:
- i) an entry on the Live Issues Tracker for 24 November 2017 recording a High Priority issue of water ingress in the HV area, with "*driving rain coming through the fans*";
 - ii) a Low Carbon report described high priority risk: "*water found around the transformer in transformer station 1. This appeared to be coming through the vents*" and "*The floor was wet and there were water marks around the fan vents*"; and
 - iii) a note on the PSH Schedule of Condition referring to "*signs of water ingress within all compartments (LV, HV, TX enclosure)*" and water staining in the HV compartment and TX enclosure.
404. Mr Hogan's evidence indicates that the damage to the transformer was limited, being small spots of rust on the transformer core and the outside of the snail fans, which were easily treated by brushing the equipment down with a wire brush and treating them with a special anti-corrosion paint to prevent future rusting.

405. These matters do not support a conclusion of a general humidity problem distinct from the water ingress problem.
406. At Outwood, both sides' experts identified poor paintwork on the upper yokes of the transformers (manufactured by TMC, a different type from the transformers at the other sites) where corrosion was found to exist. That is the opposite end of the transformer from that which would be affected by humid air entering the substation, which would first make contact with the bottom yoke and then warm up as it passed across the transformers. Dr Lockwood noted that there were no signs of corrosion on the bottom yoke, where the paint quality was much better. He did not consider that the evidence pointed to excessive humidity. Outwood has also suffered from some water ingress, with a PSH Schedule of Condition noting "*signs of water ingress within all compartments (LV, HV, TX enclosure)*" and water staining in each. Again, I am not persuaded that the corrosion problem indicates a humidity problem.
407. At Widehurst, an email in May 2018 recorded corrosion to the transformer, which Mr Ryder assessed as being between Ri 2 and Ri 4 in different places.
408. The heaters in the park had had to be turned off during construction in 2017 because the landowner had complained about the noise of the generators running at night. Later in 2017, the site was de-energised between April and August while issues with the DNO were resolved.
409. Widehurst is also a site that has suffered from water ingress, as noted in:
- i) a photograph taken in October 2019 indicating water ingress within switchgear;
 - ii) a BayWa Schedule of Condition noting "*Evidence of water ingress in stations coming from 3 main areas: Extraction fans, Filters and double doors. HV cable entries not sealed under switchgear – Access for moisture and vermin*"; and
 - iii) a Quintas report with photographs of condensation, water ingress and corrosion.
410. Conversely, even according to the Claimants' sensor data, humidity at Widehurst was 93% or higher for only 0.02% and 0.1% of the time monitored for the two substations respectively.
411. Mr Hogan's evidence was that small spots of rust formed on the transformer core and the wire mesh dividing the HV and LV sides of the substations, which were easily remedied.
412. In these circumstances, I am not persuaded that a general problem of excess humidity exists at Widehurst.
413. At Woodhouse, the PSH report dated 30 June 2020 referred to substantial corrosion on the transformers. The site has suffered from significant water ingress problems, as noted in:
- i) an entry in the Live Issues Tracker line 57 for 24 November 2017 recording water ingress in the HV area with "*driving rain coming through the fans*" (as for Moor House);

- ii) entries for 1 December 2017 recording “*evidence of historic water ingress*” into the transformer substation 1, with “*water marks on the floor at the back wall and around the door*”, as well as in the storage room and DNO substation;
 - iii) the PSH report into the failure on 30 June 2020 quoted in § 392.xi) above; and
 - iv) a PSH Schedule of Condition noting “*signs of water ingress within all compartments (LV, HV, TX enclosure)*” and water staining in each.
414. Mr Ryder and Dr Lockwood visited Woodhouse between their first and second reports. Mr Ryder exhibits to his second report photographic evidence of the corrosion. Dr Lockwood in his second report states:

“183 Also, during the visit at Woodhouse, I had the opportunity to enter a substation just minutes after it had been switched off. I entered at 16:43, the day was heavily overcast with cloud and levels of energy production were very low. The air temperature was slightly less than 20 °C. The external surfaces of the transformer windings were at approximately 40 °C, that is slightly warm to the touch. However, the core was so hot that I could only touch it for a fraction of a second. That indicates that the core temperature was in excess of 60 °C. However, the core had slight signs of surface rust (Figure 10). ...

184. Even if one argues that the winding temperature formed the ambient around the core, the core was still at least 20 °C higher than its local ambient. As transformer core losses do not increase greatly with load, it can be seen that the transformer would be noticeably warm even on a cold damp night. The observed rust could not form on the surface of a transformer core whose temperature was at least 20 °C above ambient. Indeed, when energised for sustained periods, transformer cores typically run at 20°C to 40°C higher than the ambient temperature.

185. It follows that the transformer had been exposed to humid conditions for a sustained period when the substation was not energised. Unless a substation is supplied by an auxiliary electrical supply while deenergised, condensation will occur and corrosion could take place.

186. It is my firm opinion that the Woodhouse substation had been left unheated on one or more occasions and it was in such a period or periods that the observed corrosion had taken place.

187. I have been informed by Defendants that all the sites in the case were de-energised for sustained periods shortly

after the EPC and O&M Contracts were terminated. This suggests that auxiliary generators were not supplied for the period of when they were out of service. Alternatively, Woodhouse was deenergised at another point in time, again without the required auxiliary generators being provided.

188. All of the substations are fitted with a connector which allows a mobile generator to be connected when needed. The purpose of that socket is to provide what is called 'hotel-load' to the substation; that is heating, lighting, and power for instruments and communications. The site operator should deliver such a generator to site within a few hours of the substations becoming de-energised for any reason. Therefore, it would not be problematic to install auxiliary generators.
189. In short, I have not identified a specific defect with the design of the substation which means that it is subject to excess humidity. There do, however, appear to have been operational issues which have caused rust on the transformer cores. This is unfortunate. Solar parks need to be well-maintained to ensure that they operate effectively.”
415. Mr Ryder in cross-examination did not agree with Dr Lockwood. He expressed the view that even if a transformer is too hot for condensation to collect on it, rust can result from humid air being blown across it, citing as an example corrosion frequently found on large liquid immersed transformers operating at high temperatures and on which condensation does not collect.
416. I find this evidence difficult to assess, not least because Mr Ryder’s view as outlined above was not put to Dr Lockwood in cross-examination, and Dr Lockwood was not challenged on the views he expressed in the paragraphs quoted above about rusting of transformer cores.
417. Moreover, it appears to be common ground that the sites were de-energised for significant periods following the termination of the EPC Contracts in September 2018. The PSH report dated 30 June 2020, whilst it includes some material derived from earlier reports in November 2017 and October 2018, refers to the transformer corrosion as having been noted in PSH’s June 2020 visit following the voltage transformer (switchgear) failure. There is an issue about whether the Claimants heated the sites properly during the post-termination period of de-energisation. Mr Kirk said in his witness statement that they were heated using diesel-powered generators. Mr Hogan’s evidence was that this was unlikely given the size of the disclosed bills for generator fuel and photograph evidence showing the auxiliary generator connection switched off. As to fuel, Mr Kirk was taken in cross-examination to a sample invoice (for Home Farm) including an entry for generator fuel (£45), which Mr Hogan said would suffice to keep the site running for only a day or two. Mr Kirk did not know how much fuel was required to heat the sites but maintained that they had been heated. Like the Home Farm invoice, the Woodhouse invoice included £595 for generator hire and only £45

for generator fuel. Mr Hogan was not challenged on this issue. Given the low fuel usage, I conclude that there must be at least a possibility that the Woodhouse site was not heated, or not adequately heated, for a period following termination.

418. In these circumstances, even if Mr Ryder is correct that rusting can occur on a hot transformer surface without condensation settling on it, I consider it more likely than not that, in this case, the rusting at Woodhouse occurred during a period of de-energisation as Dr Lockwood believes. It does not establish a humidity problem (as distinct from the water ingress issue considered later) at the substations.
419. For completeness, I note that all the relevant transformers were procured by Wirsol with an E2 rating, stated on their rating plates, which should have been more than sufficient to prevent corrosion: E2 permits the transformer to deal with “frequent condensation or heavy pollution or both”.

(c) Voltage transformers (VTs)

420. Mr Ryder expressed the view in his reports that five failures of voltage transformers (which form part of the HV switchgear) had failed due to humidity at Home Farm, Eckland Lodge, Otherton and Woodhouse. The rate of VT failure at the sites is much higher than the general average failure level.
421. The Home Farm VT failures occurred on 3 January 2018 and 12 July 2018. Both incidents were the subject of reports from Burnell, neither of which referred to any moisture problem. The reports do not therefore support the proposition for which Mr Ryder cites them.
422. The Claimants refer to internal Wirsol emails from 12 April 2018 headed “*Home Farm humidity levels*” referring to relative humidity for TX1 of 95.8%. However, that was the reading outside the substation, whereas the reading inside was 65.7%, indicating that the humidity inside the substation was far lower than the outside humidity and (on that date at least) well within acceptable limits.
423. There are also several reports indicating water ingress at Home Farm:
- i) a Live Issues Tracker entry on 18 January 2018 recorded a High Priority issue “*water marks noticed next to and beneath the HV switchgear in TX 1*”;
 - ii) a site visit report dated 19 January 2018 noted that both transformers were raised above the natural lie of the land, but there was evidence of water pooling on the surface behind TX1 and on the road in front of it;
 - iii) an email from Low Carbon to Wirsol on 29 January 2018 referred to water marks in the substation;
 - iv) a PSH report dated 15 October 2019 stated that “*moisture is evident*” in cable boxes below switchgear cells and referred to “*high levels of standing water in void below switchgear*”; and
 - v) the PSH schedule of condition upon termination noted “*signs of historical water ingress*”.

Mr Ryder referred to Home Farm and Outwood as “*notoriously wet sites*”.

424. The 19 January 2018 site visit report mentioned above noted evidence of water marking on the floor next to the TX1 switchgear cubicle, the pattern of which indicated that water was coming from underneath or within the switchgear cubicle. The report continued:

“No signs of corrosion on any metal parts, and this is the only sign of moisture ingress potentially from under the substation (there was historical water marks under the ventilation filters, but not related to this issue).

Exposing about an inch gap at the LV end ... it was clearly evident that there is approx.. 250mm of water present underneath the substation (at 40ft, a substantial amount), concluding that there has been insufficient backfill of sand applied. With the cable pit having a lower finished surface than the surrounding land, it will always fill with water when the land around is saturated, as was found.

...

After conversing with Jim Young of Burnells, suppliers of the substations, whilst this is indeed not desirable and needs rectification for longevity of the plant, there are no immediate concerns over functionality. My initial concerns over moisture inside the switchgear cabins was alleviated when he explained they are effectively outside units with a different casing over them, as they now need no protection from rain, being installed inside. I questioned over the recent VT failure being moisture related which he believed was very unlikely, although the manufacturer report is still pending.”

425. However, there is no indication that the voltage transformer failure was caused by water or humidity.
426. The VT failure at Eckland Lodge on 25 February 2019 is the subject of a report by 33kV Ltd, which does not refer to any moisture problem.
427. At Otherton, there had been a degree of water ingress. The PSH Schedule of Condition noted “*signs of historic presence of water*”; and “*signs of water staining around the door and below air intake louvres*” in the LV and spare containers, and transformer enclosure. A year previously, a site visit was made on 20 November 2018 in order to investigate moisture within the RMU cable termination compartment. The report noted “*No signs of moisture during this visit*”. The report went on to say that water was found around the cable grommet towards the front of the cubicle; and that at the point of cable entry the hole had not been sealed, allowing moist air to rise up inside the cubicle, which during the right conditions would cause condensation. The author recommended the installation of a vapour plate and cubicle heaters to assist in future proofing the switch gear and associated terminations.

428. The VT failure at Otherton on 25 October 2019 is recorded in a report from High Voltage Power Services, which suggested that the VT failed due to moisture ingress, but noted that “*this may have been because there was [no] power within the substation for over a [week] and might have absorbed moisture within the cable box and switchgear*”.
429. The Woodhouse VT failure occurred during the course of the litigation, and both Dr Lockwood and Mr Ryder inspected the equipment. Mr Ryder noted that the failure was extensive, necessitating replacing all the HV switchgear in substation 1. A flash-over had taken place between the line terminal of a VT and earth. It was not entirely clear whether it was an internal flash-over (most likely caused by water ingress) or an external one (most likely caused by condensation), though Mr Ryder thought the latter more likely.
430. Dr Lockwood said:
- “178. On the 3 July 2020, I made a site visit to Woodhouse. I inspected the equipment and substations very carefully and I can say that there is no evidence at all that humidity or free water caused the failure.
- That view is supported by an interview I had with the first engineer to inspect the site on the day after the failure (Mr Nigel Bird of Electrical Infrastructure Services). Mr Bird described the scene of the failure and stated that there were not any signs of dampness. I inspected the failed unit, and the switchgear of which it was a component. There were not any indications of dampness such as rusting, white deposits, watermarks or any of the other usual consequences of dampness, condensation, or of free water ingress.
179. Voltage transformers can fail due to excessive moisture. In all the cases I have seen where moisture was the cause, the failures occurred as surface tracking in which small spark discharges carved tracks over the surface of the insulation. There were no such tracks on the failed unit I examined.
180. That unit had suffered an internal arcing failure that had generated so much heat that it had shattered the thick case of the voltage transformer. The evidence of burning and melting was remote from the points where the connections entered the epoxy encapsulation. The summation of the evidence pointed clearly to it being an internal malfunction and not caused by moisture ingress (see Schedule 1).
181. To put the matter beyond doubt, I suggested to the Claimants’ experts that the damaged equipment be
- ”

taken to a specialist laboratory for inspection. This request was refused.”

431. On this latter point, Mr Ryder said in cross-examination:

“A. The narrow answer to the question is I put Dr Lockwood's request to the claimants, and the claimants declined. So I am not able -- the claimants didn't provide me with a very clear explanation about why they declined.”

432. The Claimants implicitly denied this, by putting to Dr Lockwood “*on instructions*” that there was no such request (in a way that could be positively responded to) or refusal. The evidence of both experts indicates that there was. Either way, the position is that inspection by a specialist laboratory was sensibly suggested but did not occur.

433. Mr Ryder’s view was that the VT failures at the various sites were similar and likely had a common cause, which he considered to be humidity, whereas Dr Lockwood thought a common manufacturing defect was more likely. However, given that the evidence in relation to the Home Farm and Eckland Lodge failures (at least) does not point to moisture-related failure, I do not consider that the Woodhouse failure can be assumed to have been caused by humidity, particularly in circumstances where the issue could have been referred to a specialist laboratory but was not.

434. Overall, therefore, I do not regard the VT failures as evidence of a problem of humidity in the substations.

(d) Microswitches

435. The Claimants submit that the reported problems with microswitches at Widehurst, Newton and Wrea Green are evidence of humidity, Mr Ryder’s opinion being that the similarities with the reported problems at Newton and Wrea Green were “*so striking*” that corrosion was “*very likely the cause of all three*”.

436. PSH’s reports concerning the failures at Trowse Newton (October 2018) and Wrea Green (February 2020) contain nothing linking them to humidity.

437. The PSH report about the failure at Widehurst (August 2019) states that the spring within the device had corroded to a point where it would not operate reliably. The Widehurst site was switched off for several months in 2017 as noted earlier, and de-energised for a period again following the EPC termination in September 2018. It seems possible that corrosion set in during one or both of those periods, though it is unclear why it would result in failure one or two years later. Conversely, even on the Claimants’ humidity data, the Widehurst transformer rooms at least experienced high humidity only for very small proportions of the time monitored (see § 410 above). Moreover, as noted earlier, a photograph taken in October 2019 indicated water ingress within the switchgear at Widehurst. On balance, I am unable to conclude that the failure was more likely than not caused by a general problem of humidity at the site, as distinct from the possibility of localised humidity caused by water ingress.

(e) Condensation at cable entries

438. Mr Ryder gave evidence that he had witnessed condensation at the cable entries at Widehurst, and that evidence was clearly supported by photographs and a video. The Defendants point out that these were taken two and a half hours after the substation had been shut down, on a dull and overcast day; and that condensation following de-energisation might well be expected on those conditions.
439. Mr Spencer set out in his witness statement a table alleging that photographs he had seen showed (*inter alia*) condensation within switchgear at Home Farm, Otherton, Outwood and Widehurst. However, none of the photos referenced to that table in fact showed water ingress around the cable entries, as Mr Ryder accepted when he was shown them. The only place where Mr Ryder had himself seen condensation in the switchgear was Widehurst. Nor was evidence relating to cable entries at other locations put to Dr Lockwood in cross-examination.
440. Dr Lockwood also points out that condensation in that area would not pose a risk. The manufacturers' data sheet for the equipment indicates that the cable entry region is suitable for outdoor applications. Indeed, the switchgear can be converted to full outdoor use by fitting a weatherproof cover over the top part of the panel. The cable entries are in the bottom part of the panel and not affected by the addition of the cover. It is therefore implicit that the cable entry compartments are suitable for outdoor use. Such use would be subject to much more condensation than could occur in the main substation. The substations are themselves designed to have a high tolerance to humidity.
441. In any event, the evidence relating to the cable entries does not establish any general problem of humidity. Moreover, the standard quoted in § 371.ii) above does not require condensation to be eliminated altogether, and notes that in the required conditions condensation may still occasionally occur.

(5) Conclusion on humidity

442. In the light of this evidence taken together, the Claimants have not established defects in the substation design or construction leading to excessive humidity in breach of the applicable standards or the EPC Contracts.

(6) Remedy on humidity

443. In case I am wrong in my conclusions above, I consider briefly the question of remedy. Broadly speaking, I accept the Defendants' submissions on this topic.
444. If there is a humidity defect due to the humidity surrounding the transformers exceeding 93%, the most proportionate solution would be the installation of further heating to ensure the substations are adequately heated at night. The cost of further heating is calculated by Mr Andrew to range from £2,770.40 to £2,968.70 per substation, including installation.
445. If any impermissible levels of humidity are entering the substations through the cable entries/blast vents, this could be resolved by fitting further heating to the HV compartment, or by fitting a 'burstable membrane' to the cable entry/blast vent

entryway. This would take the form of a thin plastic film which would be air tight and not permit moisture to enter the substation, but would break under any significant pressure (as would occur if there was an event requiring blast relief). Dr Lockwood considered this solution would be acceptable but Mr Ryder did not: he expressed concern that there might be a safety issue, concluding:

“A. My Lord, while it seems to be an obvious answer, I am concerned that it would impede the blast relief of the switchgear and be a safety challenge. I think a safety -- sorry defect -- I think it might ... I think I'll leave that. I think I'll leave that there.”

446. I am not persuaded that the burstable membrane solution would present a safety problem, and consider that it would be acceptable. The cost of this work is calculated by Mr Andrew to be £1,906.57-£2,057 per substation.
447. As a result, I do not consider that any humidity problems would in any event require the replacement of substations.

(J) INGRESS OF WATER (Scott Schedule Item 6)

448. In addition to the general design and construction requirements set out earlier, Employer's Requirements § 4.4.7 required that, as a minimum, the protection class of transformer housing shall be IP32. IP32 is defined in IEC standard 60529 as requiring *inter alia* that vertically dripping water shall have no harmful effects when the enclosure is tilted up to 15 degrees. Prevention of water ingress is also a component of the 25 year design life obligation.
449. Regulation 6 of the Electricity at Work Regulations 1989 provides that:
- “Electrical equipment which may reasonably foreseeably be exposed to—
- (a) mechanical damage;
 - (b) the effects of the weather, natural hazards, temperature or pressure;
 - (c) the effects of wet, dirty, dusty or corrosive conditions; or
 - (d) any flammable or explosive substance, including dusts, vapours or gases,
- shall be of such construction or as necessary protected as to prevent, so far as is reasonably practicable, danger arising from such exposure.”
450. There is a large degree of common ground in relation to this defect. There is evidence that:

- i) there has been water ingress and water pooling to floors in substations at twelve of the fifteen sites: all apart from Lisburn, Carrowdore and Balcombe;
 - ii) rain pushes through the intake vent located near to the floor of the substations and the three exhaust vents near to the roof of the substations;
 - iii) water comes through the bottom and sides of the doors; and
 - iv) there were holes cut in the doors of Wilbees and Fives Oaks for a remedial project known as 'Project Coolio'.
451. The Claimants alleged that these multiple holes and voids in these substations let in water contrary to Good and Prudent Practice, and, at least, constitute breaches of clauses 4.1 and 5.3 of the Conditions of Contract of the EPC Contract, Employer's Requirements §§ 2.1 and 4.4.7 and O&M Agreements § 11, and provide evidence of breach of regulation 6 of the Electricity at Work Regulations 1989.
452. The Defendants accept that water ingress occurred in the substations as originally designed, and that this requires to be remedied to meet the 25 year design life obligation. They do not accept that standard IP32 was breached, maintaining that there is no point at which water could enter the substation under these conditions. However, it is unnecessary to decide that point as it is common ground that sufficient water ingress is occurring in the substations as currently designed, via the intake vents, to require remedial steps to be taken.
453. The Defendants' proposed remedy is for appropriate cowls to be fitted to the intake and extract vents, and (if necessary) for the doors to be resealed.
454. Mr Ryder stated that the existing remedial works at Moor House and Wrea Green in 2018 had not been successful, because they did not prevent water ingress via air intakes and also did not provide the required degree of protection against ingress of solid objects $\geq 2.5\text{mm}$ for the extractor fans. He said the works proposed by the Defendants for nine further substations in 2018 would not have been sufficient "*as they did not include anything to provide the required degree of protection against ingress of solid objects...*".
455. Mr Ryder said in cross-examination that he was "*a bit sceptical*" about the possibility of remedying the water ingress issue through the fitting of longer cowls, but ultimately accepted that "*it is possible, although I think the practicalities might be considerably more difficult than [counsel] is seeking to imply*".
456. Mr Spencer's cross-examination included the following exchanges:
- "Q. And is it right that since Wirsol were removed in 2018, you have done nothing in order to attempt to reduce water ingress into these substations?
- A. We installed some cowls. It would need drastic work to prevent water getting into substations.
- Q. You say drastic work. It is simply a matter isn't it of installing large enough cowls and adequate seals on the doors. I am

distinguishing humidity from water ingress. That's not beyond the ken of man, is it?

A. No.”

457. Dr Lockwood was asked about the efficacy of the existing works at Moor House, on which he was unable to comment. He was not challenged on his view that in order to resolve any issues of both humidity and water ingress, “*a relatively trivial sum could have been spent to replace the cowls and vents, as well as implementing a burstable membrane on the blast vents and resealing the doors*”, which should resolve the issue: failing which further investigation could be initiated and (for example) the blast vents could be relocated away from the substation floor to ensure that any surface water pooling under the substation did not result in humidity.
458. Mr Andrew’s evidence was that the steps to remedy water ingress would involve the fitting of blanking plates, flashings, cowls and seals, and that these could all be priced.
459. I accept the evidence of Dr Lockwood and Mr Andrew that the water ingress problems can be resolved by those measures.
460. The complaint about ingress of solid materials into the substations, is not particularised in the RRRPoC or the Scott Schedule. The filter bags on the intake vents should prevent any such ingress, and it seems unlikely that material would enter via the extract vents against the air flow when the parks are operating. In any event, Mr Ryder accepted that any solid ingress issue could be solved by affixing a narrower mesh on the extractor fans. He thought that might require bigger fans, but no analysis has been put forward on that point.
461. For these reasons, I conclude that the water ingress problem can be resolved at proportionate cost by installing suitable cowls, flashings and seals, together with a finer mesh over the extract fan outlets. Mr Andrew assesses the base costs of this remedial work (apart from the mesh replacement) on a site by site basis depending on each site’s requirements, at costs ranging between approximately £2,000-£4,000 per site. I accept that evidence.

(K) USE OF PLYWOOD IN SUBSTATIONS (Scott Schedule Item 7)

462. Plywood flooring has been used throughout the substations at the twelve sites. The Claimants alleged that this constitutes a defect because its use poses a significant fire risk, it is not a material of sufficient durability, and it has an operational life of fewer than 10-15 years. Mr Ryder says in his experience of dry-type transformers in Great Britain timber flooring is never used. The Claimants say the plywood flooring requires replacement. It is also suggested that there is no evidence of an assessment of the fire risk having been carried out by the designer, Wirsol, contrary to the Regulatory Reform (Fire Safety) Order 2005; and that the inclusion of plywood flooring in substations is plainly a breach of the obligation to take reasonable practical measures to construct the substations to avoid danger contrary to the regulation 6 of the Electricity at Work Regulations 1989 (quoted above).

(1) Flammability

463. The Claimants allege that the use of plywood flooring in a transformer substation is in breach of IEC standard 62271-202 § 5.104.2, inconsistent with Good and Prudent Practice, and contrary to regulation 6 of the Electricity at Work Regulations 1989.
464. IEC 62271-202 § 5.104.2, where it applies, sets out the minimum required level of behaviour against fire. All materials, other than synthetic materials, used in the construction of the enclosure of prefabricated substations shall be non-flammable. It requires materials used for certain purposes either to be on a specified list of traditional materials (not including plywood), or to be a synthetic material below a certain calorific value (which plywood is said to exceed).
465. As a preliminary point, Mr Ryder and Dr Lockwood agree that standard IEC 61936-1 applies to the substations in question. IEC 61936-1 is the standard which the experts agree applies generally to the installations (see, for example, the discussion in relation to capacity and humidity). Mr Ryder accepts that the “*use of combustible materials in substation floors is permitted by IEC standard 61936-1 paragraph 8.8.2.2*”. That paragraph specifically requires the installation of non-combustible walls and low flammability doors; but does *not* require non-combustible floors. That may well be for the reasons identified by Dr Lockwood mentioned below regarding the relative lack of convection effects in relation to flooring, as opposed to walls, in a fire.
466. IEC 62271-202 applies specifically to substations with public accessibility. Paragraph 1.1 of the standard, entitled “*Scope*”, states:
- “This part of IEC 62271 specifies the service conditions, rated characteristics, general structural requirements and test methods of high voltage/low voltage or low voltage/high voltage prefabricated substations, which are cable-connected, to be operated from inside (walk-in type) or outside (non-walk-in type) for alternating current or rated voltages above 1kV and up to and including 52 kV on the high voltage side, and for one or more transformers for service frequencies up to and including 60Hz for outdoor installation at locations with public accessibility and where protection of personnel is provided.”
467. The Claimants highlight the point that this language refers not to substations with public accessibility, but substations at locations with public accessibility.
468. The substations in the present case are locked structures situated in fenced-off solar parks on private land. However, the Claimants make the point that, as well as being visited by operators’ personnel, the sites are tenanted by farmers who use the areas around and under the solar panels and around the substation for grazing. When it is raining sheep tend to huddle together and the substation is a location where they might do this. There is limited sheep-proofing. In addition, satellite pictures of the Wilbees and Cranham substations were produced at trial, which appear to indicate footpaths along the sides of the land on which these sites are located, though they were not clear images.

469. I do not consider that these matters mean that the substations have “*public accessibility*” for the purposes of the standard. The fact that tenant farmers have title or rights of access to and use of the land does not amount to public accessibility. Persons who can access the land only pursuant to licence or other specific rights do not stand in the same position as the public, and their conduct and safety can be regulated/ensured by the application of proper warnings or other procedures.
470. Further, the fact that there may be footpaths, at some distance from the substations, along the edge of the land on which the substations are located, does not mean there is public access to the substations. A provision of the standard in the same section as that relating to construction materials, and dealing with internal arc fault risks, illustrates that the standard envisages cases where the public are ‘around’ the substation:
- “To consider this hazard, distinction shall be made between operators and general public. The operator can be inside the substations (if operated from inside) or in front of it (if operated from outside). However, the general public may be around the substation at any time. The general public will never be inside the substation or in close proximity to the operating side when operations are being performed with the doors open (if operated from outside). These areas are considered to be of restricted access only for operators.” (§ 5.103, my emphasis)
471. Certain copy correspondence was produced during trial, between Mr Kirk and Mr Spillett of the Energy Networks Association. It appears that the Claimants wrote to five or more industry bodies asking whether IEC 62271-202 applied in respect of the relevant substations, seemingly attaching the document containing the satellite photos of Cranham and Wilbees, and stating that they were photographs “*of a typical site*”. Only the response from Mr Spillett was produced, who said “[f]rom the diagrams and supporting information you have provided I would suggest the packaged substations as described to be under the scope of the standard BS EN 62271-204 2014 [sic]...”. This response was not put to the experts in the present case and does not explain on what basis Mr Spillett may have thought standard 62271-202 to apply. I do not consider that it does apply.
472. Turning to the Claimants’ more general complaints, I do not accept that plywood is an inappropriate material for use in substation floors.
473. First, as noted earlier, standard IEC 61936-1 requires non-combustible materials to be used for substation walls and doors but does not require the same of floors.
474. Secondly, Dr Lockwood’s evidence was that plywood flooring does not represent a fire hazard – it would not *cause* a fire because its flashpoint (250 °C) exceeds anything encountered in normal substation operation, and the brief arcing in a power arcing fault would not ignite it; further, plywood flooring would not worsen a fire: it forms a horizontal surface such that “*there are no convection effects in the event of a fire*”, and flames do not spread readily on plywood. Further:

“From my experience of substation fires, there is only one circumstance where the plywood flooring might be consumed by a fire. That is if the cast resin transformer itself burns. The resin

encapsulation of the transformer is typically loaded with powdered aluminium trihydrate. That material is chosen for its fire suppression qualities. However, there are circumstances where a fault in the transformer can persist for long periods without it being detectable by the protection devices. Very occasionally that leads to the aluminium of the transformer windings being ignited. Once ignited, aluminium burns very readily with resultant very high temperatures. If that rare occurrence happened in a substation with a plywood floor, that plywood would almost certainly be consumed. However, its contribution to the total energy released would negligible.”

475. None of that reasoning was directly challenged in cross-examination, but Dr Lockwood was asked about a report produced by him in September 2015 in relation to a fire at a Magnetar substation. In that report, Dr Lockwood stated *inter alia*:

“In terms of combustible material in the substation, the transformer resin encapsulation does not burn readily as it is usually loaded with Aluminium Trihydrate which has fire suppression properties. It seems probable that the primary source of fuel for the fire was the marine ply floor and this was sufficient to maintain the combustion of the transformer cast resin encapsulation.”

Dr Lockwood did not, in that report, make any criticism of the use of plywood, which did not feature in any of the six recommendations made.

476. Dr Lockwood explained in cross-examination that he had subsequently investigated a fire at a different solar park where “*the primary source of fuel... was actually the aluminium of the transformer*”. As he explained in cross-examination:

“I saw a site in the south-west of England where a transformer had completely burnt out, including the cast resin encapsulation and ... it had burnt out.

And I concluded that the primary source of fuel in that case was actually the aluminium of the transformer. Aluminium burns quite readily if you can get the temperature high enough, and I know that it was not plywood floor because the sister substation, which ... was identical, same manufacturer, same construction, et cetera, did not have any plywood on the floor. It was a metal -- a steel floor.

So the plywood could not have been contributory in that case, there was no other significant ... material that could burn. So the fire in that case was purely the transformer, and reflected back to my previous experience at Magnetar I now do not believe that the Magnetar case of the plywood was the primary fuel.”

477. That led Dr Lockwood to reconsider the premise of the Magnetar report, quoted above, namely that the transformer encapsulation itself would be unlikely to burn. As a result,

he no longer considered that plywood flooring would be the primary source of fuel in circumstances of this kind, and no longer believes that in the Magnetar case the plywood was the primary fuel. It is evident that this later experience was reflected in the passage quoted in § 474 above from Dr Lockwood's second report.

478. The Claimants submit that this evidence was to Dr Lockwood's "*discredit*" and irrelevant (and, indeed, attempted during cross-examination to prevent Dr Lockwood from completing his answers about the subsequent investigation referred to above). I disagree. Dr Lockwood's explanation was perfectly cogent and accorded with the contents of his report. I accept his evidence and reject the Claimants' criticisms.
479. The Claimants' own proposed remedial steps include the installation of plywood in the *walls* of the new substations they wish to install. Mr Ryder doubted whether the proposed walls would in fact use plywood, as opposed to having a "*ply construction*", but Mr King's report indicates he has "*discussed this with Morgan Marine and the plywood is structural and enshrined in the GRP...*". The Claimants in their written closing submissions indicated that this part of the remedial specification would have to be changed, and I do not think it appropriate to attach weight to this point.
480. For the reasons set out above, I do not accept the Claimants' contentions that the plywood used in the substation floors is, by reason of flammability, contrary to any applicable Standards, Good and Prudent Practice, or regulation 6 of the Electricity at Work Regulations 1989.

(2) Durability and water damage

481. It is common ground that the plywood can be damaged by long-term water ingress. This problem can be prevented by preventing material amounts of water from entering the substations, and does not result in the plywood flooring itself amounting to a defect. Mr Ryder accepts in his second report that "*Dr Lockwood correctly points out that the plywood flooring will only be subject to deterioration if in regular contact with water*".
482. The only evidence of damage to date identified by the Claimants is minor fungal growth at Outwood, which Mr Ryder agreed could be simply remedied:

"Q. Now, the issue there, I mean that can be treated easily enough, couldn't it? You could remove fungal growth with any number of different treatments at which point the plywood isn't going to deteriorate any further, is it? You say it's irreversible but not untreatable?"

A. I think I must agree with counsel that it would be possible to, for example, cut out the deteriorated patch and replace it either with fresh plywood or with GRP, for example -- sorry, glass reinforced plastic mesh which is widely used as flooring in substations. It might be possible to apply some sort of chemical treatment to it. I'm not expert enough in chemical treatments for wood to be able to comment on that suggestion.

Q. To the extent this particular issue has arisen it is treatable one way or other?"

A. At this location, I think I have to agree with counsel.”

483. That limited damage was caused by water ingress, and will need to be remedied as damage caused by that defect. The use of plywood flooring was, however, in my view not a breach of contract.

(3) Remedy

484. In case I am wrong on the conclusions set out above, I consider briefly the question of remedy.

485. Dr Lockwood’s evidence was that the plywood floors could be:

- i) treated with a suitable fire-retardant coating; or
- ii) covered with a non-flammable material.

486. Mr Ryder objected to solution (i) on the basis of his understanding that no fire retardant coating would meet the stringent requirements of IEC 61171-202, and I agree that it would not suffice in the event that that standard applies.

487. Mr Ryder objected to solution (ii) on the basis that “*I don’t think I can accept the point that covering a flammable material with a non-flammable material solves the problem*”. However, no evidence was presented explaining why a non-flammable coating (resulting, presumably, in oxygen not reaching the flammable material underneath) would be insufficient as a solution; and I conclude the Claimants have thus not established any valid objection to the remedy.

488. If it were necessary to replace the plywood floors, that could be done by removing the substation equipment through the substation doors, replacing the floor and reinstalling the equipment.

489. Mr Andrew has priced the costs of these alternative solutions to the defect as follows:

- i) Treating the plywood floor with fire-retardant coating:
 - a) The costs of the work are as follows:
 - i) at sites with two substations, £5,844 for substation 1 and £5,586 for substation 2, at a combined cost of £11,430
 - ii) at sites with one substation, a single cost of £6,068
 - ii) If all plywood floors for which the Claimants claim are treated, that will amount to a total cost of £125,483.
 - iii) Patching the existing plywood floor:
 - a) The costs of the work, for a single cost per substation, is £3,652.
 - b) If all plywood floors need to be patched, that will amount to a total cost of £80,344.

- iv) Cladding the plywood floor with a fireproof covering, including attendant removal and replacement of equipment and ensuing electrical work:
 - a) The costs of the work are as follows:
 - i) at sites with two substations: £15,129 for transformer substation 1 and £10,126 for substation 2 – a combined cost per site of £25,255.
 - ii) at sites with one substation, a single cost of £15,352.
 - b) If all of the plywood floors for which the Claimants claim need to be cladded, that will amount to a total cost of £282,303.
- v) Replacing the plywood flooring with a suitable alternative:
 - a) The supply and installation cost of replacing all of the plywood floors for which the Claimants claim is £16,090 per substation on a one substation site and £15,867 per substation on a two substation site.
 - b) If all of the plywood floors for which the Claimants claim need to be replaced, that will amount to a total cost of £349,515.

490. I would accept those costings.

(L) LACK OF HV AND LV CIRCUIT BREAKERS (Scott Schedule Items 8 to 12 and 14)

491. The Claimants' claim is that twelve of the sites have insufficient and inappropriately located HV and LV circuit breakers. The experts agree that no LV circuit breakers have been fitted at ten solar parks, and there is no LV circuit breaker fitted at the Woodhouse second transformer substation. The ten solar parks with two transformers each have only a single HV circuit breaker.

(1) Contractual obligations

492. Contractual terms of particular relevance are as follows:

- i) Clause 4.1 of the electrical specification in the Employer's Requirements, which requires that electrical equipment shall:
 - “Include protective relays and systems to detect all credible faults on each item of plant and equipment and their primary interconnections, and arranged so that on functioning only the faulty apparatus is removed from the circuit.”
 - ii) Employer's Requirements § 4.4.9:
 - “Switchboards shall be sectionalised through the provision of a bus section circuit breaker”.
- and:

“HV switchgear shall be...in accordance with the equipment manual attached in Schedule 8 – specifically of 2-field 36kV type with circuit breaker (CB-C)”.

- iii) Employer's Requirements § 4.4.10, which provides that HV circuit breakers shall have their own control compartment with protection relays and other protection devices for the discrete protection of its switchgear.
- iv) Employer's Requirements § 4.4.11:

“Each LV main switchboard shall sectionalised using a bus section breaker.”
- v) Clause 4.5.5 of the electrical specification:

“A coordinated protection system shall be provided to cover all electrical equipment. The protection system shall be designed to rapidly detect faults on electrical systems and to accurately determine their location so as to facilitate isolation of the fault whilst minimising disruption to the rest of the plant.”
- vi) Section 1 of the Contractor’s Proposals, detailing the requirements for the HV Switchgear: “*2 x 33kV Customer Switchgear in concrete box full equipped...2 x 630A PV Box Feeders with G59 protection relays...*”.
- vii) Clauses 4.1, 5.3 and 5.4 of the Conditions of Contract and Employer’s Requirements § 2.11, which require the design to comply with all laws and regulations. The Electricity at Work Regulations 1989, regulation 5 requires that “*No electrical equipment shall be used where its strength and capability may be exceeded in such a way as may give rise to danger.*” Regulation 11 provides that “*Efficient means, suitably located, shall be provided for protecting from excess of current every part of a system as may be necessary to prevent danger.*”

(2) HV Circuit Breakers (Scott Schedule Item 10)

- 493. The Claimants allege that the twelve sites in question are designed with insufficient or inappropriately situated HV circuit breakers. This results in the risks of faults not being cleared or isolated, increasing risk of the busbar overheating and personal injury or death. The absence of HV circuit breakers means that if a fault develops on the HV side of a transformer, the fault results in the whole plant needing to be shut down. When maintenance and remedial work is carried out on the HV side, prudent operation requires the entire plant to be shut down. The Claimants allege this to be in breach of, *inter alia*, Employer's Requirements §§ 4.4.9 and 4.4.10.
- 494. The experts agree that ten sites with two transformers have only a single HV circuit breaker, whereas one for each transformer is required. Save for the single main HV circuit breaker, the other three safety features are not HV circuit breakers contained in the site. The Micom relay cannot be used as a circuit breaker: a protection relay is a fault sensing unit and can only act to interrupt fault currents by activating a separate circuit breaker. The HV switch is not a substitute for a circuit breaker: opening a switch

to clear a fault is not acceptable as there is a real risk of the switch failing under high fault current conditions. The DNO HV circuit breaker is for the benefit of the DNO, providing protection to the grid from faults at the solar farm. It is not part of or contained in the solar park, and therefore cannot constitute a compliant circuit breaker. As the sites are currently configured, an HV fault in either of the substations causes the whole site to be disconnected from the grid, and the whole site needs to be shut down in order to carry out maintenance on any part of the HV system.

495. By amendment made at trial, the Defendants accept that each substation at each of the solar parks is required to be protected by an HV circuit breaker and that further HV circuit breakers are therefore required to be installed. The experts agree that it is necessary to replace the HV switchgear in order to remedy the absence of adequate HV circuit breakers.
496. The only remaining issue is remedy. The Claimants' position is that new substations are required in order to fit additional HV circuit breakers or HV switchgear. The Defendants say HV circuit breakers can be fitted as part of new switchgear into the existing substations, as shown by the retrofitting of new HV switchgear at Woodhouse following a voltage transformer failure.
497. Mr Halliday's evidence was that replacing the HV switchgear had to be viewed in the context of the overall remedial work, and specifically the need to modify the substation blast relief to deal with a humidity issue. I have concluded, however, that it is unnecessary to modify the blast relief in order to address humidity (and that, if it were necessary, it would be sufficient to incorporate a burstable membrane on the blast vents). Assuming no need to redesign the blast relief for the substation, Mr Halliday said in oral evidence:
- “Q. We've agreed the switchboard needs to be replaced. That could be replaced within the existing substation, couldn't it?”
- A. If it will fit in the same footprint as the existing switchboard and that's the only remedial work, yes, you would be able to fit it”
- Q. I suggest to you it can fit within the existing footprint. I don't see anything in your report that suggests you have measured these pieces of equipment or that you suggest otherwise?
- A. It would depend on the equipment that was purchased.”
498. The evidence provides no reason to believe that the HV switchgear could not be replaced within the existing location.
499. Mr Andrew has priced the cost of replacing the HV switchgear, as follows:
- i) Mr Andrew prices the supply of HV switchgear at £26,586 per substation on a two substation site and £27,570 per substation on a one substation site.
 - ii) The total cost for all affected substations is £595,664.
500. I accept that evidence.

(3) LV circuit breakers (Scott Schedule Item 8)

(a) Liability

501. The Claimants complain that ten sites have no LV circuit breaker and there is no circuit breaker at Woodhouse TX2. This is said to result in the risk of faults not being cleared or isolated, increasing the risk of the busbar overheating and personal injury or death.
502. The Claimants' original allegation was that the absence of LV circuit breakers means that if a fault develops on the LV side of a transformer, then the whole plant needs to be shut down; and, further, that when maintenance and remedial work is carried out on the LV side, prudent operation requires the entire plant to be shut down. As indicated below, that is no longer the case if HV circuit breakers are fitted, as the Defendants now accept needs to be done.
503. The Defendants' Defence pleads that:
- i) the solar parks contain adequate LV circuit breakers;
 - ii) four safety features are "*acting as LV circuit breakers within each of the Solar Parks*": the internal circuit breaker in the inverter; the miniature circuit breaker in the combiner box; the fuses in the LV Main Switchboard; and the Woodward relay;
 - iii) there has been no breach of regulatory requirements;
 - iv) the complaint was not the subject of a defect notice prior to the termination of the EPC Contracts;
 - v) the Distribution Network Operator confirmed that the protection measures used in the solar parks were adequate; and
 - vi) the Claimants have not particularised, adequately or at all, their case as to the standards or other obligations breached.
504. However, the experts agreed that:
- i) ten sites have no LV circuit breakers at all and Woodhouse has just one. Wirsol did fit LV circuit breakers (under the same contractual terms and regulatory regime) to Balcombe, one dedicated to each transformer;
 - ii) the four safety features relied upon as "*acting as LV circuit breakers*" do not do so. None of those devices provide protection for the upstream substation. The Woodward relay is a device which measures the current and can send a signal to open the electrical switchgear to interrupt the fault: it is not a circuit breaker; and
 - iii) the designed arrangement in the event of a fault on the LV side causes either the main HV circuit breaker to open or commands the relevant HV switch to open. The former results in the whole site being de-energised. The latter is "*not acceptable as there is a real risk of the switch failing under high fault current conditions.*" This has resulted in work-around operational safety methods

needing to be adopted temporarily to remove the grave danger to personnel, but a risk to equipment remains and remedial work “*is essential*” so that switches are not used to clear fault currents.

505. Further:

- i) I agree with the Claimants that the defect notice point does not prevent a claim for breach of contract; and
- ii) any confirmation from the DNO does not answer any proven breach of contract (though it could be relevant to whether any breach existed).

506. However, I do not agree with the Claimants’ contention that, on the pleaded cases, the conclusions set out above mean that the claim succeeds. The Defendants have denied that the parks “*failed to contain adequate HV and LV circuit breakers*”, and that the Claimants have adequately particularised their case. The Claimants’ claim as set out in the Re-Amended Scott Schedule made the points that (i) the existing set-up (using an HV switch to protect against an LV fault) is unsafe, resulting in a risk of fire, the busbar melting rapidly and possible fatal injury to personnel; (ii) a fault in either substation on the LV side at sites with two substations will shut down the entire site; and (iii) it is not possible deliberately to isolate the LV switchgear without shutting down the entire site. The Claimants have not, however, particularised a case to the effect that LV circuit breakers are still required even if HV circuit breakers are fitted. They did advance such a case at trial, in the light of the Defendants’ belated concession that HV circuit breakers are indeed required. If they are to be allowed to rely on that case, they cannot fairly contend that the Defendants should be precluded from meeting it, as the Defendants have sought to do.

507. The Claimants now allege that, even if HV circuit breakers are fitted, the lack of LV circuit breakers is in breach of Employer's Requirements §§ 4.1 and 4.5.5, quoted above, and that the use of LV circuit breakers represents Good and Prudent Practice.

508. The experts agreed that:

“...it is implicit that the site of the putative LV circuit breakers would be between the LV terminals of the transformer and the switchgear busbars and that a suitable protection relay would be fitted to detect fault conditions and command the putative LV circuit breaker to open...

The busbars feed multiple cables, each fitted with 250A fast acting fuses. Therefore, the addition of LV circuit breakers would add an additional zone of protection limited to the LV busbars.”

509. Dr Lockwood said in his supplementary report that there were, however, no operational benefits in installing LV circuit breakers.

510. Mr Halliday’s reports set out the need for and benefits of LV circuit breakers, but his focus was on whether it was permissible to use an HV switch to respond to LV faults, and the point that the existing arrangements at the solar parks involve shutting down

both substations for a fault in one transformer or substation. Mr Halliday did not (given the Defendants' existing denial in relation to HV circuit breakers) address the position where adequate HV circuit breakers are provided save to this extent:

“If HV circuit breakers are installed this would allow an LV fault at Substation TX1, for the LV busbars and the Main LV Switchboard up to the outgoing fuses, to be cleared without shutting down the entire site.”

511. There is no specific contractual requirement in the EPC Contract to install LV circuit breakers. Mr Halliday accepted this in cross-examination. The key requirements are those in Employer's Requirements that:

- i) the solar parks “*[i]nclude protective relays and systems to detect all credible faults on each item of plant and equipment and their primary interconnections, and arranged so that on functioning only the faulted apparatus is removed from the circuit*” (§ 4.1); and
- ii) the protection system be designed “*to facilitate isolation of the fault whilst minimising disruption to the rest of the plant*” (§ 4.5.5).

512. I agree with the Defendants that these provisions do not require the isolation of every single piece of equipment. As the Defendants point out, if that were so, then there would need to be circuit breakers between every sub-component of the substations. The reference to removing the faulted apparatus from the circuit implies that, following its removal, there will remain an active i.e. complete circuit which can continue to function. Where, as in the present case, the components of each half of a solar park are wired in series, shutting down any part of the substation inevitably makes the circuit incomplete and prevents that half of the solar park from operating. Mr Halliday accepted that total substation isolation is the effect of isolation of either the HV or LV side of the affected substation. It therefore makes no sense to speak of removing, say, the LV section of a substation from the ‘circuit’, because its removal will leave no extant, operating circuit for that half of the solar park. Conversely, it does make sense to speak of removing one of two substations (as a whole) from the circuit, because that will not break the circuit of which the other substation forms part, nor prevent that other substation from continuing to operate. It also follows that LV circuit breakers are not required in order to “*minimis[e] disruption to the rest of the plant*” for the purposes of Employer's Requirements § 4.5.5.

513. In addition, it makes no practical sense to interpret the contract any other way, because there is in my view no material practical benefit in isolating only the LV sub-component of the substation. That is for the reasons given below.

514. First, if maintenance is being carried out on the LV side of the substation then the LV side of the circuit is switched off. The relevant half of the solar park is not producing any power, since the transformer is effectively disconnected from the inverters which feed it power.

515. Secondly, it would also not be possible to keep the transformer energised at all while performing maintenance on the elements of the LV equipment adjoining the transformer. That would require access to the transformer compartment and (for safety

reasons) it is not possible to enter the transformer compartment while the transformer is energised i.e. connected to the grid and therefore live. So there is no possibility of limiting humidity by keeping the transformer energised while working on this LV equipment.

516. The Claimants contend that Dr Lockwood accepted that:

- i) LV circuit breakers would permit the LV side to be shut down for maintenance while keeping the transformer energised as Mr Halliday had suggested; and
- ii) by not de-energising the transformer when carrying out maintenance or repair on the LV side, the risks associated with de-energisation, associated with humidity and condensation, are avoided.

517. In my judgment that is an untenable reading of Dr Lockwood's oral evidence. The real gist of his evidence, which I accept, was that the benefits of having LV circuit breakers would be very small indeed and the cost and complexity that would be involved meant there was no point in having them. The zone that could be isolated without de-energising the transformer is "*very small and very, very reliable*". It consists solely of the LV fuse assembly: anything upstream of that could not be worked on without de-energising the transformer. It would not be possible to work on the main LV busbar run without turning off the transformer, because it is in the transformer room, which a person cannot enter without de-energising the transformer (because of the presence of high voltage components in the room). In the event that work to the fuse board were required, meaning the transformer had to be turned off, humidity could be kept at bay using heaters. Against that, LV circuit breakers, whilst a common phenomenon, failed quite frequently (in Dr Lockwood's direct experience).

518. Thirdly, it was suggested by Mr Halliday that different training was required to operate the HV and LV equipment. However, the transformer would always have to be de-energised to permit access to the LV equipment adjoining the transformer, and that requires the use of the HV equipment. There is, moreover, no evidence that the training requirements would require attendance of a different individual or that the costs of this step (even if it did occur) would be such that LV circuit breakers would be a proportionate addition to the solar park.

519. Fourthly, Mr Halliday made the point in his oral evidence that in circumstances of a substation-wide shut-down, where there is no LV circuit breaker, "*it means you have a much larger section of equipment to fault find on and diagnose the fault and potentially it can take you longer to get the system back on line.*" Thus, if the HV circuit breaker trips, one can rule out any fault on the LV side and narrow the fault finding from the start. This was, however, a new point which was not canvassed in the experts' reports or put to Dr Lockwood, and might require consideration of whether one can necessarily assume from the fact that a HV circuit breaker operates (first) there is no fault on the LV side. I do not think it would be right to give weight to this point when determining these issues.

520. The Claimants point out that under EPC Contracts with materially the same terms, Wirsol provided LV circuit breakers at TX1 at Woodhouse, as well as Cranham; and that the distinction between these sites and the other sites drawn by Dr Lockwood (by reference to some arrangement of the DNO) was "*entirely new, vague, undocumented*

and ought to be rejected". Dr Lockwood stated his understanding that the DNO had wished there to be LV circuit breakers at certain substations so that the DNO could take an auxiliary power supply from the LV side of the transformer even if the fuse board of the substation and the downstream part of it were isolated for any reason. I have seen no other evidence one way or the other about this point. In any event, I do not consider that the provision of LV circuit breakers at two sites means that their absence from the other sites should be inferred to be in breach of Good and Prudent Practice or otherwise in breach of contract.

521. For these reasons, I reject this head of claim.

(b) Remedy

522. I consider remedy briefly in case I am wrong on the issue of breach.

523. If it is necessary only to add LV circuit breakers in a given substation (and not replace the busbars), it is common ground this can be done by installing the circuit breakers through mounting on the transformers.

524. If it is necessary both to replace the busbars and install LV circuit breakers in a given substation, it is agreed this will require replacement of the LV switchboard.

525. There is an issue as to whether either step requires replacement of the substation, or can be done within the existing substation.

526. The Defendants argue that there is ample space for either LV circuit breakers or LV switchboards within the existing substations, as has been done at Cranham and Woodhouse.

527. Mr Spencer stated that "*Retrofitting is not possible*" and that "*larger transformers, busbars and circuit breakers require space, and this is simply not available in the enclosed package substation.*" However, he had done no measurements of the substations, nor the equipment, and he accepted in cross-examination that it was possible to dismantle and remove the equipment in the substation via the substation door in order to carry out internal substation remedial works.

528. Mr Halliday said there was insufficient space in the substations for LV circuit breakers to be retrofitted to the transformers. That was not a point made in his first report, and he did not provide any detailed explanation for that view.

529. Mr Halliday also stated in cross-examination that he believed that remedying the defects by carrying out substation modifications would take two to three times longer than carrying out a new installation. The Claimants put to Mr Andrew in cross-examination that in the event full liability were established on *all* defects, the remedial work proposed by the Defendants would take two to two and a half months. Mr Andrew disagreed and said that he thought it could be done in a similar period to the Claimants' Remedial Scheme (four weeks), viz in "*five to six weeks*".

530. Based on these pieces of evidence, I am not persuaded that the fitting of LV circuit breakers, with or without a replacement LV switchboard, would require (practically or economically) the replacement of substations.

531. Mr Andrew has priced the costs of adding LV circuit breakers and replacing the LV switchboards as follows:
- i) Adding LV circuit breakers to the existing LV switchboards: £21,436, £21,660 or £20,841 per substation for purchase and installation.
 - ii) Addition of LV circuit breakers (also called LV ACBs) to new transformers (if those are installed): £13,485 or £20,236 per transformer.
 - iii) The experts have agreed the cost of a full LV switchboard replacement per substation at £46,300. That would give a total of £416,700 for the affected sites.
532. I would accept that evidence.

(4) Bus Section Breakers (Scott Schedule Items 9 and 11)

533. The Claimants allege that in relation to all twelve relevant sites there were no LV or HV main switchboard bus section breakers, contrary to contractual requirements, in particular Employer's Requirements §§ 4.4.9 and 4.4.11.
534. The experts have agreed that:
- i) the contract required LV and HV bus section circuit breakers;
 - ii) the design of the site is based on a single connection to the DNO with two radial feeds to the two transformers on the solar farm;
 - iii) bus section breakers are normally used when there are dual independent feeds to a substation;
 - iv) in any system based on radial feeds to the LV and HV busbars, there would be no benefit in providing LV or HV busbars; and
 - v) if a ring-type system were used, then there would be a benefit.
535. Based on this evidence, I conclude that there are breaches of contract, but they have caused no loss or prejudice and it would be unreasonable to insist upon reinstatement.

(5) Wilbees Third Circuit Breaker (Scott Schedule Item 12)

536. The Claimants allege that there is a third HV circuit breaker at Wilbees inappropriately located upstream, beyond the final switch at the entry point to the Grid (in addition to the one main HV circuit breaker, and the DNO circuit breaker outside of the site). It is alleged that this circuit breaker would be better situated as an HV or LV circuit breaker.
537. The defects experts agree that “*At Wilbees there is a third substation situated between the Solar Farm TX1 Substation and the entry point to the grid. This third substation has two 33kV circuit breakers....The reason for this additional substation is not known.*”

538. Dr Lockwood is of the view that the redundant breaker is currently bypassed, there are no risks associated with it, and it can simply be left. He was not asked about it in cross-examination.
539. Mr Halliday said in his report that, according to the single line diagram and the G59 regulatory certificate for Wilbees, the additional substation is active, that the protection device in the additional substation is being used and the redundant breaker is not bypassed: “*It is an additional and unnecessary point at which faults can take place and to reduce this risk ought to be removed.*”
540. Asked in cross-examination about the position on the footing that HV circuit breakers would be installed at the site (so that the extra circuit breaker would not be needed for that purpose), Mr Halliday said it would be better removed. He accepted that it was not a problem, and that he had not identified any contractual basis for requiring it to be removed, but said it was another potential point of failure in the system. In response to the suggestion that it might be useful as another layer of backup protection, Mr Halliday said HV circuit breakers would provide that protection anyway, and having this additional circuit breaker might over-complicate matters and make it harder to ‘achieve discrimination’ (which I take to mean locate the source of the problem).
541. The pleaded claim in relation to this additional circuit breaker is not that it is, in some way, imprudent or bad practice for it to be present, but rather that it would be better situated as a HV or LV circuit breaker (Scott Schedule item 12), and the remedy claimed is put on that basis. That claim is not, in my view, made out on the evidence and therefore fails.
542. If its removal were required, then I would accept Mr Andrew’s evidence that it can be achieved at the cost of £507 per substation.

(6) Combiner box miniature circuit breakers (Scott Schedule Item 14)

543. The Claimants allege that the miniature circuit breakers (MCBs) housed in the combiner boxes installed at twelve sites were not sufficiently rated for the maximum current that they may be called upon to operate at, resulting in a risk of catastrophic failure and personal injury. This is said to be a breach of, *inter alia*, clause 4.1 of the Employer’s Requirements which provides that equipment must be designed to ensure satisfactory operation under sudden variations in load including “*transient short circuits and internal/external fault conditions*”; and regulation 5 of The Electricity at Work Regulations 1989.
544. The experts agreed in the Joint Memorandum that:
- “The fault levels at the points of installation of some of the MCBs exceeds the rating of the currently installed...units. As a result, these devices will need replacing.
- If the MCB operates above it[s] rated fault level there is a risk of a catastrophic failure of the MCB and fire at the respective combiner box.”

545. There is one MCB per inverter and so between 98 (Widehurst) and 137 (Five Oaks) MCBs on the sites with two substations. The single substations sites, Cranham and Otherton, have 82 and 66 respectively. The defects experts further agree that if any MCB is to be replaced at a site, then “*it is inadvisable to have a mix of device types within a given site and it is recommended that any site affected by this problem should have all the MCBs replaced.*”

546. The question, however, is at which sites the MCBs need to be replaced. In the Joint Memorandum the experts said:

“As indicated in the areas of agreement, there is a number of locations where the MCB breaking capacity might be exceeded. Defendants’ expert [Dr Lockwood] will be presenting a list of those locations in his expert report. ...”

547. Mr Halliday carried out for his first report an analysis of the maximum fault levels that can be faced by the MCBs at each site, and provided a table which might appear to indicate that at all twelve sites the maximum fault levels significantly exceed the 25kA fault breaking capacity of the MCBs, i.e. the maximum current they can operate at to clear a fault. Mr Halliday’s estimated lowest maximum fault level was 35.31 kA (Widehurst) and the highest was 54.84 kA (Cranham)). However, this evidence was subject to significant qualifications:

“Without a detailed fault study report for each site, I cannot accurately determine the number of miniature circuit breakers that need to be replaced. It will be necessary for detailed fault studies to be completed to allow this assessment to be made. ...”

548. Dr Lockwood in his first report provided a power systems analysis for four of the sites (Trowse Newton, Outwood, Five Oaks and Widehurst) concluding that at least one MCB needed to be replaced at each of those sites.

549. Mr Halliday in his second report said “*There has been no data provided to determine at which sites the MCBs are underrated. On the basis of the reasonable worst case conditions MCBs will require to be replaced at all sites.*” He elaborated slightly as follows:

“6.2.6.3 Dr Lockwood has provided absolutely no analysis, results, information, documentation or verification of the analysis and results, nor any details of which MCBs he now considers have fault levels in excess of the 25kA rating which are referred to in paragraphs 345 and 346. In table 6 of my expert report dated 24 June 2020, the fault level at all sites are listed. At all sites the fault level is above the 25kA rating of the existing fitted MCBs. Based on these results and acting prudently all sites require the MCBs to be replaced.

...

6.2.6.5 There was no further information provided on MCB fault levels in the letter from Enyo dated 21 July 2020. On this basis this does not impact/ alter my views stated in paragraphs 6.2.6.2 and 6.2.6.3 above and I do not regard the information provided as being “*sufficient and complete*” as stated by Dr Lockwood in his letter dated 27 July 2020.”

550. Dr Lockwood did not address the topic further in his second report.
551. In cross-examination, Dr Lockwood explained that he chose the four sites he analysed on the basis that three were the most heavily loaded sites, and one (Widehurst) had a different type of inverter. He accepted that he had not performed an analysis for the other sites. It was suggested to him that the four sites he had analysed were all at the lower end of the range of the maximum fault level according to Mr Halliday’s theoretical analysis, but he was unable to accept that proposition, pointing out that he had no details of the calculations and there was a potentially significant impedance effect which required to be taken into account. He did not consider that his results for the four sites could be extrapolated to the other sites.
552. Mr Halliday in cross-examination accepted that he had said further fault studies were necessary and that they would show a lower fault level than in his table, and that he had not conducted the required detailed fault study for any of the sites. He pointed out, however, that as part of his second report he had done a calculation for one site to show the difference made by taking the incoming fault level into account, which had changed the value from about 34.5KA to 32.7 KA. Thus, in his view, the actual input impedance had a fairly minimal impact on the actual fault rate required for the MCBs. He accepted that he had not carried out a detailed fault study for each site.
553. The Claimants submit that Dr Lockwood must be taken to have accepted Mr Halliday’s analysis, having failed to respond to it in his second report. I do not agree. Dr Lockwood had, as he made clear, already set out in his own first report what he considered to be the correct basis of calculation. It is clear from his evidence as a whole that he did not fully accept Mr Halliday’s calculations. The Claimants also submit that the burden is on Wirsol to identify and rectify all breaches, by reason of § 11.1(b) of the Conditions of Contract. Clause 11.1 is headed “Completion of Outstanding Work and Remedying Defects”, and provides:

“In order that the Works and Contractor’s Documents shall be in the condition required by this Contract (fair wear and tear excepted) by the expiry date of the relevant Defects Notification Period or as soon as practicable thereafter, the Contractor shall perform:

- (a) any work which is outstanding on the date stated in a Taking-Over certificate, as a condition precedent to certification of the final Payment Milestone under Sub-Clause 14.4 (Milestone Payments);
- (b) all work required to remedy defects or damage (including damage caused by the defect and damage

arising from the investigation or repair of the defect or damage), as may be notified by the Employer or of which the Contractor is otherwise aware on or before the expiry date of the Defects Notification Period; and

- (c) any work required to remedy a Systemic Defect.

Each Party shall notify the other Party in writing and, (if requested) the Independent Engineer as soon as reasonably practicable after becoming aware of the existence of a defect or damage occurring as a result of a defect or a Systemic Defect.

The Contractor shall execute all work referred to in paragraphs (a) and (b) above in accordance with this Contract as soon as reasonably practicable subject to (i) complying with any relevant provisions of the Agreement for Lease, (ii) providing prior written notice of the time of such works to the Employer and (iii) with minimum disruption to the operation of the Facilities and the performance of services provided to the Facilities.

If there is a Systemic Defect, the Contractor shall execute all work referred to in paragraph (c) to ensure that the Systemic Defect is rectified by the replacement of all the components in the Works subject to Systemic Defect.”

554. However, the Claimants’ approach begs the question of whether a defect has been identified or notified in the first place. It does not have the effect of reversing the burden of proof, in the context of litigation, as to which MCBs are inadequate and require replacement.
555. Although Dr Lockwood might be criticised for not undertaking the more complete study that it appeared from the Joint Memorandum (dated 3 June 2020) he would do, it should have been apparent from his first report (dated 24 June 2020) that he had not performed a complete analysis. The Claimants have not themselves provided an analysis which, according to their own expert, constitutes a full study taking into account impedance.
556. In these circumstances, I have to form a view on whether the defect has been established, on the balance of probabilities, in relation to sites other than the four identified by Dr Lockwood. On balance I consider that it has. The maximum fault levels in Mr Halliday’s table were all well in excess of the 25kA MCB fault rating. His evidence was that to the extent he had done a calculation taking into account impedance it had made little difference. The four sites where Dr Lockwood had found the maximum fault levels to be in excess of the MCB limits were clustered around the lower end of the figures in Mr Halliday’s table – the maximum fault levels he estimated for all the other sites were comparable to or higher than at those four sites. I therefore find it more likely than not that the MCBs at all the 12 sites require replacement.
557. As to remedy, the cost of each MCB has been agreed by the experts at £160, and the total cost for replacement of all MCBs at all sites is agreed at £231,040.

(M) MONITORING DEFECTS (Scott Schedule Items 15 to 19)

558. The Claimants sent fifteen defect notices dated 30 July 2018, one for each solar farm, to Wirsol in respect of alleged monitoring system defects, and pursue them as claims now.
559. As a preliminary point, the Defendants point out that it appears the Claimants have taken no steps to upgrade the monitoring system to date, despite over two years having passed since the termination of the contracts; and I agree that that may cast doubt over the necessity for any remedial measures. However, I consider each sub-head of claim on its merits below.

(1) Measurement of voltage at string level (Scott Schedule Item 15)

560. Employer's Requirements § 6.1 sets out a number of general requirements relating to the basic functions of the monitoring system for the parks, including "*the capability to read the irradiation data on the highest level of granularity possible and to export it...*"). Clause 6.2 is headed "*Specification*", and includes the following:

“The system must be capable of (but not limited to) processing:

Voltage of string

Output current of string

Output (wattage) of string

...”

561. The Defendants accept that the system does not monitor the voltage of each individual string, but their evidence is (and it appears to be common ground) that the system does measure voltage for each pair of strings of solar panels. Each inverter is connected to many strings of solar panels. Mr Hogan explained in his witness statement that that arrangement was in place because the strings are immediately combined in the inverter in pairs, which is industry standard. One can still easily locate a fault if any PV panel on a string is damaged or performing poorly. I accept that evidence.
562. Mr Hogan added that it would also be possible to work out the individual string voltage from the current and power, both of which were monitored. Mr Spencer did not accept, in cross-examination, that current and power were monitored at individual string level. He added that one can, for example, measure shading using individual string voltage. However, there is no evidence to suggest that voltage monitoring by string pairs will not provide sufficient detail for that purpose.
563. In the Scott Schedule the Defendants made the further points that the SPVs will have suffered no prejudice as a result of this matter, and did not raise it until over a year after the execution of the SPAs. I agree that no prejudice arises.
564. In my view, the ability to measure voltage at string level is a breach, but (for the reasons set out above) not one that has caused any loss or prejudice, and it would be unreasonable to insist on reinstatement.

(2) Voltage measurement at combiner box (Scott Schedule Item 16)

565. Employer's Requirements § 6.2 requires the system to be capable of processing both "*Inverter current output and voltage*" and "*Combiner boxes output and voltage*". Inverter voltage but not combiner voltage is available.
566. However, Mr Hogan explains that the two are materially the same on these sites: the combiner box voltage is not variable but fixed at 400V, and the voltage drop between the combiner and the inverter (due to efficiency losses) will be negligible. I accept that evidence. It follows that in substance the voltage is available at combiner box level, and there is no breach.

(3) Remote monitoring of transformer temperature (Scott Schedule Item 17)

567. Employer's Requirements § 6.2 (read with § 6.1) requires the system to be capable of processing "*Transformer status*", and for this and other data to be monitored remotely. There is no facility for remote reading of transformer temperature at three sites (Balcombe, Lisburn and Carrowdore solar parks) but it is available at the other sites. There is a dispute, which it is not necessary to resolve, about whether Wirsol was in the process of finishing this work at the time of termination. A defect accordingly remains for these three sites.

(4) Alarms and alerts (Scott Schedule Item 18)

568. Employer's Requirements § 6.1 requires "*A full set of alerts and alarms for all the plant components*" which "*will include (but not limited to) alerts for plant trips or faults, transformer trip or faults, inverter trips o[r] faults, fuses blown, cable faults, grid disconnection, loss of data communication*". Clause 6.2. states that alarms shall include (but not be limited to) no power at generation meter, no string output, low output performance, pressure alarm, temperature alarm and high speed alarm.
569. In the Scott Schedule, the Claimants alleged that "*a full set of alerts and alarms for all plant components including alerts for transformer trips and faults was not provided*". The Defendants denied this, alleging that a full set of alerts and alarms had been installed, apart from a high wind speed alarm, which was due to be installed when termination intervened, adding that "*In any event, this is not a material breach ... as the Solar Parks were designed with static solar panels and no material steps could or would be taken to respond to periods of high wind*". This is confirmed in Mr Hogan's witness statement, adding that wind speed can be monitored and viewed on the Mind4Energy platform. The Claimants led no evidence on these points. I accept that the lack of wind speed alarms is a breach of the Employer's Requirements, but I also accept Mr Hogan's evidence that they would serve no useful purpose at these parks. No loss has been proven.
570. A further allegation is advanced in Mr Spencer's evidence that there was no alarm on the monitoring system giving the status of the transformer fans. The Claimants submit that relying on the far less immediate indicator of transformer temperature is too late to avoid overheating. The Scott Schedule included a generic complaint that "*a full set of alerts and alarms for all plant components including alerts for transformer trips and faults was not provided*", but made no reference to transformer fan

monitoring. As a result, the issue was not considered by the Defendants' witnesses or their experts in their statements/reports.

571. In cross-examination, it was put to Mr Hogan merely that the Defendants had admitted that there were no such alarms, to which he replied he did not know. The following exchange occurred in the cross-examination of Dr Lockwood:

“Q. One of the problems here was that there was no remote monitoring of fans to allow for informed quick maintenance, was there?”

A. I believe that is the case.

Q. But in any event you would also agree that it provides an additional maintenance cost, both in terms of monitoring and the costs of monitoring those fans, but reacting when an alarm is set out or when a fan or controller fails, it isn't associated with a natural air cooled transformer?

A. There are potential costs, and, yes, there are disadvantages to using air cooled transformers in these terms. There are distinct advantages to having air forced transformers.

Q. And if for example there is no monitoring, and the fan or their controllers fail, it's only if the ambient temperature monitoring or the transformer temperature monitoring is working that you might then catch a real risk -- a risk to equipment life and a risk to fire?

A. You used the term "and" in a logical argument. For there to be a risk of problems you would need both the transformer core temperature measurement -- sorry the winding temperature measurement -- systems, plural, to go wrong, and the substation monitoring systems to go wrong. It's not either one goes wrong and you're in trouble, both have to go wrong and be left unattended for there to be any danger issue.”

572. A difficulty with a loaded question such as the first one quoted above is that the answer may leave it unclear precisely what the witness has accepted: in this case, that there was no fan remote monitoring, or also that that was a ‘problem’. The Claimants submit that Dr Lockwood accepted both. However, the further ensuing exchanges quoted above indicate that he did not, and considered other protections adequate. There is no evidence from either of the Claimants' experts on this matter. Had the point been pleaded, then it would have been possible for the witnesses of fact and experts to address it properly in their written and oral evidence. As it is, I am unpersuaded that the Claimants should be permitted to advance, or in any event that they have established, a claim based on this unpleaded allegation.

(5) Storage of reactive energy data for 90 days (Scott Schedule Item 19)

573. The Claimants allege that the outputs of metering equipment at the parks were not connected to monitoring hardware capable of storing reactive energy data for at least 90 days. The Defendants responded that this data was available for at least 90 days on the Class 0.2 meters installed at each park. The Claimants say the meters are measurement devices only, and the data-loggers connected to the monitoring system do not store the information. They make the point that Employer's Requirements § 6.1 requires the control system to store and file historic data which can later be consulted and analysed by the system operators. Clause 6.1 goes on to say that meters in particular must include all necessary information for invoicing and regulatory requirements, and that reading this information must be possible in real time and include all electrical parameters including active and reactive energy.
574. Mr Hogan confirmed in his witness statement that the data was stored on the monitoring system, and was not challenged as to that. There is no evidence to the contrary. I accept his evidence.
575. The Claimants also asserted in the Scott Schedule that that data needed to be capable of remote monitoring pursuant to Employer's Requirements § 2.15:

“The plant shall be automated and require minimum operator intervention for normal operation. It shall be possible to start the plant and the 33kV switchgear shall have the capacity to auto re-close following an event of a grid disconnection to bring the plant to full capacity without operator intervention.

The degree of automation provided shall ensure the plant can be safely and reliably re-started, and will shut down by interface with the DNO grid voltage and G59/2 requirements which are capable of being monitored from an off-site location.

The Contractor shall design and provide everything necessary so that all operations including startup and shutdown can be operable remotely, including the reboot for the inverter's shutdown, the safe auto re-closing of the G59 relays and the SCADA for the meteo station. The Contractor shall also design and provide everything necessary for:

- all process and equipment alarm status to be remotely monitored;
- all process and individual equipment failure and tripping status to be monitored by a sequence of events monitoring system; and
- all Front End Monitoring Systems to be open access and non-propriety”

It is not immediately obvious that this provision requires remote monitoring of reactive energy data, and the suggestion was not pursued or elaborated in written or oral submissions.

576. Accordingly I do not find any breach to have been established under this head.

(6) Remedy

577. I have concluded above that the only sub-head where there is a breach that has caused loss is the absence of a facility to monitor transformer temperatures remotely.

578. Neither party has put forward pricings for remedial work in relation to the individual sub-heads set out above. The Claimants' expert, Mr King, has put forward a simple composite figure in his second report of £20,000 for sites with two transformers, and £10,000 for sites with only one, based on a quotation obtained from PSH. This appears primarily to relate to relocation and reconnection of the monitoring system if the substations are replaced, and certainly includes costs for those activities.

579. The Defendants' expert, Mr Andrew, tried unsuccessfully to obtain a quotation from Mind4Energy, the subcontractor previously employed by Wirsol to provide the monitoring system. Mr Andrew considers Mr King's estimate excessive in its own terms, and that most of the work he envisages would not be required if there is no need to replace the substations. Mr Andrew has stated that in the absence of a detailed quotation or other specific details to allow competitive prices to be procured, he considers a provisional sum of £10,000 per site should be allowed to cover the works as currently described (including relocation of the monitoring equipment due to installation of new substations); but indicates that the cost would be materially less if such relocation is not required.

580. As a result, there is no quantified cost for either (a) remedial work in respect of the alleged monitoring defects if (as I conclude below) there is no need to replace substations, or (b) remedial work to allow remote monitoring of transformer temperature. There may accordingly be no basis on which the court can assess a sum for damages for the only breach I have found in principle to have caused loss. However, I shall hear argument as to whether the existing evidence contains sufficient particularity for such loss to be assessed.

(N) INADEQUATE SITE FINISHING AND LANDSCAPING WORKS ((Scott Schedule Item 20)

581. This is admitted by the Defendants and quantum is agreed at £20,225 and £44,165 in respect of Carrowdore and Lisburn respectively.

(O) 25 YEAR MINIMUM OPERATIONAL LIFE WARRANTY (Scott Schedule Item 21)

582. The Claimants allege that Wirsol failed to comply with a warranty that it had designed the Works to have a minimum design operating life of 25 years.

(1) Contractual obligations

583. Clause 4.1 of the Conditions of Contract included the following warranty:

“... the Contractor warrants that it has designed the Works to have a minimum design operational life of 25 years under the operational conditions set out in the Employer’s ... Requirements, provided that the same are operated and maintained (and, where relevant, replaced) in accordance with the operational and maintenance manuals received [under the contract] and provided that the individual component parts set out in Clause 4.5...shall only be warranted for the periods set out in that Clause 4.5”

584. Clause 4.5 provides *inter alia* that the Contractor shall ensure that warranties are provided in relation to the inverters and the transformers for a period of 5 years from their commissioning (with the option for the Employer to extend this with the supplier).

585. Employer’s Requirements § 2.12 provided that:

“The Works shall be designed for a minimum operating life of a period of at least 25 years, taking full account of proximity to coastal environment and ground type (PH). ...”

586. In *MT Højgaard A/S v E.ON Climate & Renewables UK Robin Rigg East Limited* [2017] UKSC 59 the Supreme Court considered a clause that required that “*the design of the foundations shall ensure a lifetime of 20 years without replacement*”. Lord Neuberger, giving the sole substantive judgment of the court, stated that the clause on its proper construction was a contractual obligation that the *design* of the foundations was such that they would have a lifetime of 20 years, as opposed to being a warranty that they *would* last 20 years without replacement (§ 30). In other words, the question related to the quality of the design, as opposed to whether the foundations in fact lasted 20 years. It follows that the question is to be answered as at the date of design.

587. The clause in the present case includes the concept of “*design life*”, which was analysed in *Blackpool Borough Council v Volkerfitzpatrick Ltd* [2020] EWHC 1523 (TCC) §§ 153 to 157. The court there identified (by reference to a British Standard addressing structural service life planning) that a design life is an assumed period during which the structure is to be used for its intended purpose with anticipated maintenance but without major repair being necessary.

(2) C’s case as to Wirsol’s design operational life

588. The Claimants point out that the Defendants have not adduced relevant evidence about the design process, such as design documentation referring to or showing that the requirement for a 25 year operational life was even considered or addressed. They allege that the “*multitude of defects taken together*” indicate that Wirsol failed to comply with the warranty.

589. I have found many of the alleged defects not to be established. I focus therefore on such defects as I have found to exist and which the Claimants have highlighted in the context of the design life warranty.

(3) Transformers

590. Mr Ryder has provided evidence that the inadequate capacity of the transformers defect by itself limits the useful life of six of the transformers to less than 25 years, namely Outwood TX1, Trowse Newton TX1, Wilbees TX2, Five Oaks TX2 and Wrea Green TX1 and TX2. The first four of those are transformers which, in section (F) above, I have concluded lack sufficient capacity. Mr Ryder has analysed the impact of the differential of current supply from the inverters compared to the capacity of the transformers on the winding hot spot temperatures. Excessive winding hot spot temperatures leads to a degradation of the winding solid insulation which is itself a measure of lifetime of the transformer. Once the insulation life is gone the transformer cannot operate.
591. This approach to analysis, though not the calculation promulgated by Mr Ryder, is agreed as acceptable between the experts. The experts agree that solid insulation life for the transformers can be determined by reference to IEC standard 60076-12. This provides a method for estimating solid insulation life based on winding hot-spot temperature. Further, they agree that winding hot-spot temperature can be estimated from the representative ambient temperatures and loading.
592. Dr Lockwood has characterised Mr Ryder's analysis as overly pessimistic, in particular, as regards the amount of sun and the network requirements to be considered. Mr Ryder maintained that his approach was in accordance with Good and Prudent Practice. He also re-worked Dr Lockwood's alternative methodology for estimating transformer life expectancy, taking into account Mr Ryder's conservative assumptions, and reached the conclusion that even on that premise three of the transformers (Outwood TX1, Trowse Newton TX1, and Five Oaks TX2) do not have sufficient solid insulation life.
593. There are, however, significant flaws with the Claimants' approach.
594. First, it assumes the relevant design life for transformers is 25 years (taken by Mr Ryder to equate to 1800 hours a year at full load, hence 45,000 hours), whereas the contract makes clear that only a 5-year period applies to transformers: see above. It appears from Mr Ryder's first report that, on his preferred approach, only one transformer (Trowse Newton TX1) would have an expected life of less than 5 years (9,000 hours), and that is a transformer which I have already concluded lacks capacity anyway.
595. Secondly, Mr Ryder's analysis assumes 1800 hours a year at full load i.e. 5 hours a day. Dr Lockwood pointed out in his reports that full load, however, is reached only when the energy density of the sun falling on the panels is about 1000W per square metre, whereas the Meteorological Office data on which Mr Ryder's analysis is based deems sunshine hours to exist at only 120W per square metre. Data provided to Dr Lockwood by Wirsol for one site suggested that actual time at full power production was typically less than 10 hours a year.
596. Thirdly, Mr Ryder's figures, including his reworked figures, assumed the network would be operating at 94% of nominal voltage and 0.95 leading power factor. As indicated in section (F) above, I do not consider that to be a realistic possibility.
597. For all these reasons, I conclude that the Claimants have not established a breach of this warranty by reference to transformer lifetime.

598. Separately, the Claimants' expert reports have suggested that the 'paint system' applied to the transformers at certain sites is inadequate to last 25 years. This allegation is, however, entirely unpleaded. There is also, in my view, force in the Defendants' points that:
- i) the complaint, properly analysed, is that the transformers actually procured were defective, in that they in fact lacked an adequate painting system to cope with the conditions in fact encountered; the Works were designed by Wirsol so that the transformers would have adequate painting systems, the transformers were all rated E2, which permits frequent condensation or heavy pollution or both, and Mr Ryder agreed that if the transformers were E2 rated then that would mean there would be no issue with their paint systems; a complaint that the transformers were not actually manufactured to E2 standard does not amount to a breach of the design warranty;
 - ii) the relevant part of Mr Ryder's report relies on evidence advanced by a paint expert for which the Claimants do not have permission; and
 - iii) the analysis makes a number of questionable assumptions, including that the problems identified with one transformer can be assumed to exist in all other transformers made by the same manufacturer.
599. Since the allegation (a) is unpleaded, and no application for permission to amend was made, and (b) would not even on its face form a proper basis for a claim for breach of the design warranty (see subparagraph (i) above), it is unnecessary to consider it further.

(4) Forced air cooled transformers, water ingress and excessive humidity

600. The Claimants allege that the selection of forced ventilation over natural air cooled transformers resulted in poor control of humidity and ingress of water and fine solid contamination. They note that the defects experts have agreed that ambient conditions in the substations may affect the life of some of the equipment installed there, and suggest that the experts have also agreed that the complexity of the system, requiring the use of fans, compared to natural air cooled transformers, has the potential consequence of reduced reliability and availability and greater propensity to loss of equipment life (if fan failures take place). However, what the experts in fact agreed was:
- “The use of fans increases the complexity of the system and this has the potential consequence of reduced reliability and availability. It is therefore usual to have systems to detect defects in cooling in order to protect the transformer from damage. All of the transformers have winding temperature measurement and protection. Assuming this protection is functioning correctly, it should minimise the consequences of any fan failures for equipment life and also any risk of fire.”
601. That agreement does not provide a basis for concluding that the 25-year design warranty has been breached by the use of forced air cooled transformers.

602. I have concluded earlier that the Claimants have not made out their case on excessive humidity. The Defendants have accepted that there has been water ingress into substations. No doubt if that continued, it could affect the lifetime of the sites. I do not, however, see any evidential basis on which to conclude that the water ingress has resulted from design defects as opposed to (for example) errors in construction or manufacturing defects. In any event, since it is common ground that the water ingress needs to be cured, it is difficult to see how repackaging this claim as one for breach of the design warranty could affect the outcome of the case (including the quantum of recoverable damages).
603. The Claimants also pray in aid in this context the catastrophic failure of the original transformer at Cranham, as an example of the effects of excess levels of humidity and ingress of water. However, I have concluded in section (I)(4) above that the evidence does not establish that the failure was caused by moisture, with an internal fault being a more likely explanation.

(5) Plywood flooring

604. The defects experts agree that the plywood flooring is susceptible to deterioration and rotting when in regular contact with water, and that the operational life of the plywood flooring when exposed regularly to water is only 10 to 15 years. The Claimants allege that the flooring design, therefore, breaches the 25 year operational life warranty. This point is misconceived. It is plainly not part of the design that the flooring should be regularly exposed to water. Such exposure as has occurred has resulted from water ingress which ought not to have happened and whose cause (it is common ground) needs to be removed. The flooring does not breach the design warranty.

(6) Circuit breakers

605. The Claimants suggest that the lack of circuit breakers provides an acute risk of failure, fire and consequential damage to equipment contrary to the 25 year design life warranty. They note the experts' agreement that it is not acceptable for the LV busbars to be protected from fault currents by commanding the relevant HV switch to open, and that "*A risk to equipment remains and it is essential that changes to equipment or control systems are made so that switches are not used to clear fault currents.*"
606. As set out earlier, the Defendants now accept that each substation at each of the solar parks is required to be protected by an HV circuit breaker and that further HV circuit breakers are required to be installed; but I have rejected the Claimants' case about LV circuit breakers.
607. In my view the likely risk to equipment means that the existing lack of HV circuit breakers does also amount to a breach of the design warranty, since the lack of a safety feature which could shorten the plant's life prematurely is inconsistent with designing for a 25-year operational lifetime. No basis has been suggested, however, on which this will affect the assessment of loss.

(P) OTHER ISSUES RELATING TO REMEDY

(1) General approach to quantification of loss

608. The following points appear to be common ground. The costs of and occasioned by reinstatement in a construction context are often, though not invariably, the proper measure of damages where there has been defective performance. Where reinstatement is the appropriate basis for the assessment of damages, it must be both reasonable to reinstate and the amount awarded must be objectively fair as between the parties. Where reinstatement is the appropriate measure of damage, it is the reinstatement reasonably necessary as a result of the physical damage caused by the defect of which complaint is made or to overcome the defect which is recoverable.
609. It follows from the latter point that if a defect can reasonably be rectified by a more limited remedy than that proposed by a claimant, then the claimant will have failed to establish that its proposed remedy is required. It cannot recover the cost of excessive remedial action. It further follows, in my view, that where a breach in fact causes no loss or prejudice to the Claimant, then no remedial action at all may be required: only nominal damages will be appropriate. This is a separate point from the one in the following paragraph below, which concerns situations where some prejudice does exist.
610. It is also distinct in principle from arguments to the effect that a claimant has failed to take specific steps which would have mitigated its loss (as in the case of *Geest v Lansiquot* [2002] UKPC 48, cited by the Claimants, where defendants suggested that the claimant's personal injury should have been mitigated by undergoing an operation on her back, and the Privy Council pointed out at § 16 that mitigation arguments must be pleaded or otherwise notified to the claimant so that he/she can prepare to meet them).
611. In addition, the cost of reinstatement will not be awarded where it would be "unreasonable for the claimant to insist on reinstatement, as where, for example, the expense of the work involved would be out of all proportion to the benefit to be obtained": *Ruxley Electronics and Construction Ltd v Forsyth* [1996] AC 344, per Lord Lloyd at 369H. See also Chitty on Contracts (33rd ed.) § 37-214:

"Where, after completion, there are defects in the works, the employer will normally be entitled to damages equal to the costs of making good the defects (this is sometimes referred to as the costs of reinstatement). However, whilst such an award of damages puts the plaintiff (employer) into the position he would be in if the contract had been properly performed in the first place, it is still for the plaintiff to show that reinstatement is a reasonable response to the damage in question." (citing *Atkins v Scott* (1990) 7 Const. L.J. 215, CA.)

612. The parties differ about the extent to which the Defendants may advance this point in relation to particular defects: the Defendants positively advanced a point of this nature in relation to forced air cooling of transformers but not in relation to other alleged defects. In principle I consider that the burden remains on the Claimants to establish that damages measured by reference to the cost of reinstatement is the appropriate remedy. However, the point is probably academic since the defects I have found to

exist or which the Defendants accept exist (inadequate capacity of some transformers and busbars, water ingress, lack of HV circuit breakers, underrated MCBs and (in one aspect) lack of monitoring system) are, with a few minor exceptions, defects where replacement, as opposed to damages based on diminution in value, is or would be the proportionate and appropriate measure.

(2) The Claimants' remedial scheme

613. In relation to the thirteen solar parks based in Great Britain, the Claimants' claim is for the replacement of substations together with replacement natural air cooled transformers of sufficient capacity and compliant with the terms of the EPC Contracts. This "*Claimants' Remedial Scheme*" addresses all but the final three defects referred to above, for which there are discrete remedial works. An outline specification of the Claimants' Remedial Scheme was provided in Schedule 6 to the RRRAPoC, with further detail provided in the Scott Schedule.
614. The Claimants' expert, Mr King, in his first report calculated the total cost of the Claimants' Remedial Scheme as £10,019,183, but in a supplemental report gave a revised figure of £7,225,300. He now puts the cost at £6,998,461. The Defendants now calculate the cost of the Claimants Remedial Scheme at £6,418,246. The Defendants also calculate that if the Claimants' succeeded in establishing all the defects alleged, then the Defendants' approach to remedying such defects would cost £3,768,515.
615. In simple terms, the Claimants' Remedial Scheme involves the following measures:
- i) For the ten sites with two transformers, the supply of new oil filled transformers, new HV and LV switchgear and housings (small substation), removal and disposal of the existing equipment and substation, MCBs, and remote monitoring work. In relation to Five Oaks, for example, the Claimants' Remedial Scheme values the work to TX 1 at £280,341 and the work to TX 2 at £259,978. The Claimants suggest that the costs of the proposed new substations are only a small proportion of the overall costs (£16,006 and £10,264 respectively).
 - ii) For the two single transformer sites, Cranham and Otherton, the works are essentially the same but for just one transformer. The Claimants have, at their own cost, had partial remedial work carried out at Cranham following the recent catastrophic failure of the transformer including the replacement with an external oil-filled transformer. The Claimants allege that that work was necessitated by the Defendants' breaches in relation to water ingress and humidity. I have rejected that allegation. Moreover, it appears that the Claimants seek to recover the cost of replacing the original transformer on the basis of lack of capacity, despite the replacement of the transformer, on the basis that Wirsol's breaches of duty preceded the failure.
 - iii) Replacement of the two transformers at Balcombe, priced by the Claimants in the sum of £112,127, plus monitoring system work.
 - iv) Monitoring system work at all fifteen sites.

616. The Claimants say it is in any event common ground that the following works will need to be carried out at the Defendants' cost:
- i) replacement of LV busbars at four substation locations on four different sites and transformers at three of those substations;
 - ii) removal of clipping at 8 sites;
 - iii) addressing water ingress through the intake vent and exhaust vents and sealing of doors at 12 sites;
 - iv) installation of HV circuit breakers;
 - v) replacement of MCBs at some sites; and
 - vi) the landscaping work already done at Carrowdore and Lisburn.
617. The Claimants suggest that there is no defence pleaded to the Claimants' Remedial Scheme. In the Defence all that is pleaded is that the figure claimed is grossly overstated. In the Scott Schedule, there is also no pleaded case on remedial scheme other than that, subject to liability, the Defendants say more limited work (than replacement of entire substations as the Claimants propose) is needed in relation to water ingress (Scott Schedule Item 6), plywood flooring (Item 7), and circuit breakers (Items 8 to 11). The Defendants have not pleaded alternative remedial works to the other six main defects claims (Items 1 to 5 and 21). Subject to these few exceptions, it is said that the Defendants' positive case on remedial scheme and quantum is limited to a challenge to the reasonableness of the quantum claimed only. Further, the Defendants have not pleaded that the Claimants have failed to mitigate their loss.
618. Scott Schedule Items 1-5 and 21 relate to insufficient transformer and busbar capacity, clipping of inverters, adjustment of protection settings, use of forced air cooled transformers, excessive humidity and the design warranty. Of those items, I have found breaches to have occurred only in relation to transformer and busbar capacity, and the design warranty insofar as related to lack of circuit breakers. I note in this context that clipping and protection settings adjustments are, at most, a symptom of inadequate transformer and/or busbar capacity; and, in any event, can plainly be changed with ease and without any arguable need for remedial work.
619. So far as concerns the inadequacy of transformer and busbar capacity at some sites, the position remains that the Claimants must prove their case and the court must decide what remedial work is necessitated as a result of the breaches. To take one obvious example (numerous others could be chosen), the Claimants' Remedial Scheme includes the installation of LV circuit breakers. However, I have concluded that the contract does not require these. Clearly the remedial work required to replace transformers or busbars cannot be taken to include the installation of LV circuit breakers.
620. The above point is of general application. The question is, simply, what remedial work is reasonably necessitated by the breaches I have found to exist. That point merely applies *a fortiori* where the Defendants have put forward in their pleaded case a specific remedial proposal e.g. in relation to HV circuit breakers.

(3) Replacement of substations

621. A particular question which nonetheless arises is whether, at least at sites where it is necessary to replace transformers and/or busbars and/or HV switchgear, it is reasonably necessary to replace the entire substation. The Claimants make a number of points in this context, which I consider individually and then in the round.
622. First, as to the physical work involved, the Claimants submit as follows:
- i) The installation of external transformers will require very significant reconfiguration. Were substations to be retained, the HV room and the transformer room would need to be cleared and wholesale cable diversion exercises to the external transformer required. Dr Lockwood accepts this would require flexible cables from the exterior transformer into the substation, cabling would be needed from the fuse boards outside. There are 15 fuse connections and up to four cables per fuse connection. This would involve cutting a hole in the side of the substation a metre wide, adding clamps, fitting a floor and a further cutting of a hole in the substation to run the cables back into the HV side. This is wholesale structural change to a purpose-built prefabricated substation.
 - ii) Replacement of the HV switchgear is no small work. Dr Lockwood proceeded upon the assumption that the replacement of the HV switchgear at Woodhouse took only three days. However, the O&M contractor, PSH, reported that the outage from the failure of the switchgear on 26 June 2020 was likely to be 16 weeks and it was quite clear from their report dated 30 June 2020 read as a whole that the site was not yet back online and would not be for significant time to come. Dr Lockwood accepted that he did not have any details of the scope of the remedial work required to Woodhouse. When it was put to him that the transformer cage was cut to allow the equipment to fit and that this was a modification to the substation safety systems, Dr Lockwood accepted that modifications were made, but that he did not look into the details of them. He accepted that the remedial work necessitated the sealing around the cable entries; and that in replacing the HV switchgear one has to change the HV cabling.
 - iii) The addition of LV circuit breakers and/or replacement of the LV busbars, if required, is an even more substantial exercise. If the substation is to be retained this requires the way through the HV room and the transformer room to be cleared. This work effectively requires the wholesale stripping out of the substations. The location and size of an LV circuit breaker is problematic and might involve substantial structural works, including cutting into the substation, or in some cases not be possible.
 - iv) In relation to work as a result of the water ingress and the humidity, Dr Lockwood's proposed remedial works included replacing the cowls and air vents (intake and exhaust), a burstable membrane on the blast vents, resealing the doors, and "*if there were still difficulties, then a further investigation could be initiated. For example, with the blast vents, they could be relocated away from the floor of the substation to ensure that any surface water pooling under the substation does not result in humidity.*" When it was put to him that if you were taking a prudent risk-based, conservative approach for final remedial work,

in order to ensure that the remedial work is successful, then the listed work is what you would need to do, he responded “*It would probably be best to do it, yes.*”

623. As to (i) above, it is common ground that transformers requiring replacement should be replaced by outdoor oil-filled transformers, which will involve removal of the existing transformers and installation of cabling to whichever substation contains the remainder of the switchgear and protection systems. No persuasive evidence has been put forward to the effect that it is necessary or proportionate at the same time to replace the entire substation.
624. As to (ii), Dr Lockwood’s evidence was that HV switchgear could be replaced within 3 days, citing the Woodhouse incident as an example. In cross-examination he explained that he had obtained his information from the people fitting the equipment, who said it would take three days, though there were in fact delays in obtaining the equipment. He added that his view was also based on “*lots of other failure incidents*”. The PSH report anticipated a much longer outage, but it is not explained or clear why that was, and I do not consider it to provide a reliable estimate of the cost of installing new HV switchgear in a planned context, as opposed to following an explosion of the kind that occurred at Woodhouse. I do not consider this evidence to establish that replacing existing HV switchgear at an existing substation would take longer than the experts’ assumed outage times if the Claimants’ Remedial Scheme were used, viz 13 days per substation. As was pointed out to me as part of the corrections process, it was ultimately common ground between the quantity surveying experts that the works proposed by the Claimants could take place simultaneously at both substations at two-substations sites; and I see no reason to believe that the same would not apply to the works which the Defendants accept are necessary (or which I have held to be necessary), including replacement of HV switchgear.
625. As to (iii), the Claimants’ analysis relates essentially to alleged difficulties in installing new LV circuit breakers, which I have found not to be required. It is not suggested, and was not put to Dr Lockwood, that the replacement of LV busbars alone would involve substantial difficulty, certainly not of the order as might justify replacing the entire substation.
626. As to (iv), there is no reason to believe that replacement of cowls and air vents would be logically complex or require any, or any significant, outage time. Dr Lockwood’s proposal in relation to the blast vents related to any problem of “*humidity coming up through the blast vents*” (first report § 310(3)) rather than water ingress, as did his answer about the remedial work it would “*probably be best to do*”.
627. Secondly, the Claimants suggest that there are many manifest problems associated with *in situ* ‘repair and reinstall’, as compared to replacement, most of which are simple common sense:
- i) The work will not be completed to the same standard as would be possible if it were carried out in the normal manufacturing process in the factory. If all the pieces of equipment are removed in a field, placed outside, re-assembled new parts with old parts, that plainly carries with it a higher degree of risk than if the whole thing is constructed as new in a factory as part of the normal

manufacturing process. Dr Lockwood accepted the proposition that it would, indeed be a higher risk.

- ii) Any warranties for old equipment, for example, the transformer and its associated substation if not replaced, would be at risk of being invalidated, especially if further cutting in to the “metal can” or into the safety structures between the three substation rooms is carried out without permission. Wirsol were required to ensure that equipment warranties were provided by manufacturers of a minimum of five years for the transformers, and 20 years for structures. Any rights to claim in relation to any equipment or the substation not replaced would be at risk if *in situ* repair and reinstallation were carried out, rather than full replacement.
- iii) There are risks of enhanced maintenance requirements which Mr Ryder identified in his second report and described in evidence: *“One could, for example, end up with different kinds of equipment at different stages in their lives having different maintenance requirements...with the implication that required maintenance would be increased or that the required maintenance frequencies for different pieces of equipment in the same substation would be different, meaning that more maintenance outages would be necessary.”* The Claimants say Dr Lockwood’s response *“It’s perfectly acceptable”* lacks any conviction or reasoning.
- iv) Mr Ryder identified in his second report that the Defendants’ patch repair schemes would lead to reduced expected lifetimes. He expanded upon this in oral evidence: *“we are taking equipment which has already suffered from some deterioration or aging in service, and trying to restore it to an as new condition and that this might not be possible or we might not be successful in doing so.”*
- v) Overall, a patch repair, remove and reinstall alternative would simply and rather obviously leave the Claimants with a “Heath Robinson” set of installations, not in accordance with Good and Prudent Practice, nor meeting the express obligations placed upon Wirsol that they shall provide *“a modern, functional, well-designed solar power plant capable of continuous, efficient and reliable operation with minimum maintenance. The equipment supplied shall be of proven, robust and reliable design incorporating protective systems and devices with adequate factors of safety and maintainability built-in”*, and Works that are *“new, proven and safe...designed for high availability, reliability, and efficiency”*. Only the Claimants’ Remedial Scheme would put them in the position they would have been had Wirsol complied with its obligations under the EPC Contracts.

628. Again I consider these points in turn:

- i) Dr Lockwood accepted that a higher risk (though not a much higher risk) would exist on counsel’s premise that *“you remove all of these pieces of equipment in a field, you place them perhaps with a covering but nevertheless they’re still in a field, and then you reassemble new parts with old parts”*. This followed questions about the position if the transformer had to be removed and HV and LV circuit breaker work were done. On my findings, it will be necessary (at most) to remove the transformer, busbar and HV switchgear altogether, to be

replaced by a new outdoor transformer, new busbar and new HV switchgear. No sensible basis has been put forward on which the court should assume this will require other equipment to be taken out and parked in a field prior to reinstallation.

- ii) No evidence has been put forward of specific warranty terms that would be breached. Dr Lockwood's view was that most relevant warranties would be likely to have expired by the time the work came to be done, and that seems a reasonable assumption. Moreover, as Mr Andrew pointed out, to the extent that equipment is being replaced, the Claimant will benefit from new warranties, an improvement on the current position.
- iii) The objection relating to maintenance schedules might have some cogency if remedial work were to involve mixing old and new versions of any particular type of equipment e.g. new and old HV switchgear or transformers within a single substation. However, there is no reason to believe that will be the case, and no evidence of any particular maintenance schedules that would be disrupted.
- iv) The remedial work will not involve trying to restore equipment to an 'as new' condition but, largely, the replacement of certain equipment on certain sites and some modifications to substation walls in order to allow cable entries.
- v) If the postulated remedial work is carried out properly, there is no evidential basis on which to expect that it will not comply with the contractual provisions the Claimants quote.

629. Thirdly, the Claimants say that, if it be relevant, the cost saving by reference to the various Mr Andrew 'patch repair, remove and reinstall' remedial solutions is illusory. Mr Andrew was cross-examined about what he described in his supplementary report of as the "*Defendants' Combined Remedial Solutions*" constituting the Defendants' alternative remedial solutions on the premise that the Claimants succeeded on liability. The 'delta' between his costing of his remedial solutions and the valuation he made of the Claimants' Remedial Scheme was £2,622,981. However, the Claimants say the following items need to be added to Mr Andrew's figures:

- i) A need to include for replacement HV switchgear. Mr Andrew accepted this added a net sum of £743,000 to his valuation.
- ii) MCBs remedial works at the agreed cost, adding £60,000 (or presumably, for all sites, £231,040) to Mr Andrew's valuation.
- iii) Remote monitoring and remedial works at the agreed cost, adding £100,000 to Mr Andrew's valuation.
- iv) Project management: the Claimants say the proper project management figure for the Defendants' Combined Remedial Solutions must be a multiple of the £222,400 agreed by Mr Andrew in respect of the Claimants' Remedial Scheme, conservatively between £500,000 and £900,000, and certainly far more than the impossibly low figure of £86,700 figure allowed by Mr Andrew for his Combined Remedial Solutions.

- v) Insurances: these are a percentage value of the works.
 - vi) Contingency: Mr Andrew's evidence in his second report was that "*The intention of a contingency sum is to allow for uncertainties in the potential scope of work. The Claimants' Defects Experts consider the integrated remedial scheme to be low risk. Mr King's solution is based on all new equipment and substations and a full installation price. As such the contingency level should be lower.*" Mr Andrew agreed a 10% contingency for the Claimants' Remedial Scheme. Following his own logic the contingency for the various Defendants' solutions ought to be higher than for the Claimants' Remedial Scheme. The logic was grudgingly accepted by Mr Andrew. That would involve between 10% to 20% being added to the valuation of the putative Defendants' scheme.
 - vii) Mr Andrew did not take account of additional downtime or outage time associated with the Defendants' putative schemes. Based on Mr Halliday's evidence that would be between two and three times more than provided for in relation to the Claimants' Remedial Scheme, being £216,354 or £68,455 on the QS experts' analysis respectively. In other words, one has to add between £120,000 and £300,000 in respect of downtime when comparing the reasonableness of the Claimants' Remedial Scheme with any of the Defendants' would-be alternatives.
 - viii) On the basis of Mr Ryder's evidence that the Defendants' schemes would require additional maintenance and higher frequencies of maintenance, that would give rise to an additional cost compared to the Claimants' Remedial Scheme: and that would need to be taken into account when weighing up the suitability of competing schemes. Mr Andrew, eventually, accepted in principle that it would be a factor, but said he had not valued it nor been asked to. The Claimants, on instructions, suggest an uplift of 20% above the annual O&M costs, amounting to £50,000 for each of 10 sites for 21 years.
 - ix) On the assumption that Mr Ryder's evidence is accepted that there would be additional maintenance outages, that too would need to be weighed in the assessment exercise. Mr Andrew again agreed, but stated that he cannot provide any opinion on it.
630. These submissions concern two different approaches to remedial work, both of which, however, assume the Claimants succeed in establishing all of the alleged defects. In fact only a limited number of defects have been established (and, for some important defects, at a limited number of sites). The comparison is therefore of limited assistance when considering the cost of remedial work in relation to such breaches as have been made out.
631. Mr Andrew's analysis in his first report concluded that replacement of substations would be disproportionate. He noted that Mr Ryder in his first report had identified a need to replace whole substations, for reasons of space, time and cost, only if both new busbars and LV circuit breakers had to be installed. Mr Andrew also made the point that loss of revenue due to outage time could be significantly reduced by doing the work over winter rather than summer (e.g., assuming 13/26 days' outage for 1/2 transformer sites respectively, reducing lost revenue from £373,909 to £137,107). Drawing a comparison with outage times under the Claimants' Remedial Scheme, estimated by

Mr King at that stage to be 13 days for one-substation sites and 26 days for two-substation sites, Mr Andrew stated “[t]he downtime required to replace the busbars or replace HV switchboards would be capable of being undertaken within the 26 days downtime identified above for an overall replacement substation”. Taking Moor House as an example, Mr Andrew estimated the cost of replacing the two substations as £315,983 in total, compared to £77,270 for the replacement of busbars and HV switchgear – albeit that did not take account of the need for transformer replacement.

632. Mr Andrews did not, in his supplementary report, revisit the above comparisons in the light of the point that work could proceed concurrently on both substations at two-substation sites (see § 624 above). Conversely, however, I see no reason to believe his original assumption to have been that it would take more than 13 days to replace busbars and HV switchgear at a single substation. The evidence also provides no reason to believe that busbars and HV switchgear cannot be replaced at both substations concurrently. In substance, therefore, Mr Andrew’s comparisons remain logical.
633. As to project management, Mr Andrew on first being questioned, agreed that “*The claimants’ remedial scheme is much simpler from a project management perspective than your combined remedial solutions. Or indeed any of the solutions. Because it merely involves a prefabricated new substation, new external transformer and then cable diversion works over a four week programme involving a 13 day outage...*”. Mr Andrew also accepted that if Mr Halliday’s assessment that “*if you do work on a brownfield site to carry out modifications and do that it takes probably two to three times longer than it would do as a new installation*” was right, then the outage time would be 33 to 34 days within an overall works period of 6 weeks (which itself, the Claimants point out, does not reflect, for example, the time taken for removal and replacement of the HV Switchgear only at Woodhouse). On any fair analysis, the Claimants say, any Defendants’ alternative set of patch repair solutions must present a more complex and time-consuming project management exercise than that presented by the Claimants’ Remedial Scheme which involves a prefabricated transformer and substation being installed on site, with only a 13-day outage for cable diversions.
634. The starting point of the above contentions on behalf of the Claimants is the following exchange in the cross-examination of Mr Andrew:

“Q. ... The claimants' remedial scheme is much simpler from a project management perspective than your combined remedial solutions. Or indeed any of the solutions. Because it merely involves a prefabricated new substation, new external transformer and then cable diversion works over a four week programme involving a 13 day outage that we referred to earlier?

A. Yes.”

635. That was, however, a clear example of a compound question, involving several propositions, on which the Claimants seek to rely on as assent to a particular component of the question even though the gist of the witness’s evidence was clearly to the contrary. The ensuing exchanges included the following;

“Q. So you've agreed that the claimants' remedial scheme is much simpler from a project management perspective?

A. Well I've not agreed, I wasn't aware if I've agreed that then that would be incorrect, I don't agree it's simpler.

Q. I said the claimants' remedial scheme is much simpler from a project management -- remedial solutions, because it merely involves a prefabricated new substation new external transformer then cable diversion works, and you then said to that yes.

A. I thought that was a statement you were making there in terms of what your view was. If you're asking me if that's what my opinion is, I don't think it's simpler in terms of project management. In terms of the claimants' remedial scheme you're talking about an entirely new building, it's getting put in place, and foundations, slabs and then lots of cable diversions on a site which has got lots of live cables running about it. So I wouldn't have thought that that was a simpler scheme to project manage.

Q. Well his Lordship heard your answer. It merely involves the prefabricated substation is done elsewhere, and a new external transformer is brought in, and then that is constructed before the existing substation is -- and transformer is turned off and then a cable diversion exercise is carried out involving the minimal possible outage. That is simpler from a project management point of view, isn't it?

A. I don't agree it's simpler, no.

Q. Now, the reason why your remedial solutions, combined remedial solution is more complex is because it's piecemeal work being done by a whole host of different suppliers and there's a need to supervise, manage and quality control all of that work on site, isn't there?

A. Well, I don't agree with that. I think it's the same suppliers we've tended to use to price a lot of the works here. So I don't see how it's more piecemeal, in fact I think it's probably more straightforward because the actual installation building is already there and it means that the contractors can go and see it and it could actually be planned and co-ordinated with the different subcontractors. I mean this isn't actually unusual. There's not a lot of subcontractors in this project in terms of what work is to be done ...”

and:

“Q. But for a scheme which involves the work being done off-site, at a factory, prefabricated and therefore inherently with less project management, you've come back with -- you've agreed a figure with Mr King of 222,000. I'm putting to you that this combined remedial solution scheme or indeed any of the range

would be at least that much and probably a multiple of that 222,000 figure.

A. Yes, well, I don't agree, and the reason for that you're saying that the claimants' remedial scheme is prefabricated off site. It's inherently more convoluted and problematic from a project management point of view because of the very fact of having to organise all of the different bases to be procured and then for the actual switchgear housing to be delivered and installed and then for the individual pieces of equipment to have been installed, delivered and installed and then all to be re-cabled in different locations in a different set-up and then in some of the solutions in the claimants' remedial scheme you're taking the LV switchgear and actually moving it back across into the new substation. So my opinion is that's a much more complicated premise in terms of the project management --

Q. We need to move on.”

636. The Claimants characterise this as Mr Andrew having initially accepted a point “*and then, when he could see that they did, indeed, demonstrate that the Claimants’ Remedial Scheme was on his own terms reasonable, Mr Andrew, unconvincingly, sought to avoid agreement or downplay the significance of the points*”. I reject that suggestion, including the implicit allegation of lack of good faith in carrying out Mr Andrew’s duties to the court as an expert. In my judgment his evidence, written and oral, was both honestly given and cogent. I accept it.
637. As to contingencies, Mr Andrew did not in fact accept the Claimants’ logic. He said his own logic was that a 10% contingency was acceptable for both the Claimants’ and the Defendants’ remedial approaches. The sequence of events is that he initially proposed a 10% contingency for his approach, but considered that the figure should be lower for the Claimants’ scheme as it was based on all new equipment and substations and a full installation price. However, he ultimately accepted 10% for the Claimants’ scheme too. It does not follow that his 10% figure for the Defendants’ scheme now requires to be adjusted upwards.
638. I have already noted that I do not accept the Claimants’ case on additional maintenance requirements/frequency.
639. Fourthly, the Claimants suggest that it is the unchallenged evidence of Mr Johnson, the Claimants’ solar asset valuation expert, that the adoption of the Defendants’ partial solutions as compared to replacement would add £4,500,000 to the value of the blight or diminution in value. This is, the Claimants say, for the entirely logical reason that “*a purchaser would no longer be buying a refurbished as new set of power plants but would be buying plants where known defects are being managed rather than fully repaired/replaced.*”
640. I do not accept that submission. Mr Johnson’s opinion on this point was premised on the remedial work leading to the Claimants having “*plants that continue to have known defects or that have been repaired to a lower standard*”, or “*plants that have known issues which are at best being managed with partial solutions (with consequent*

reductions in output capability and increased risks)”. The premise is wrong, since there is no reason to believe the remedial work would lead to either of those situations. Further, Mr Johnson was indeed challenged on this point in cross-examination. He suggested that he was viewing the matter on the basis that a hypothetical purchaser of the plant might consider that the “*issues have been highlighted and they have not been remedied, whatever the reason for those*”; he agreed to the suggestion that he was in effect saying that the fact that the allegation has been made, even if not ultimately sustained as regards the required remedy, is itself a source of blight. However, Mr Johnson did not produce any examples of purchasers taking such an approach, and it is hard to see any rational basis to expect a purchaser to believe that (for example) sites with new replacement transformers, busbars and switchgear were not adequately repaired because the entire substation was not replaced. In any event, any ‘blight’ of that nature is in my view not recoverable in law. The court should not, as a matter of legal causation, remoteness or policy, permit a claimant to recover on the basis that a hypothetical purchaser might conclude that the court was wrong in its assessment of the remedy required for the breach.

641. In my judgment, the Claimants have failed to establish that a reasonable remedy for the discrete defects that I have found to exist requires the replacement of substations or, more generally, the Claimants’ Remedial Scheme.

(4) The Cranham transformer

642. I have summarised the Claimants’ submission in relation to the Cranham transformer at § 615.ii) above. The transformer failed in April 2019, after the original Particulars of Claim had been served. It has already been replaced with an outdoor oil-immersed transformer. No claim has been brought alleging that Wirsol are responsible for the transformer’s failure, or to claim the costs of its replacement, though the Claimants intimated in oral closings that they would seek permission to amend if necessary. I have concluded that the transformer did not fail due to humidity or moisture-related defects as the Claimants suggest; nor has any factual case been advanced to the effect that any lack of capacity actually caused the transformer to fail. In these circumstances, I am unable to see how any lack of capacity in that transformer could have caused loss. One way of viewing the matter is to say that the failure of the transformer for reasons unconnected with the Defendants’ alleged breach is an intervening event of an unforeseeable kind which breaks the chain of causation (cf *Chitty* § 26-075 giving the example of a typhoon). More simply, however, the fact is that the Claimants have not suffered any loss arising from any lack of capacity in the Cranham transformer. I have in any event not concluded that it did lack sufficient capacity. No claim therefore lies, and I would refuse permission to amend.

(5) Other costs of remedial work

(a) Downtime while remediation takes place

643. Two points arise here: how long the affected substations will need to be out of action, and at what time of year that will take place.
644. As to the first point, the Claimants highlight the statement made by Mr Halliday in cross-examination that:

“... I know from experience that if you do work on a brownfield site to carry out modifications and do that it takes probably two to three times longer than it would do as a new installation”

645. The Claimants accordingly suggest that the Defendants’ version of the Claimants’ Remedial Scheme would involve between two and three times more downtime than the Claimants’ Remedial Scheme. However, Mr Halliday’s comment, aside from being of a very general nature, was made in the context of cross-examination about the possibility of extensive works including, for example, having to rotate the LV switchboard through 90 degrees in order to make room for LV circuit breakers. I do not consider that this evidence supports the view that the remedial work needed, on the Defendants’ approach, to the discrete defects I have found to exist would last any particular length of time; still less that it would last longer than the 13 days’ outage time per substation which both experts have assumed for the totality of the Claimants’ Remedial Scheme.
646. In the absence of more precise evidence, the fair assumptions to make are in my view (a) that the remedial works would take 13 days per substation (whether or not transformers and busbars have to be replaced as well as HV switchgear and other work) and (b) that the remedial works can proceed simultaneously on both substations at two-substations sites (see § 624 above), and would thus take 13 days in total at such sites.
647. As to the time of year, which affects sunlight and hence revenue loss, Mr Andrew takes an average of production in the winter, between November and January, to calculate likely losses in revenue, whereas Mr King takes an average of revenue lost across the entire year.
648. The Defendants say Mr Andrew’s is the only sensible approach, as there is no doubt the work will not be carried out in spring/summer given the impact upon revenue. Mr King takes the annual average on the basis that we do not know what time of year the work will be done. Toucan’s Financial Controller, Mr Skilton, said in his witness statement that: “*In general any material downtime is best organised for November, December and January when expected output is low and not offset by the higher wholesale power prices*”. In cross-examination Mr King accepted that this approach was logical, though he made the general suggestion that there might be other costs involved in doing the work in winter.
649. Conversely, Mr Andrew accepted in cross-examination that if work is deferred until November 2021 (which is not accepted by the Claimants) then there would necessarily be a full year of inflation-linked cost increases to take account of (say 2.4% on the entire capital sum).
650. On the basis that this judgment is handed down in late March 2021, followed by the processes outlined by the Claimants referred to in § 263 above, it seems likely that the work could not take place before late autumn/winter 2021 in any event. Nonetheless, I see force in the Claimants’ submission that as work will be required on some significant matters (e.g. HV switchgear) at 13 different sites, each with different planning regimes, landlords and tenants, it is reasonable to derive an average taken over the course of 12 months on the assumption that the work will not be confined to a very specific period. In my view it is fair to give the Claimants the benefit of the doubt on

this point, by taking an annual average figure as the basis for lost revenue during the site outages.

(b) Removal and disposal of transformers, switchgear and containers

651. This issue turns on whether Mr Ryder's evidence is accepted that removal and disposal of transformers and switchgear is specialist work warranting the employment of a specialist contractor, Celtic Recycling. Mr King echoed Mr Ryder in his evidence on the topic, reflecting his understanding that "*the work involved requires such specialist involvement due to the nature of the equipment being reprocessed and the presence of substances such as sulphur hexafluoride (SF6).*" Mr Andrew uses a Burnell quotation instead.
652. Mr Ryder said he had suggested Celtic as a partner bearing in mind the need to collect redundant equipment from all over England and the wide variety of different types of equipment. However, on the basis that the task involved, so far as the Claimants are concerned, is merely one of removal, it is unclear why Burnell would not be able to fulfil it, and they evidently consider that they can. Mr King suggested that Burnell might have a vested interest in the proceedings. However, since the work being priced is disposal of equipment rather than supply, it is unclear why there should be any such vested interest (or why any such interest would matter). Mr Andrew was able to locate the details of his quotation from Burnell and the specialist haulage company, RD Anderson, from which he obtained a further quotation.
653. In the circumstances, I agree with the Defendants that it would be appropriate simply to select the cheaper of the two quotations, both of which were provided by firms that consider themselves capable of carrying out the work.

(c) Disconnection, civils and installation works at final commissioning

654. The difference here relates only to the work to be carried out at the Balcombe site. It is hypothetical since I have not found that transformer to lack capacity.
655. Mr King's pricing is based upon a PSH quotation for the Balcombe transformer replacement of £71,227.08.
656. Mr Andrew considers this PSH quotation too high, particularly when compared to the PSH quotation Mr King sets out for substation replacement and transformer installation at Cranham and Otherton, which is £110,753.20 for each. The work to be carried out at Balcombe would be significantly less as there is no substation replacement, only transformer installation, and Mr Andrew estimates the cost at £52,920. In cross-examination, Mr Andrew explained that he had compiled a detailed item-by-item quotation for the specific reduced work applicable at Balcombe. He pointed out the significantly reduced footprint of the work at Balcombe, which is 6.5m² for the transformer slab, compared to 30m² for a new substation replacement. He noted that Mr King's PSH quotation included almost as much electrical work as the far more extensive Otherton solution and concluded that it was unreliable for being insufficiently tailored to the work. Mr Andrew also noted that the PSH quotations obtained by Mr King seem comparatively high overall: Mr Andrew has analysed PSH and Britannia quotations for the installation of transformer and switchgear foundations and found PSH to be 29% higher for the same work.

657. In these circumstances I do not think it reasonable simply to adopt the quotation obtained by the Claimants. At the same time, bearing in mind that Mr Andrew's figure is built up from quotations rather than being based on an actual quotation, it cannot be assumed that a contractor would necessarily quote at the level he suggests. Taking a broad view, I would (had the question arisen) have considered it fair to assess this cost at £60,000.

(d) Specialist screw pile foundations: difference £68,400

658. The Claimants claim for the cost of specialist foundations for new substations. On the basis that I have not accepted the claim that the substations need to be replaced, this issue appears to be hypothetical.

659. The Claimants rely on a communication from Mr Spencer to Mr King dated 19 and 20 May 2020 (and exhibited to Mr King's report) which states that screwpile foundations are used for five sites. However, Mr Andrew explained in cross-examination that the screw piling used for the original foundations at five of the sites was installed *instead* of the alternative, concrete foundations, based on design calculations tailored to the specific substation installation, with the substations supported directly on the screw piles. There is no reason to assume that this approach would be required for replacement substations, still less to budget for both screw piling and concrete foundations (which are more expensive). I would therefore not accept the Claimants' contentions in any event.

(e) Insurances

660. The experts agree that insurance costs are appropriately valued as a percentage of the base remedial works costs. Mr King contends for 0.425% and Mr Andrew 0.15%. Mr King also adds a further £10,000 lump sum for loss of revenue insurance.

661. Mr King's percentage of 0.425% was derived from a comparator for another project, but little information about that project has been provided. Nor have the Claimants provided details of the insurance obtained for the transformer replacement work at Cranham.

662. Mr Andrew's figure is a standard percentage allowance used for the assessment of insurance costs in pricing books, taken from Spon's "*Architects*". The Claimants say that on a proper reading of that extract, the 0.15% figure clearly relates only to insurance for fire risk and does not cover Contractor's All Risk (of which fire would be a part) and Public Liability, which would be more typical to any construction project.

663. The use of the Spon's quotation was canvassed in cross-examination of both experts. The Claimants' objection is that the 0.15% is specific to pricing fire risk. The extract from *Spons* contains a table under the heading "*Insurances, bonds, guarantees and warranties*", the last entry in which is "*Insurance of the works Based on 0.15% of project value £8,000*". A note under the table reads:

"If at the Contractor's risk, the insurance cover must be sufficient to include the full cost of reinstatement, all increases in cost, professional fees and any consequential costs such as demolition. The average provision for fire risk is 0.15% of the

value of the work after adding for increased costs and professional fees.”

664. Read with the note, the table is in my view ambiguous. However, I do not find Mr King’s approach persuasive given the lack of detail about the comparator. On the basis that the onus lies on the Claimants, who have failed to produce actual insurance costs (which presumably would have been available), I conclude that there is insufficient evidence on which to award damages by reference to any greater percentage than the 0.15% put forward by Mr Andrew.
665. The Defendants and Mr Andrew also consider that Mr King is double-counting for loss of revenue in including his £10,000 further allowance for loss of revenue insurance. The Claimants claim separately for loss of revenue during downtime. However, as Mr King explained in cross-examination, revenue insurance covers the risk that an event (e.g. a weather event) occurs leading to an overrun over and above the assumed 13 days’ downtime. It is therefore appropriate for this sum to be included.

(f) Inflation

666. The experts disagree about whether there is any basis for adding inflation to the costs of the remedial work, but have agreed to use BCIS all-in TPI indices for any applicable calculation. Mr King has added an uplift for inflation of 1.2% on the basis that the works will be carried out in Q2 2021. Mr Andrew makes no separate provision for inflation as he considers that any potential inflation (which he considers unlikely) is reflected in the current quotations and pricing given the work is assumed to be done imminently in Q2 2021.
667. The Defendants’ position is that it is inappropriate to add inflation to the prices obtained by the quantity surveying experts, on the basis that the underlying quotations are provisional in any event and will not actually attract this uplift. As is usual, they are in some cases only open for acceptance for 60 days, so actual quotations are still to be further negotiated and finalised. There is no reason to assume a general inflationary rise in prices will be imposed as part of this negotiation: prices may just as well fall.
668. On the basis that the loss is *prima facie* to be assessed as at the date of breach, I do not consider it appropriate to add an element for inflation. The time value of money (which may broadly reflect inflation) can be addressed through the Claimants’ claim for pre-judgment interest.

(g) Contingency/ design development costs: difference £29,564.

669. Both experts allow for a 10% contingency cost, and I have earlier rejected the suggestion that the percentage should be higher on the basis that the Defendants’ approach to remedial works is to be adopted.

(Q) BLIGHT

(1) Introduction

670. The Claimants seek damages for breach of the EPC Contracts on the basis that the solar parks are “*blighted*” by the defects alleged, to such an extent that “[*m*]ere payment of the remedial costs and remediation attempts will not remove the blight”.
671. The pleaded claim for this head of loss is £18.9 million. Mr Kavanagh put forward a figure of £20 million. The sum calculated by the Claimants’ own expert is £6,796,204, or (it appears, if the Defendants’ approach to remedial work is adopted) £12,538,169.
672. The Defendants do not contend that this claim is precluded by § 17.6 of the Conditions of Contract.

(2) Principles

673. In construction, just as for damaged or defective cars and ships, it is established that the remediation of defects and payment of the costs thereof may not be an adequate remedy. It may be the case that the building or engineering installation remains blighted, and that can sound in the award of damages. HHJ Hicks QC said in *George Fischer Holdings Limited v Multi Design Consultants Ltd* (1998) 61 Con LR 85, 145:

“In point of principle a plaintiff who carried out the best and most economical repair which can be devised to defective property but is left at the end with an asset for which purchasers in the market are not prepared to pay as much as for one which never had the defects has plainly lost both the money expended on the repair work and the residual difference in value.”

674. The leading case is *Strange v Westbury Homes (Holdings) Ltd* [2009] EWCA Civ 1247, where the Court of Appeal stated:

“16. Mr Singer accepts that in principle it is possible for a court to award damages for a residual diminution in value of property following the satisfactory completion of remedial works if it is satisfied that such a residual diminution in value has been proved on the evidence. In my judgment he is right to make that concession... If the evidence supports the conclusion that the proper carrying out of remedial works to a residential property will nevertheless result in there being a residual diminution in the value of the property, then I cannot see in principle why the claimant should not be awarded damages to reflect that diminution in value.

17. ... I wish to emphasise that it is only right to award damages under that head if there is cogent evidence of a residual diminution in value...”

675. Where the court awards both remedial damages and damages to reflect a residual diminution in value i.e. ‘blight’, it must avoid double counting: see *Harrison v*

Shepherd Homes Ltd [2012] EWCA Civ 904 §§ 19-22 (cited in Jackson & Powell on Professional Liability (8th ed), § 9-228, fn. 588).

676. The Claimants submit that the diminution in value is to be assessed as at the date of breach, though circumstances may require that it be assessed at a later date where it is necessary to satisfy the compensatory principle, such as the date of judgment. They say that the expert they called on this issue, Mr Johnson, assesses the diminution in value now taking account of risks as they can be currently understood, whereas the Defendants' expert, Mr Slark, values a few years into the future on the assumed basis that there are no long-term impacts on the assets and a reasonable operating history for the portfolio is established.
677. I turn shortly to the expert evidence. In principle, however, the assessment of blight damages must in essence be forward-looking. As the Court of Appeal said in *Strange*, quoted above, the question is whether there will be a residual diminution in value *following* the proper, satisfactory completion of the works. It is illegitimate, in my view, to take into account the position pre-remediation, or the risk that remediation might not be full or complete. The assessment must be conducted on the premise that full and complete remediation has occurred, in accordance with the court's conclusions as to what defects exist and what work is necessary to remedy them. There is, moreover, no room in my view for proceeding on the basis that investors may take a different view from the court as to those matters.
678. In making that assessment, it is reasonable to take into account wider market factors such as the nature of the market and the attitude to risk, reputation, and the history of the assets. The court is not required necessarily to assume that (for example) a notional investor, at arm's-length, looking at the portfolio, would regard it as entirely risk free post remediation over its projected 25 year life expectancy; or to ignore evidence about the sites' actual history, and the size and nature of the market. At the same time, however, the existence and quantum of any alleged blight must, as *Strange* makes clear, be proven by cogent evidence. Generalised views or assertions are inadequate.

(3) Factual witnesses' evidence of blight

679. The Claimants' factual witness statements identify two specific reasons why the SPVs will suffer a residual diminution in value by reason of the alleged defects.
680. The first is that the alleged defects are such as to remove the premium that would otherwise be payable in respect of solar parks built in compliance with the FIDIC Silver Book template, and that that premium can never be restored. Mr Kirk asserts that the lost premium is of the order of £8 million. The relevant passage in the Silver Book states that "[t]he Employer is willing to pay more for the construction of his project... in return for the Contractor bearing the extra risks associated with enhanced certainty of final price and time". However, those considerations are relevant to a product during the construction phase and, as Mr Kirk accepted, not to a hypothetical investor after the solar parks have already been built. There is, moreover, no objective evidence before the court of the existence or amount of any such premium; nor that sites to which a remedial solution has been applied, so as to ensure compliance or material compliance with the contract, would not retain or regain any such premium.

681. The second reason put forward is that the effect of the defects is to compromise a network of inter-connected contracts supporting the solar parks, so as to affect the low-risk and self-supporting nature of any investment in the project. However, no supporting evidence either as to the existence or the quantum of any impairment is put forward, nor any reasoning as to why it would persist if the defects are remedied. Mr Kirk stated that each SPV's knowledge of the defects means that it cannot procure the same level of business interruption and material damage cover as before, and that the cover is more expensive; and that the O&M cover no longer has availability guarantees. However, no details are provided, nor any explanation of why such difficulties will remain once the defects are satisfactorily remedied. Mr Kirk also suggests that the overall effect of the defects (including the investment no longer having a 25 year duration) has impaired the portfolio's value by more than £10 million. However, in the absence of cogent evidence of why any such impairment will persist after remediation of such defects as I have found to exist, and (if so) as to its size – bearing in mind also that Mr Kirk's statement presumably assumes *all* the alleged defects to be made out, which they have not been – these assertions do not in my judgment amount to cogent evidence in support of a blight claim.

(4) Expert evidence as to existence of blight

682. The Claimants contend that the experts agree that at least some blight exists, citing their agreement in the Joint Memorandum that:

“...even after the specific remedies as set out by the technical and quantity surveying experts have been carried out, there is expected to continue to be a loss in value of the solar parks as a result of the alleged issues suffered and the history of the parks (APOC 51.2A). The extent of that loss at the date of judgment will in part be dependent on the court's determination of what defects exist and which defects require remedy.”

683. That statement must, however, be read in conjunction with the more detailed statement of Mr Slark's position on this four pages later in the same document, which reads:

“The extent of any blight on the solar portfolio is dependent on the court's findings on the extent of any defects with the assets and breaches of warranties by the defendants.

The loss to the Claimants' in the case where no material defects or breaches are identified with no long-term impact on the performance of the portfolio would be negligible.

The loss to the Claimants' in the case where material defects are identified and remedied would likely only have short-term impacts on the performance of the portfolio, and no long-term impacts on the Claimants once a reasonable operating history for the portfolio is re-established. The loss to the Claimants would not be substantial in such a case.

The loss to the Claimants' in the case where material defects are identified but not remedied could have long-term impacts on the

physical and financial performance of the portfolio. Only in such case could the loss to the Claimants be substantial.

In light of the significant difference of opinions expressed by the defects experts in their Joint Memorandum it has not yet been possible to quantify the loss in each of the above cases.

I anticipate that there will be substantial overlap between the valuation of the loss for blight and loss claimed in respect of Topco shares which will need to be addressed in assessing the total claim so as to avoid double counting.”

684. Mr Johnson in his first report set out his understanding of blight in this way:

“9.3.1 This claim is in relation to the impact on the valuation of the solar power plants of the alleged defects. In a shorthand manner this has been referred to as blight. That is caused by a mix of:

- (i) the past history of the site, which has a significant impact on the current value of the company;
- (ii) the impact of the financial issues that the company has faced and will continue to face and the increased risk that poses;
- (iii) the period for which the plant is expected to continue before full remediation is achieved; and
- (iv) the ongoing extent of risks related to the original breaches that have not been remedied.”

685. It will be noted that at least the third and fourth of those matters expressly contemplate the position *before* the defects have been remedied, or indeed the position where breaches have not been remedied. For the reasons I give earlier, that is the incorrect premise for approaching a blight claim. The second matter, relating to financial impact, is unclear, but to the extent that it concerns the cost of remedying defects or losses occasioned by defects, the same considerations apply.

686. Mr Johnson goes on to say the following:

“9.3.3 The experts have agreed that even after the specific remedies as set out by the technical and quantity surveying experts have been carried out, there is expected to continue to be a loss in value of the Solar Parks as a result of the alleged issues suffered and the history of the parks (APOC 51.24). The extent of that loss at the date of judgment will in part be dependent on the court's determination of what defects exist and which defects require remedy.

- 9.3.4 We disagree however as to how and when that loss is to be considered. Mr Slark in the joint statement indicates that if material defects are identified and remedied that “*would likely only have short-term impacts on the performance of the portfolio, and no long-term impacts on the Claimants once a reasonable operating history for the portfolio is re- established. The loss to the Claimants would not be substantial in such a case.*”
- 9.3.5 I consider that we have to assess the loss of value now, at the time of judgement, not what it *might* be in the future **if**:
- (i) an appropriate remediation programme is successfully completed; **and if**
 - (ii) a reasonable operating history for the portfolio is then established; refinancing is achieved as assumed; **and if**
 - (iii) no greater risk than normal for future operating parameters is perceived (beyond what would be typical for such a plant); **and if**
 - (iv) no risk is perceived of a lower useful life as a result of the impact of the defects having existed for several years and any impacts of that on other parts of the plant.
- 9.3.6 If all of the requirements happen then in those circumstances, several years in the future the valuation might increase from where it is now. Equally **if**:
- (i) the remediation programme is not of a suitable scope or is not successfully completed; **or if**
 - (ii) there continue to be operational issues post remediation; **or if** refinancing is not achieved as assumed; **or if**
 - (iii) a greater risk than normal for future operational parameters is perceived; **or if**
 - (iv) any risk is perceived of a lower useful life than originally expected then the valuation might decrease from where it is now.
- 9.3.7 When looking at the value now, before any of these are fully known, we have to consider the risks that would impact on valuation. The difference between the upside in valuation and the downside is notable. Mr Slark seeks

to apply what could theoretically be the case at some stage several years into the future if investors are fully satisfied in all the above respects. I do not consider that that is an appropriate approach.

9.3.8 Looking now toward the future, the current value will be lower than it was originally expected to be precisely because all of those risks still apply and the greater the difference in perception of risk, the greater the difference in value I will explain more from a potential investor's perspective on each below:

- (i) Operating parameters: To date the plants have suffered from reduced output as a result of the "clipping" need described above, as well as repeated tripping of plants causing outages. If a comprehensive remediation plan is implemented then after that date operating parameters **should** return to what was originally expected. However, until tested for an extended period, this cannot be confirmed and investors are not going to simply assume it will all go to plan. The remediation plan in itself is a risk even if expected to return operating parameters to where they should have been;
- (ii) Risk of catastrophic failure: One plant (Balcombe) has already suffered a fire. The concerns with operating several plants at greater than the recommended rating for transformers, the lack of certain circuit breakers and the failure to correctly manage humidity (particular condensation) in substation housings lead to increased risk of a substantial incident both prior to remediation and still (to a lesser extent) afterwards. Investors will be cognisant of such a risk and even post remediation some doubt is likely to remain in investors' minds;
- (iii) Useful economic life: Increased trips and running at a rating higher than recommended are both recognised as leading to an increased risk of the plant not being able to deliver for the full economic life originally expected. Even if some components of the plant are replaced in a suitable remediation scheme, any new purchaser would need to be completely comfortable that there are no impacts on economic life arising from the prior running patterns; and

(iv) Refinancing: I talk of extra refinancing costs below assuming a slightly increased interest rate but assuming that refinancing happens with no further issue. However, because of its history and the risks above, although I assume refinancing at only a slightly elevated interest rate, that may not be the case. Lenders get paid relatively little so accept correspondingly little risk and the fact that refinancing was achieved in 2018 does not guarantee it in what may be a very different world in 2023.

9.3.9 The other point to note in terms of valuation is that for an operating plant with a good operating history there is an ability to sell the plant to secondary market investors who take less risk (so will only take plants that do not have significant risk issues) and ask for less return precisely because they are taking less risk. This is a valuation upside for a project owner such as Toucan. That no longer applies in this case as given its history low risk investors would not be interested in it.”

687. This approach was reflected in Mr Johnson’s evidence in cross-examination, e.g.:

“Q. ... Well, I'd suggest in circumstances where any alleged defects are remedied, there would be no basis for believing there to be reliability issues at that point, would you agree with that?

797. A. But that's a different point in time. One of the basic tenets of valuation is you look at what is the position at the time at which you're carrying out the valuation. So if I were carrying out a valuation after certain things had been remedied and then on the basis of that I was carrying out a valuation, that's a different basis from where I am here.”

688. The approach set out in §§ 9.3.5 and 9.3.6 quoted above, and in Mr Johnson’s oral evidence, is in my view inconsistent with the Court of Appeal’s statements in *Strange* and incorrect in principle. If it were legitimate to take account of pre-remediation matters such as the risk that the programme might not be successfully completed, then blight claims would likely arise in every defects claim. Further, to factor in a risk or perceived risk that the remediation programme is “*not of a suitable scope*” either is inconsistent with the court’s decision (by assuming the court has made incorrect findings about the required scope of remedial works), or is founded on a risk (that the Claimants will not carry out properly the works which the court has decided they should be put in funds to carry out) that cannot be for the Defendants’ account. Similarly, factoring in a risk or perceived risk of lower operational life is in substance inconsistent with (or based on perceptions inconsistent with) the court’s conclusions as to the defects proven and not proven (including the alleged design life warranty breach) and as to the necessary remedial work.

689. Moreover, as the Defendants point out, none of the defects I have found to exist are potentially irremediable. The allegations are not of subsidence, or knotweed, or some other latent and possibly incurable problem. They are (put shortly) that the Defendants installed equipment that does not comply with the requirements of the EPC Contracts. The solution is simply to replace it.
690. Mr Johnson similarly expressed the view in his second report that the blight would be even higher if Mr Andrew's approach to remediation were adopted, referring to it as involving "*plants that have known issues which are at best being managed with partial solutions (with consequent reductions in output capability and increased risks)*" and "*defects ... being managed rather than fully repaired/replaced*". That approach is again based on the premise that the court's conclusions as to what breaches exist and how they need to be remedied (precisely in order to avoid such things as output reductions and risk) are wrong or may be perceived to be wrong. The court should not award damages against a defendant on that basis. Still less should the court award damages on the basis of hypothetical investors' supposed perceptions about breaches which the Claimants have alleged but failed to establish, i.e. (in Mr Johnson's words) "*issues have been highlighted and they have not been remedied, whatever the reason for [that]*". There is no basis in fact to suggest that overstatement in the Claimants' allegations will cause a loss of value, if their case is rejected by the court; but even if it did, that would not be a loss caused by the Defendants or for which can be legally liable.
691. Turning to certain more specific ways in which Mr Johnson suggested that the alleged defects would affect the sites' value, he said any defects found by the court would give rise to doubts as to the reliability of the solar parks in the longer term. However, there is no reason to suggest that such concerns could arise (and no explanation was provided as to how they logically could arise) in relation to defects of the kind I have found do exist. They are, as the Defendants say, not general allegations of poor workmanship or poor quality components. For example, once transformers of insufficient capacity have been replaced with new transformers, there is no reason to doubt their durability or reliability: on the contrary, they will be several years newer than those originally installed. Mr Johnson's answer to this reverted to the approach which I indicate above is in my view incorrect in principle:
- “Q. Okay. Well, I'd suggest in circumstances where any alleged defects are remedied, there would be no basis for believing there to be reliability issues at that point, would you agree with that?”
- A. But that's a different point in time. One of the basic tenets of valuation is you look at what is the position at the time at which you're carrying out the valuation. So if I were carrying out a valuation after certain things had been remedied and then on the basis of that I was carrying out a valuation, that's a different basis from where I am here.”
692. Mr Johnson also suggested that Wirsol's (or possibly the Claimants') reputation would suffer should the defects alleged be made out, with consequent effects on the value of the solar parks. He cites the Deloitte Reputational Risk Survey, which "*highlighted the value of reputation as being on average over 25% of the value of the company*". However, the Defendants point out that solar parks are essentially revenue-generating assets, not consumer or amenity assets like phones or cars (both of which have been

cited by the Claimants as comparators). Their value depends on future net cash flows, comprised of production volumes and revenues net of operating costs. In principle, the value of a solar park is likely to be diminished only by considerations which give rise to a risk that future net cash flows may be reduced or interrupted. On the hypothesis that the court will have already ordered damages sufficient to remedy any and all material operational difficulties arising from the presumed defects, it is difficult to see the relevance of any abstract reputational damage.

693. Mr Johnson referred to the use of “*refurbished equipment*”, which typically “*sells for a significantly lower price*” than new equipment. However, the remedial work I have concluded is necessary in large part involves the replacement of inadequate equipment with new equipment, with the exception of certain specific work on substations to prevent further water ingress. The analogy is inapt.

(5) Inclusion of non-defective sites

694. Mr Johnson’s reports proceed on the basis that the blight claim extends to the four sites constructed not by Wirsol but rather by Abakus. The portion of the blight claim attributable to these sites is £1,069,227. The Abakus sites were constructed by Abakus Byes as contractor, with the relevant solar park SPV as employer. The SPVs were ultimately owned by Wircon UK. Wirsol had no role in relation to them.

695. Mr Johnson said in his report:

“Once the reputation of the developer (Wirsol) is tainted by common problems on multiple sites, I consider that it is harder to convince an investor that although multiple sites have problems, the rest are fine... The plants were constructed and designed by the same company, over the same period.”

696. That reasoning cannot apply to these four sites, and Mr Johnson appeared to accept this:

“Now I understand that point as regards the Wirsol sites but it's wrong as regards the Abakus sites isn't it?”

A. Yes, that is misstated in which case it would be 15 out of 19.

Q. Just to check what you're agreeing with, so that I don't bank more than you've offered, you're accepting I think that the blight would only apply to the sites Wirsol is the constructor for?

A. Yes.”

and in re-examination:

“Q. So if Abakus is a third party contractor you're content these sites would not be blighted?”

A. If it's completely independent, yes.”

697. However, Mr Johnson was also asked in re-examination whether these sites might be blighted on the alternative basis that companies in the Wirsol group were the *employers*

under the contracts for the construction of these sites. Mr Johnson replied that he did not think the position would be the same as when Wirsol was contractor as well, but that “*for me it's probably more the fact of Wirsol as employer that's the sort of issue that would be concerning*” and “*I think that because Wirsol is the employer and therefore directing the works, there would be a discount applied to Abakus sites in that case.*”

698. The Claimants submit that Wirsol (and, the documents indicate, Mr Hogan) was intimately involved in the procuring of the installations at these sites, and no investor would investigate or draw distinctions on this basis. However, this is in my view entirely speculative.
699. Mr Johnson also assumed that the blight claim would apply in respect of the two Northern Ireland sites. The portion of the blight claim attributable to these sites is large, £1,943,605, reflecting the fact that Lisburn is by far the most valuable of the solar parks (being a 20MW site rather than a 5MW site). However, the Carrowdore and Lisburn plants were built to an entirely different design in comparison with the English sites, using oil filled transformers. The only defect found to exist at these sites relates to inadequate landscaping and cable burial, quantified at £20,225 for Lisburn and £44,165 for Carrowdore. No claim is brought in relation to the sites' capacity or substation design.
700. As the Defendants point out, the blight claim in respect of these sites assumes an investor would value sites with trivial issues (which at Lisburn are wholly unconnected to the solar park equipment), remedied for a sum of about £65,000, at a discount of around £2 million. Mr Johnson suggest that an investor would nonetheless discount those sites to exactly the same extent as the English sites, which are alleged to suffer from major defects: “*[a]n investor may look at the sites individually but they will still be looking at the developer in terms of who is actually behind them. If you look at individual sites you do not ignore who the manufacturer is*”. Mr Slark's evidence was that “*what investors look at is [the] discounted net revenue stream of the sites*”; and there is no realistic basis on which the revenue stream at the Northern Ireland sites could be expected to be impaired due to defects at different sites built to a different design.
701. The Claimants nonetheless submit that the asset they purchased is a portfolio of nineteen solar sites. (That is probably true for the purposes of the related warranty claim, though not for the purposes of the SPVs' individual claims under the EPCs.) Some sites have greater defects than others. Fifteen of the nineteen were constructed by Wirsol. All the assets were owned by Wircon, and Toucan purchased that portfolio.
702. However, (a) given the nature of the assets e.g. revenue-producing installations, there is no reason why the previous ownership of the sites should make any difference to their valuation, and (b) viewing the sites as a composite does not affect the indisputable fact that the Northern Ireland sites are free of material defects. In my view, the Claimants' and Mr Johnson's analysis is erroneous in including the Abakus-constructed sites and the Northern Ireland sites.
703. The Claimants further submit that assessing an appropriate discount figure is not a science: the portfolio is still blighted –at most, part of it would be less blighted than the other parts. In the absence of any empirical assessment as to what that discount would be, and how it would affect the resultant blend, there is (the Claimants say) no

foundation for eroding Mr Johnson's suggested rate. I would disagree with that proposition even if I were otherwise persuaded by Mr Johnson's approach. It is obvious that a blight claim for some £6.8 million, of which approximately £3 million is attributable to two groups of sites that cannot on any realistic view be said to suffer from blight, would require to be very substantially discounted, and by the full £3 million absent any cogent evidence justifying a different approach.

(6) Quantum of alleged blight

704. Mr Johnson states that he has “*put in a 1% increase in the discount rate to reflect [the risks outlined in the report]*”. He did not explain, in his reports or at trial, how he had arrived at that figure. He did not, for example, cite any relevant comparators where a similar discount rate was applied in a transaction or valuation for similar reasons.
705. Mr Slark points out that Mr Johnson's 1% increase in the discount rate would correspond to:
- i) an increase in annual expenditure of about 25% above expected levels in each year of the allegedly defective solar parks' lifetime, notwithstanding the effects of any remedial action; or
 - ii) a decrease in annual production volumes of about 5% below expected levels in each year of the allegedly defective solar parks' lifetime, notwithstanding the effects of any remedial action; or
 - iii) a decrease in production of about 55% across the allegedly defective solar parks in the last five years of their operational lifetime, notwithstanding the effects of any remedial action.

The discount could also correspond to some combination of lesser increase/decreases in these factors, but would on any view remain extremely substantial.

706. As well as lacking any real explanation or evidential support – Mr Johnson's figure is in reality no more than a figure plucked from the air. It is, moreover, premised on all the alleged defects being established, which has turned out to be far from the case. Mr Johnson rightly accepts that the quantum of loss in respect of any blight – assuming, contrary to the foregoing, that such blight will be established – will depend on which defects are established. However, no alternative figures are put forward. Nor, given the lack of reasoned or evidential basis for the 1%, can any alternative figure be deduced.
707. Mr Slark said as to quantum:

“8.8.2 I find that the Claimants' position on a 1% (or greater) increase in its required rate of return is untenable, when placed in the appropriate context of the risks of a solar park. Except in their exposure to wholesale electricity price volatility (an aspect that is not relevant to this claim) solar parks are inherently low risk, and so any change in risk premia to reflect a change in circumstances, such as loss of warranties, if found to be

justified, would be of the order of a few basis points (where a basis point is one hundredth of a percentage point). I can find little to support an increase in the required rate of return above 0.125%, suggesting that the present value of any loss would be unlikely to exceed £509,438.

8.8.3 There may be considerable merit in revisiting the assessment of this claim after the court provides its findings on remediation and on other aspects of the various claims.”

708. Mr Slark noted in his evidence that for a period between remediation and the point at which the solar parks have established a normal operating history, they may be subject to higher insurance premia and less favourable O&M contracts. However, those are matters of which the Claimants could have adduced, but did not adduce, evidence.

(7) Conclusion on blight claims

709. For the reasons given above, the Claimants have failed to adduce cogent evidence of either the existence or the quantum of the alleged blight. The blight claim fails.

(R) REFINANCING COSTS

710. The Claimants allege that the Defendants’ breaches of the EPC Contracts placed the ‘Topcos’ in breach of the Facilities Agreements with BLB; that the Topcos, as a result, decided to repay the entire debt outstanding under the Facilities Agreements by arranging alternative financing under the “*Issue 10 Solar bonds*”; that the terms of the bonds were less advantageous than those of the Facilities Agreements, such that the Topcos suffered a reduction in value; and that that reduction in value will, in turn, be passed on via the Holdcos to the SPVs under whose causes of action the Claimants now sue. The Claimants’ expert, Mr Johnson, estimates the loss suffered by the SPVs as £8,865,398.

711. In slightly more detail, the Claimants say that as a result of the breaches of the EPC Contracts, the Topcos were in breach of the terms of the Facilities Agreements. BLB’s position was that termination of the EPC contracts would be an event of default under the Facilities Agreements. The Topcos therefore decided to repay the facilities on 31 August 2018 and refinance the amounts outstanding thereunder with a shorter term investment of 5 years, totalling principal and interest of £80,589,700.

(1) Causation

712. I begin with the question of causation. A claim will lie only if the breaches of the EPC Contracts were an “*effective*” or “*dominant*” cause of the loss: see e.g. *Galoo v Bright Grahame Murray* [1994] 1 WLR 1360, 1374H-1375 per Glidewell LJ, cited in *Chitty on Contracts* § 26-66.

713. The Claimants accept that during the period in question, Toucan was “*already considering whether to refinance or stay with BLB*”, but they suggest that it is “*unchallenged*” that:

- i) on Mr Kavanagh's evidence, were it not for the dire situation that Toucan found itself in in August 2018, the portfolio would have continued to be funded by BLB pursuant to the Facilities' Agreements, and
- ii) Toucan *had* to refinance the portfolio because of the circumstances that existed in August 2018: irrespective of what Toucan's business strategy might have been in the future (namely a refinancing in the normal course of things), it had no choice but to refinance in August 2018.

714. In my judgment, the evidence entirely fails to establish either of those propositions.
715. The only witness evidence the Claimants put forward in support of their factual case is a paragraph in Mr Kavanagh's witness statement which states:

“By early July 2018 Wirsol... had rejected a vast majority of the [SPVs'] EPC claims that the solar park was defective. Whilst the defects were not significantly impacting short term cash flows, the [SPVs] faced significant work over the longer term and I considered this would increase substantially the likelihood that the Banking Facilities (which were 18 years) suffered a default. Further BLB had also indicated that the [SPVs] terminating the [EPC Contracts] with Wirsol would also be an event of default - and the [SPVs] had no choice but to do this considering the breaches of those contracts.

I considered the most appropriate solution was to refinance with a shorter term investment – in this case 5 years. This was a significant step backwards for the SPVs and RFE because the refinancing risk after 5 years is substantial as well as the costs to exit the swap. I consider the loss resulting from having to refinance again in the future and costs to exit the BLB Banking Facilities to be £6.7m.”

716. It will be noted, first, that Mr Kavanagh does not actually state in this passage that Toucan had no choice but to refinance. He states that Toucan considered that it had no choice but to terminate the EPC Contracts, and that BLB had indicated that that would be an event of default, but he does not state that BLB had given any indication that it would in fact exercise its right to refuse to continue to finance the projects were Toucan to terminate the EPC Contracts. Nor do any of the contemporary documents indicate that BLB had made any threat to withdraw its funding in the event of termination of the EPC Contracts.
717. Moreover, and quite apart from the questions of credibility to which I come below, Mr Kavanagh's statement is striking for what it omits to mention: first, the well documented fact that Toucan had for some time been in discussion with BLB about a refinancing for Toucan's own reasons; and secondly, the substantial fee which accrued to Mr Kavanagh's own benefit as a result of the refinancing that actually occurred, and which in fact constitutes the lion's share of the alleged loss which the Claimants now seek to pass on to the Defendants. The fact that Mr Kavanagh felt it unnecessary to mention either of those points in his evidence is in itself a reason for treating his evidence with caution.

718. Turning to the documents, it is clear that the Claimants had already decided to refinance because the terms available under a bond issue were perceived to be preferable to the existing terms under the Facilities Agreements (which had been put in place during Wirsol's ownership of the sites). The Claimants' Mr Kirk appears to have taken the lead in progressing these arrangements. On 18 April 2018 Mr Kirk told Mr Hogan that the Topcos had already decided to refinance, saying:

“We are meeting Karin [Karin Schramm, of BLB] next week btw - we are paying her out. Pls keep confidential until we've told her - paying her out allows us to release the trapped cash from [the Debt Service Recovery Account] and just generally in structure and this helps u with ALE.”

719. On 22 April 2018 Mr Kirk reassured Mr Hogan, in relation to Toucan's outstanding liability under the ALE Contract (considered later in this judgment), that “*refinancing out [BLB] releases cash*”.

720. On 10 May 2018 Mr Kirk messaged Mr Hogan to say he had “[*m*]et w Karin [Schramm] and told her she's getting her £85m back – she's lovely and super fine with it”.

721. On 21 May 2018 Mr Kirk emailed Ms Schramm saying:

“Karin,

Thanks again for the positive and pragmatic approach on our proposal to repay the two facilities (Wirsol 45 and Wirsol 60). As I said when you came in, you've been our best lender. I'm sure we will be involved in future deals somehow.

Also, thanks for asking Eversheds for a quote to prepare the docs to release the security. Please send this when you have it.

From our side, the team here are making sure the right amount of funds is in the right place at the right time. We've been through the facilities docs and got our view of the redemption journey, but makes sense we work through it openly to avoid surprises. Smooth execution of this is a priority for the whole team here so if you are worried about anything please give me a call.

In terms of dates, we are working towards **31 August 2018**. Principal Lx Interest from last calc date (28 Feb) to repayment date (31 Aug) Ex Break costs Ex Swap valuation Ex DSR Balance Ex Redemption amount due to Bayern Ex In terms of the document, we are aware the c17.3 sets out the formal notice periods and we will submit these in due course. Anyway, the point of whole mail is to ask if BLB have pro forma redemption statement you wish to use again? We can submit ours for your approval if not. This is being discussed later in the week with our investors, so if you can turn this round quickly by pressing a

button on your system I would be grateful” (emphasis in original)

722. The fact that his email identified 31 August 2018 – the date on which the Claimants ultimately repaid BLB – as the target date for repayment in itself puts in considerable doubt the Claimants’ present assertion that they were forced to refinance in a hurry. Moreover, the reference to “*our investors*” may indicate, and in any event the email as a whole clearly indicates, that Toucan was planning an orderly refinancing: and was not, as the Claimants now claim, forced to refinance with their backs against the wall and under severe time pressure.
723. Mr Kirk accepted at trial that from April 2018, Toucan was planning to refinance the BLB facilities on 31 August 2018 irrespective of any breaches by Wirsol of the EPC Contracts. The 31 August 2018 date was always the target date, because (as Mr Kirk explained) the refinancing could effectively only take place at six monthly intervals, in either August or February. A BLB email of 29 August 2018 indicated that “[*t*]here are no break costs on the loans if the prepayment is made on 31st August 2018”.
724. Conversely, there are no documents suggesting that the Claimants decided to refinance by reason of any fear of breaching the Facilities Agreements, or anything to do with the EPC Contracts. The only references by BLB to an event of default drawn to my attention in the documents were in two emails of 22 August 2018 from Ms Schramm. The first, to Mr Dan Skilton of Toucan, said:

“that's exactly the point, we need to understand the likelihood for the button to be pushed on time so the repayment does occur on the 31.08. Sheeraz's informed us that you are terminating the EPC, which is a potential EOD under the Facilities Agreement, so as you will understand we need to understand the mechanics and timing of the repayment, which is crucial for us to occur on the 31, as I have also mentioned in our call.”

The second, to Ms Sheeraz a few minutes later, said:

“We understand that you are planning to prepay, but as long as we have not seen the funds actually coming in, and given the below is a potential event of default under the Facilities Agreement, we need to protect our position and understand the reasons behind termination of the EPC and how you are planning to remedy it.

We think a face to face meeting would indeed be very helpful and as a matter of urgency, would like this to happen tomorrow”

725. However, the first email quoted above was part of a long chain of emails, which had included Mr Kirk’s email of 21 May 2018 quoted above, and a quotation from Eversheds as early as 22 May 2018 for doing the necessary legal work. The 22 August email quoted above followed shortly after an email from Toucan’s Financial Controller dated 20 August 2018 saying:

“We are very close to having funds organised to facilitate the prepayment, however it is currently looking like funds will not be in our control until 28th August at the earliest now. We will not be in a position to sign the notice of voluntary prepayment until our account is in credit for cleared funds.

This would mean that we would miss the 31 August prepayment date if we cannot reduce the 5BD notice requirement.

Karin/Suzy, is there any scope from BLB's side to reduce the 5BD requirement if it means we're able to achieve 31st August? If so, what is the minimum notice BLB require?

If there is no scope to reduce the notice period we expect to be in a position to prepay the facilities in the week commencing 3rd September.

Let me know if you have any questions.”

726. These emails contain no hint that the refinancing either had to be done, or had to be materially accelerated, by reason of any concerns about an event of default, or breaches by the Defendants. On the contrary, they indicate that the Claimants had already lined up their alternative funding, and that the discussion in late August about timing was no more than fine tuning of the timetable. I therefore cannot accept Mr Kavanagh's evidence in cross-examination that “*there wasn't always going to be a refinancing of that debt*”. On the contrary, I find it difficult to see how Mr Kavanagh could have believed that to be the position. The suggestions in the Claimants' written closing submissions that “*Toucan had approximately two weeks to refinance – in other words pay off the outstanding BLB Loan Facilities of circa £78 million*” and that this was a “*distress re-financing*” are absurd.
727. Moreover, the bond prospectus which the Claimants prepared for the purposes of the replacement financing, by Thurrock Council, contradicts the suggestion that the refinancing had to be done by reason of serious breaches by the Defendants leading to termination of the EPC Contracts. The prospectus was entitled “*Rockfire Capital – Toucan 19 Solar Farm Portfolio – Senior Debt Refinancing & Investors Bond Buyout*”. The version in the trial bundle stated at the foot of the cover page “*Issues 9 & 10 – August 2018*”: in itself a likely indication that the refinancing had been planned for some time.
728. It is clear from the contents of the prospectus, and Mr Kavanagh accepted in cross-examination, that it was a formal financial promotion approved by Rockfire Capital under the regime set out in the Financial Services and Markets Act 2000. The introduction to the prospectus reproduced a letter signed by Mr Kavanagh as CEO of Rockfire Capital followed by an image of his signature. The letter stated:
- “Following our conversations, we would like to take this opportunity to provide you with further information regarding the follow on investment to replace the Senior Debt with the bank (“BLB”) and buyout of existing bond holders across the Toucan 60 and Toucan 45 portfolios. The refinancing represents

an opportunity for [redacted] to have first ranking security over the assets of the portfolio and receive the returns that the bank has been receiving to date.

The Toucan 19 Solar Farm Portfolio (Toucan 45 & Toucan 60) is operating well and within the predictions expected at the outset. This portfolio has already provided its first interest payment to existing bond holders.

It is Rockfire's intention to make the follow on investment before the end of 31 August 2018 to avoid early repayment penalties and for Rockfire to demonstrate to Thurrock Council our commitment to delivering requirements efficiently.”

729. The prospectus makes no mention of any alleged defects, despite three pages of risk warnings. As well as the statement from Mr Kavanagh’s letter quoted above about the solar parks “*operating well and within the predictions expected at the outset*”, the prospectus said on the following page:

“Toucan Gen Co Limited completed the acquisition of the portfolio on 25 May 2017 and took over the operation of the 9 solar PV projects.

Overall the sites are operating well and within the predictions expected at the outset. In fact we are within 2.5% of our expectations against revenue and costs to date and overall 2.5% up against our EBITDA expectation.

Two Bayerische Landesbank compliance covenant reporting have been completed and debt cycles have been completed without issues. All bond debt payments have been met during the period.

At acquisition all sites were fully operational although one site had not achieved the Provisional Acceptance Certificate which was completed on 17 August 2017.

Six solar sites have achieved intermediate Acceptance Certificate, two are under discussion with the EPC and 1 is due in September 18.”

730. On the case the Claimants now advance, these statements to the effect that the parks were operating well were false, as was the clear implication that the facility with BLB had been problem-free.

731. In cross-examination, Mr Kavanagh said the prospectus had in fact gone to only one investor, and he referred to having had “*conversations with the investor about exactly what’s happening with the investment and these assets*”, and to explanations given as to “*what I knew at that time the level of defects or level of problems we had with [Wirsol’s] designs*”. No record was produced of any such conversation. I consider it unlikely that Thurrock would have invested if Mr Kavanagh had told it that the solar

parks suffered (as the Claimants have alleged in this litigation) from a large number of serious defects.

732. Another significant feature of the bond prospectus is that it directly mis-stated the amount of money required to repay BLB. The “*Introduction*” page of the prospectus, which also contained Mr Kavanagh’s letter, prominently included tables of “*Current Funding*” and “*Proposed Funding*”. The “*Current Funding*” table stated that the “*Existing Bank Debt*” corresponding to the “*Issue 5 Bond*” was £38 million, and that corresponding to the “*Issue 6 Bond*” was £47 million, a total of £85 million. Similarly, the “*Proposed Funding*” box included an entry referring to “*£85m New Bond funds that pay off the existing bank debt*”. Thus Toucan was telling the investor that it had £85 million of bank debt which it was seeking funds from the investor to pay off.
733. However, the debt owed to BLB at the time of the refinancing was in fact only about £78 million. Moreover, Mr Kavanagh accepted in cross-examination that he knew that the amount owed to BLB was at least £5 million less than the £85 million stated in the prospectus; and that most of the difference was accounted for by a fee of £5 million to be paid to Mr Kavanagh’s company, Rockfire Capital Limited. The statements made in the prospectus about the current funding and the proposed use of investors’ new money were therefore false.
734. The evidence of Mr Kirk was that no-one told him about this £5 million fee, despite the fact that the companies Mr Kirk was managing would presumably have to service the interest and capital repayment of the corresponding £5 million element of the new bond. Mr Kavanagh confirmed that he did not tell Mr Kirk about the fee, because “*The operation isn’t run like that*”. The sole document disclosed in relation to the fee (following a disclosure application by the Defendants) is an invoice issued by Rockfire Capital to Toucan Bond Co 19 Ltd, which identifies the sum owed as “*Commission on Solar Bonds Issue 10*”.
735. Other documents refer to Mr Kirk’s evident dissatisfaction about Mr Kavanagh’s methods of withdrawing money from the business. A few months earlier, on 23 April 2018, Mr Kirk messaged Mr Hogan to say that Mr Kavanagh “*was taking the £350k permitted in ur portfolio and the £650k from mag... but those are designed to cover our costs not his cars*”. Mr Kirk sought to explain this at trial as expressing the view that “*the existing structure is projects with all of its contracts, then it has to go up and back down. That’s the problem, that’s what I am saying. That’s the big one. I am circumventing it is up and down in the waterfall*”. It is not entirely clear what this meant but, as the Defendants point out, Mr Kirk’s contemporaneous view that Mr Kavanagh was extracting money from the businesses for his own benefit is plain. Similarly, on 2 May 2018, Mr Kirk messaged Mr Hogan to say:

“I’m not working for someone that just treats us like a cashpoint for his own equity when [the] taxpayers and signed contracts [sit] above his equity”.

Mr Kirk sought to explain this at trial as “*more of a personal failing on my side at this point to properly manage and communicate with Mr Kavanagh*”.

736. The facts relating to the arrangement fee are relevant for three reasons.

737. First, the fact that the refinancing would involve a £5 million ‘fee’ accruing to the benefit of Rockfire Capital, and hence to Mr Kavanagh, provides an additional motivation for the refinancing having occurred. It further undermines the Claimants’ case that the refinancing, or its timing, was forced upon them in a situation of great urgency and pressure.
738. Secondly, the point has a significant bearing on Mr Kavanagh’s credit as a witness. He maintained in cross-examination that the fee did not require to be disclosed in the prospectus. Whether that be so or not, the fact remains that the statements about current and proposed funding in the prospectus were flatly untrue. Mr Kavanagh sought to avoid responsibility for the prospectus, saying in cross-examination that it would have been signed off by his group’s compliance team; that he (Mr Kavanagh) didn’t have anything to do with the production of the document “*in that level of detail*”; and, ultimately, that he did not read the document at all – despite the inclusion in the introduction of a letter purporting to be from Mr Kavanagh and to reproduce his signature. Mr Kavanagh also said the money had “*already been paid*” by the investor (Thurrock) by the time the prospectus went out, and the prospectus was merely “*a papering document for a transaction*”. However, he nonetheless accepted that the prospectus, as a regulatory document, could not properly contain statements that were knowingly false or which were misleading.
739. Mr Kavanagh made reference to “*my conversations with the investor about exactly what’s happening with the investment and these assets*”, but also said “*The bond issuer can raise any sums of money that it wants to. In this scenario you are painting here as it being literally, I agree with what you said. I already said that two questions ago, but the actual reality of what actually happened and what those funds were used by the issuer to settle is a matter the investor wouldn’t know about.*” He later said in cross-examination that he did not tell Thurrock that he was taking £5 million out of the transaction, but that Thurrock were aware that Rockfire Capital always charges a commission for the work that it does on behalf of the issuer.
740. Mr Kavanagh ultimately sought in cross-examination to evade the obvious point that the statements in the prospectus about current and proposed funding were untrue:

“Q. I will come to what the investors are said by you to know. I am currently asking you questions about the formal FSMA document you issued. It says the existing bank debt is 85 million. It says you are raising 85 million. It says you are going to use the new bond funds to pay off the existing bank debt. So it must be saying that you are going to use the 85 million you raised to pay off 85 million of existing debt?

A. No, we used that money to pay off the existing debt and to pay our fee.

Q. And what you have said there, as I just put to you, is not true, is it?

A. No, it is true. I raised the money. I paid off the debt. I paid my fee.

Q. Mr Kavanagh, please listen to the question. What I just put to you as being what this prospectus says is not true, is it?

A. I am -- I can't agree with you, I am afraid.

Q. And you knew that you were not going to pay back the existing debt of 85 million with this bond, didn't you?

A. I knew we would pay back the buy in debt whatever that cost would be at the time of paying it back and that the value --

Q. Are you deliberately ignoring the question?

A. -- and that the balance would be to pay the commission fees due to the Rockfire Capital from the issuer.”

741. I bear in mind that the contents of the prospectus were not directly in issue in this case. Nonetheless, they provide reason to question Mr Kavanagh’s probity. It seems unlikely that Mr Kavanagh did not know even the headline contents of the prospectus, set out on the page which also contained his letter, including the false statements about current and proposed funding. It is hard to see how or why those responsible for drafting the prospectus could have misrepresented the size of the existing BLB debt, unless Mr Kavanagh told them to do so in order to seek to conceal the existence or size of the arrangement fee. It is unlikely that Mr Kavanagh did not draft or read even that most basic information in the prospectus: but even if he did not, the false information about the BLB debt seems very likely to have originated with him. Even if one is to accept Mr Kavanagh’s evidence that the prospectus was not in fact used to raise funds, but only to ‘paper up’ the transaction, the fact remains that a regulatory document bearing his name contained clear untruths on an important matter: the size of the existing debt and the use to which funds were to be put. Whether or not the document was relied on by the investor, such an approach suggests a lack of integrity.

742. Thirdly, the misstatement in the bond prospectus goes to quantum, to which I turn shortly. The fact that the fee was concealed both from Mr Kirk and in the prospectus would in any event cast serious doubt as to whether it was a *bona fide* arrangement fee as claimed or, simply, a covert extraction of funds by Mr Kavanagh for his own benefit.

743. In the light of the evidence I have reviewed above taken as a whole, I conclude that the Claimants’ claim that the refinancing, or its timing or terms, was caused by breaches by the Defendants is wholly baseless. Moreover, I consider it to be an allegation which the Claimants (and in particular Mr Kavanagh) could not genuinely have believed to be true.

(2) Quantum of the refinancing claim

744. In the light of my conclusions above it is not strictly necessary to consider the quantum of this claim, and I therefore address it only fairly briefly.

(a) Basis of assessment

745. The Claimants’ expert assessed the alleged loss for the refinancing claim in this way:

“The loss resulting from the refinancing is based on the net difference between the BLB capital and interest outflows and the new bond (including the assumed refinance after year 5) capital and interest outflows.”

746. Mr Johnson’s approach thus assumes that absent the (assumed) breaches of the EPC Contracts, Toucan would have retained the BLB facilities for the entirety of their term, i.e. until 2034. However, it is clear from the evidence considered earlier that, even absent any breaches, Toucan would have refinanced the BLB facilities at or about 31 August 2018. The relevant counterfactual should therefore have been the hypothetical situation in which Toucan refinanced on or about that date, in the absence of any alleged breaches of the EPC Contracts. Since most of the losses claimed derive from the alleged costs of arranging the finance in 2018 and again in 2023, rather than the *terms* of the refinancing, the claim has been approached on an incorrect and inflated basis from the outset.

(b) The 2018 refinancing: relevant capital sum

747. Mr Johnson assumes the capital and interest outflows required to finance the whole of the £85m capital sum raised under the Issue 10 Solar bond to be attributable to the need to refinance the BLB facilities as a result of Wirsol’s breaches of the EPC Contracts. The BLB facilities were repaid in full on 31 August 2018 for £78,605,145 (including £766,631.73 in swap termination costs). According to the Claimants, the £85m capital raised by the Issue 10 Solar bond was used as follows:

Repayment of BLB debt	£77,838,513.31
Swap termination costs	£766,631.73
Eversheds bond issue costs	£60,000
Chatham fee	£25,000
Arrangement fee	£5,000,000
Working capital	£1,309,854.96
TOTAL	£85,000,000

748. The ‘arrangement fee’ and ‘working capital’, totalling approximately £6.3 million, make up almost all of the Claimants’ refinancing claim. That is because Mr Johnson calculates loss by comparing “*capital and interest outflows*” under the BLB facilities with “*capital and interest outflows*” under the refinanced instruments. The interest liabilities under the original and refinanced debt are similar, with the result that in the words of the Defendants’ expert, Mr Slark:

“The initial sums are enlarged in the bond repayment profile as interest accrues on those sums; and then diminished in the final loss analysis by the application of a discount rate. However, the interest rate and discount rate are very similar and largely net off.

As a result, the total figure claimed as a ‘loss’, in respect of the sums used for these purposes [i.e. working capital and the arrangement fee] is almost the same as the original capital amounts.”

749. Mr Johnson did not dispute that the arrangement fee and working capital made up most of his calculated loss.
750. Taking the working capital first, this sum represented money that formed part of the refinancing bond proceeds but which was not required in order to pay off the BLB debt or in any other way to achieve the refinancing. Thus the Toucan group took it as working capital. In other words, it did not form a loss at all, let alone a loss resulting from the need to refinance by reason of the Defendants’ breaches. The Claimants have put forward no coherent explanation as to how this £1.3 million could properly form part of the claimed loss. In their written closing submissions, the Claimants suggest that had the BLB loan not been repaid on 31 August 2018, then break cost and default interest would have been incurred for each day’s delay. However, even if that be the case (and the point was not properly explored in the evidence, being raised by the Claimants only in the re-examination of Mr Johnson), it would mean costs would have occurred had the refinancing *not* occurred by 31 August. It cannot on any view amount to a loss actually incurred by reason of the refinancing.
751. Nor, as the Defendants point out, has any proper basis been put forward for treating interest liabilities in respect of the £1.3 million working capital portion of the bond debt as a loss:
- i) The Claimants have not pleaded or proven that the Defendants’ breaches of the EPC Contracts gave rise to any need to borrow extra working capital.
 - ii) There is no evidence that, assuming they needed to refinance the BLB debt, the Claimants had no choice but to raise initial capital in the round sum of £85m, leaving them with a balancing figure of £1.3m on which they were required to pay interest. Mr Johnson accepted that “[t]hey could potentially have raised [£]84 [million]”, which would result in a balancing figure of approximately £300,000.
 - iii) Mr Johnson’s analysis is that the Claimants’ Weighted Average Cost of Capital should be used to discount any sums recovered to their net present value, at a rate of 4.26%. The value to the Claimants of the extra capital raised therefore exceeded the interest payable upon it (4%).
752. Turning to the arrangement fee, the Claimants apparently did not appreciate until later in the trial that this fee formed part of their claim, both leading counsel and Mr Kavanagh himself stating in terms that it formed no part of the claim. Now it has become clear that the claim does include the arrangement fee (as is apparent from Mr Johnson’s report), the Claimants seek to contend that it would be properly recoverable as a loss caused by the Defendants’ breaches. However, they have adduced no factual witness or documentary evidence in support of the need to pay the fee or its quantification, save for the invoice I mention above referring to it as a “*Commission on Solar Bonds Issue 10*”. In particular, as I have already noted, Mr Kavanagh’s own witness statement strikingly omits any reference to it. There is accordingly no evidence

of any services provided by Mr Kavanagh or Rockfire Capital Limited in return for the £5 million.

753. Remarkably, the Claimants now make an *ex post facto* attempt, through their expert evidence, to contend that the fee is recoverable as a legitimate arrangement fee. They point out that Mr Slark did not suggest that no arrangement fee would have been appropriate at all, and that Mr Johnson accepted the £5 million as being an arrangement fee.
754. Mr Slark's view was that a £5 million arrangement fee, representing about 6% of the finance raised, was "*excessive*" and "*out of the market*", indicating that it was "*not... determined on an arm's length basis*". He suggested in his reports that a reasonable fee in the circumstances assumed for the purposes of his report would be no more than 2% of the principal sum, i.e. £1,563,814.12. He used this 2% figure on the assumption that the refinancing was pursued urgently and in short order: "*I have stated because of the urgency I've - - I have adopted a 2 per cent figure as opposed to a lower figure*". Mr Johnson criticises Mr Slark for taking insufficient account of the (assumed) circumstances, and uses the actual fee in his calculations, but stops short of expressing the view that the fee was reasonable: as he put it at trial, "*I'm not commenting on the 6.25 per cent as such*".
755. The Claimants make the points that the original, vanilla, funding by BLB under each portfolio involved an arrangement fee of 1.5%, and that arrangement fees are not charged on an hourly basis, or by reference to the degree of effort that is involved in securing the finance, but simply on the result. That is why such a fee is usually a percentage function of the amount raised. They say it is fanciful to suggest that Toucan could have gone into the market, in the circumstances in which they found themselves, and found an independent broker who would be able to obtain financing at all. They criticise Mr Slark's figure of 1.5-2% as being based on hypothetical facts rather than the facts of the present case.
756. I do not accept those contentions. If the Claimants wished to seek to recover from the Defendants, as a loss incurred, the arrangement fee paid to Rockfire, it was for them to set out in evidence the facts supporting a case that (a) the £5 million paid ultimately to Mr Kavanagh's benefit was an arrangement fee and not merely a means by which Mr Kavanagh was able to extract money from the transaction, (b) that it was reasonable in amount and (c) that financing could not have been obtained for a lesser fee. The Claimants have failed to do so.
757. For these reasons, I would in any event not have accepted that either the working capital or the 'arrangement fee' formed part of the recoverable loss.

(c) The 2023 refinancing: interest and fees

758. Mr Johnson estimates likely fees of 2.5% of the capital sum for this further refinancing, and a likely interest rate of 4.5%. Mr Slark estimates likely fees of 2% and a likely interest rate of 4%. Mr Johnson bases his figures on the perceived risk profile of the solar parks as at 2023, in light of their (assumed) history of defects. However, as in relation to the blight claim, any assessment of likely costs in 2023 should be conducted on the assumption that any defects have already been fully and effectively remedied. I would therefore have preferred Mr Slark's evidence on this point.

(d) Discount rate

759. I would have agreed with the evidence of Mr Slark that, in discounting to present value losses assumed to be suffered over a 16 year period, it is appropriate to use an all equity rate at 5.6%: because early receipt of funds would accrue directly to the Claimants' equity. Mr Slark was not challenged on his approach.

(e) Conclusion as to quantum

760. Mr Slark calculates in his second report that, if the working capital and arrangement fee are excluded from the calculation, and assuming the 2% and 4% interest for the 2023 further refinancing, the overall effect of the refinancings was to cause the Claimants no loss but, rather, a net benefit of £1,115,885. As the Defendants point out, that makes intuitive sense in the light of the Claimants' evident wish to refinance in any event. Thus the refinancing claim would in any event have resulted in no recovery against the Defendants.

(3) Title to sue

761. As noted earlier, it is the Topcos who have incurred any additional costs resulting from the refinancing. However, the Topcos are not parties to the claim or to the EPC Contracts. The Claimants bring the relevant claim as assignees of the SPVs, and contend that the additional costs of the refinancing will be passed on to the SPVs.
762. In response to a Request for Further Information, about “[w]hether the ‘loss in value’ has now been ‘passed on by the Topcos via the Holdcos to the SPVs’... and (if so) the mechanism and/or arrangements by which this ‘pass[ing] on’ has occurred”, the Claimants replied that sums advanced under the Facilities Agreements were “advanced down the corporate structure on back to back loan terms”. However, no evidence has been adduced of any such loans in relation to the refinancing bond issue.
763. Mr Kirk stated in a further fifth witness statement served the day before he gave oral evidence that “*the revenue to pay the interest [on the 2018 bond] is generated by the 19 SPVs*”. However, no evidence has been adduced of any obligation on the SPVs to pay the sums in question.
764. The Claimants argued in closing that as the SPVs were guarantors under the Financing Agreement, the refinancing was for their benefit and so they could not resist a claim by the bond issuer: presumably along the lines of some form of implied indemnity. That argument, raised very much as a rear-guard attempt to retrieve the claim, was not fully canvassed in argument. Given my conclusions under subheadings (1) and (2), I find it unnecessary to express a view on it, and prefer not to do so.

(4) EPC clause 17.6

765. For the same reasons, it is not necessary to address the Defendants' contention that the refinancing claim is in any event excluded by clause 17.6 of the EPC Contracts, which I discuss in a different context in section (G)(4) and (5) above.
766. Very briefly, however, I would have concluded that the refinancing claim did fall within the scope of clause 17.6. It would clearly constitute indirect or consequential loss or

damage (and, if and to the extent relevant, not loss arising naturally and directly from the breach). I concluded earlier (narrowly) that the breach in relation to transformer capacity at Five Oaks, Trowse Newton and Outwood involved gross negligence for the purposes of clause 17.6. Aside from transformer capacity, the Claimants also suggested that the Defendants knew about other defects in the sites. In their written closing they highlighted the records of water ingress that I have already discussed, together with what they say are examples of humidity defects being recorded on various dates. However, I have rejected the Claimants' case on the alleged humidity defect. Neither the water ingress entries, nor the other evidence put forward, provides a basis on which to conclude that the Defendants were guilty of deliberate default or gross negligence in the performance of the EPC Contracts in respects over and above what I have found to be 'gross negligence' regarding transformer capacity at certain sites.

767. The question would then have been whether those particular breaches, relating to transformer capacity, in themselves caused the need for the refinancing actually effected. Quite apart from my general conclusion on causation set out under subheading (1) above, I find no basis in the evidence on which to conclude that those discrete breaches in relation to three sites led to any commercial or legal need to terminate the EPC Contracts or to undertake the refinancing. The refinancing claim would therefore have failed by reason of clause 17.6 in any event.

(S) TERMINATION OF EPCS AND O&M CONTRACTS

768. There is a dispute arising from the circumstances in which the O&M Agreements were terminated. The Claimants' case is that the SPVs served notices validly terminating the EPC Contracts, which in turn entitled them to terminate the O&M Agreements. The Defendants purported to accept the Claimants' notices as repudiatory breaches of the O&M Agreements which they accepted. The Claimants allege that the Defendants thereby themselves repudiated (or renounced) the EPC Contracts and abandoned the sites, resulting in losses. The Defendants in turn contend that the Claimants failed to mitigate their loss by accepting the Defendants' offer, without prejudice to the parties' positions, to remain on site for the requisite period.

(1) Termination of the EPC Contracts

769. EPC clause 11.1 ("*Completion of Outstanding Work and Remedying Defects*") provides as set out in § 553 above.
770. Clause 11.4 sets out remedies for failure by the contractor to remedy defects, including in § 11.4(c) provision for termination in the event of defects which deprive the employer of substantially the whole benefit of the works or any major part of the works, or which causes or contributes to the performance of the works falling below any of the Minimum Performance Guarantee.
771. However, EPC clause 15 sets out a further regime entitling the employer to terminate the EPC following breach, subject to compliance with specified procedures. It was not argued that the clause 15 regime was qualified in some way by the clause 11.4 regime. The clause 15 regime, whilst it includes specific provisions in § 15.2(g) for material breaches, is not limited to material breaches. §§ 15.1 and 15.2(a) provide as follows:

“15.1 Notice to Correct

If the Contractor fails to carry out any of its obligation under this Contract, the Employer may by notice require the Contractor to make good the failure and to remedy it within the specified reasonable time.

15.2 Termination by Employer

The Employer shall be entitled to terminate the Contract if:

- (a) the Contractor fails to comply with Sub-Clause 4.2 (Performance Security) or with a notice under Sub-Clause 15.1 (Notice to Correct)”

772. The SPVs served a series of notices under EPC clause 11.1 between 15 February 2018 and 30 July 2018 (“*the defects notices*”). Not satisfied that the stated defects had been fully remedied, they then on 16 August 2018 served a notice under EPC § 15.1 giving the Defendants a further 14 days to remedy the alleged remaining defects (“*the notice to correct*”).
773. By a letter of 30 August 2018, the Defendants took the position that the alleged defects identified in the defect notices were either not breaches of the EPC Contracts or minor breaches that had been or shortly would be remedied.
774. On the basis that the Defendants had still not remedied the defects, the SPVs then on 3 September 2018 served notices terminating the EPC Contracts.
775. On the same date, the SPVs gave notice terminating the O&M Agreements pursuant to § 20.5.3 of those agreements, which entitle the SPV to terminate if the corresponding EPC has been terminated under *inter alia* clause 15 thereof. In relation to Five Oaks, Lisburn, Outwood and Wrea Green, notice was also given under § 20.5.3 of the O&M Agreements on the ground that the Defendants had employed subcontractors without having obtained the SPVs’ written consent to their appointment and its terms.
776. Clause 20.5 of the O&M Agreements provided for such terminations to be effective as of 16 October 2018. In the meantime, however, the Defendants wrote to the SPVs alleging that the SPVs’ notices of termination of the O&M Agreements were repudiatory breaches of those agreements which the Defendants accepted. The Claimants allege that the Defendants then abandoned the sites, requiring the Claimants temporarily to de-energise them, resulting in loss of revenue and recommencement costs.
777. To the extent that this claim is established, the parties’ solar valuation experts agree that the Claimants’ loss of income was £568,201.60, and the cost of recommencing operations was £94,028.90.
778. The Defendants argue that the alleged defects identified were either not defects at all (as regards most of the issues), or were minor and were in the process of being remedied. As to the latter point, however, EPC §§ 15.1 and 15.2(a) do not contain a materiality threshold, and the Defendants did not elucidate any basis on which they should be disappplied to breaches that might be regarded as minor, or which were in the

course of being remedied but had still not be remedied by the end of the applicable notice period.

779. The Claimants provided with their written closing a schedule summarising the topics covered by the defects notices. In relation to eleven sites – all apart from Balcombe, Carrowdore, Cranham and Lisburn – the defects notices specified water ingress as a defect. It is common ground that a water ingress defect did exist in relation to those eleven sites (plus Cranham), and the Defendant has not taken issue with the way in which the defect notices specified that defect. On that basis, the defect notices for those eleven sites were valid at least insofar as they referred to that defect: and the failure to remedy that defect by the end of the period specified in the notices to correct provided grounds on which the relevant SPVs were entitled to terminate. The Defendants mention in their closing that the water ingress problem *would have been* fixed for all the sites but for the termination of the EPC Contracts, but do not allege that it had in fact been fixed by the relevant deadline.
780. The defect notices for Balcombe, Carrowdore and Lisburn included reference to a lack of monitoring systems for transformer temperature, and the Defendants admit that remote monitoring of transformer temperature had not been provided at these sites. In the absence of any challenge to the contents or specificity of these notices, I conclude that the Claimants were entitled to terminate these EPC Contracts too.
781. In relation to Cranham, the defects notices referred to the transformer manufacturer, air forced cooling, transformer undersize, lack of core temperature monitoring, other monitoring defects, and pyranometers. I have not found there to be any breach in relation to the Cranham transformer, and the transformer temperature monitoring defect was remedied in time. Insofar as the defects notices related to monitoring, they did not refer to lack of voltage monitoring at string level, which is the only other monitoring breach I have found to exist. I therefore conclude that the Claimants were not entitled to terminate the Cranham EPC.
782. In the light of these conclusions it is not necessary to consider the further issue raised about the contents of the defects notices relating to transformer capacity, in respect of those sites where I have concluded that transformers did lack capacity. Briefly, the Defendants' point is that the defect notices did not contain a complaint 'at large' about capacity. The complaint was specific: for example the Outwood defect notice stated that the inverters connected to TX1 could produce 3,456A and those at TX2 could produce 3,168A, based on a current of 48A per inverter; and that Wirsol was required to "*make good these Defects*". However, I have not accepted the Claimants' case that the transformers were required to have capacity to handle 48A per inverter i.e. the maximum capacity of the inverters taken in isolation. Had it been relevant, I would have accepted the Defendants' submissions on this point. A notice which specifies a defect as being a lack of a capacity which the transformers were not contractually required to have, and containing no alternative position, cannot in my view serve as a valid defect notice in respect of some lesser defect.

(2) Termination of the O&M Agreements

783. Because the Claimants were entitled to terminate the EPC Contracts in relation to all sites except Cranham, they were equally entitled to terminate the O&M Agreements for those sites pursuant to § 20.5.3 of the latter agreements.

784. In relation to four solar parks (not including Cranham, however) the SPVs additionally asserted that the notice to terminate the O&M Agreements was justified under § 20.5.3, on the basis that Wirsol had used subcontractors without the SPVs' written consent as required under § 24.1. Clause 24.1 provided:

“The Contractor shall be entitled to sub-contract the performance of the whole or any part of the Services to any sub-contractor, provided that such sub-contractors and the terms and conditions of their appointment have first been approved by the Employer in writing, such approval not to be unreasonably withheld.”

785. The Defendants point out that the relevant subcontractors had been engaged for a year or more when the O&M Agreements were purportedly terminated, to the SPVs' full knowledge: and that one of them (Mind4Energy) is still engaged by the SPVs as their monitoring provider. The parties clearly understood the required approval under the O&M Agreements had been obtained. Mr Hogan's evidence on this issue was not challenged at trial. Alternatively, the Defendants submit that the Claimants are estopped by convention from denying that approval was given, both parties having conducted themselves on the assumed basis that the use of these subcontractors was permitted. The Claimants object that the plea of estoppel is defective, as it does not pertain to the clause, and the evidence to support such a plea is inadequate: there is no evidence that the SPVs represented to Wirsol that they would not hold Wirsol to the rights to terminate based on failures of Wirsol to have subcontractors' terms and conditions approved in writing and the SPVs' knowledge that the subcontractors were working on site and approved in general terms is not to the point. That objection is in my view misdirected. The breach is constituted by employing the subcontractors in circumstances when their terms and conditions have not been approved. The SPVs knew the subcontractors were being employed and that they, the SPVs, had not first approved their terms and conditions. By continuing to perform the EPC Contracts without seeking to exercise any right to terminate the SPVs were both electing to continue with the contracts and expressing (by conduct) the common assumption that the subcontractors and their terms of appointment were acceptable. Had it been relevant, therefore, I would have preferred the Defendants' submissions on this point.

786. If the notices to terminate the O&M Agreements were invalid then the purported termination would itself constitute a repudiatory breach, evincing a clear intention not to perform. This was Wirsol's understanding, and it gave notice on 5 September 2018 that Wirsol had terminated the O&M Agreements by accepting this repudiatory breach.

(3) Mitigation of loss

787. The Claimants' case is that Wirsol should have continued to provide the O&M services under the O&M Agreements until 16 October 2018, and caused loss by failing to do so.

788. The Defendants submit that even if they did breach the O&M Agreements by purporting to terminate them when they had no right to do so, the SPVs wholly failed to mitigate their loss.

789. The duty to mitigate “... imposes on a plaintiff the duty of taking all reasonable steps to mitigate the loss consequent on the breach, and debars him from claiming any part of the damage which is due to his neglect to take such steps” (see *British Westinghouse*

Electric Co Ltd v Underground Electric Rys [1912] AC 673, 689, per Lord Haldane). A claimant cannot recover any loss it suffers through unreasonable action, or unreasonable failure to act (see McGregor on Damages (20th ed) § 9-004, recently endorsed in *Assetco plc v. Grant Thornton UK LLP* [2019] EWHC 150 (Comm), [2019] Bus LR 2291 § 882). Further, the refusal of a proposal made by a party in breach of contract that might reduce the losses flowing from the breach is capable of amounting to an unreasonable failure to mitigate: see Chitty on Contracts § 26-101, citing *Payzu Ltd v. Saunders* [1919] 2 KB 581.

790. The Defendants contend that Wirsol offered to continue to provide the same O&M services on the same terms, without prejudice to the parties' position as to whether the O&M Agreements had been validly terminated; and that the SPVs unreasonably refused to accept that offer.
791. The chronology was as follows.
792. Enyo Law on 5 September 2018 wrote on the Defendants' behalf to the Claimants' solicitors, Eversheds, rejecting the claim that the SPVs were entitled to terminate and purporting to accept the SPVs' termination notices as repudiatory breaches bringing the EPC Contracts to an end. The letter then continued as follows:

“Period up to 16 October 2018

12. We note that the Termination Notice seeks to adhere to clause 20.5 of the O&M Contracts, which provided that termination is effective 30 business days after receipt of the notice by Wirsol (i.e. 16 October 2018).

13. As stated above, we consider the Termination Notice to be ineffective and it amounts to a repudiatory breach which Wirsol has now accepted.

14. However, in an effort to be constructive and to enable an orderly hand-over between Wirsol and Toucan, Wirsol is prepared to agree enter new agreements upon the same terms of the O&M Contracts for the period between now and 16 October 2018 upon the understanding that such agreements are fresh contracts which will terminate on 16 October 2018.

15. Please can you indicate Toucan's proposal by return. Pending any further response, Wirsol will perform no further work under the O&M Contracts.”

793. Eversheds replied on 6 September 2018:

“...

Our second letter of 3 September 2018 is a valid notice of termination of the O&M Contracts and that that termination will take effect on 16 October 2018.

The O&M Contracts remain in full force and effect until 16 October 2018 when termination under the notice dated 3 September 2018 takes effect. Consequently, there is no need for the SPV Companies and Wirsol to enter into new O&M contracts for this period and the SPV Companies will not do so.

Until termination of the O&M Contracts takes effect on 16 October 2018, Wirsol remains obliged to perform its obligations under the O&M Contracts. Wirsol's unilateral decision to abandon the sites is a further breach of the O&M Contracts. We therefore require that Wirsol confirm by no later than 6pm on 6 September 2018 that it will continue to perform its obligations under the O&M Contracts, until they are terminated on 16 October 2018.

If you fail to respond by 6pm today then we will proceed on the basis that Wirsol has abandoned the sites. For the avoidance of doubt we hereby put you on notice that such abandonment will mean the SPV Companies will suffer loss and damage and will have no alternative other than to turn off the PV plants at the sites. The SPV Companies take health and safety extremely seriously and they are not prepared to allow sites containing HV equipment (with identified defects) to operate without maintenance and monitoring being performed.

Further, as you are aware, if Wirsol does abandon the sites then there is no limit on the damages recoverable by the SPV companies pursuant to clause 13.3 of the O&M Contracts. You have until 6pm today to notify us of your client's position."

794. Enyo Law replied the same day, 6 September 2018, rejecting the Claimants' analysis and making the following observations in response to Toucan's position:

"(a) Wirsol's position is that its termination of the O&M Contracts was fully justified and, therefore, Toucan will have no claim for loss and damage.

(b) If this analysis is wrong, by proceeding on the basis that "Wirsol has abandoned the sites", Toucan would be accepting a repudiatory breach by Wirsol with the result that the O&M Contracts had been terminated and Wirsol would be exposed to claims for loss and damage caused by this wrongful termination.

(c) In the scenario set out at (b) above, Toucan has an obligation to act reasonably to avoid or reduce its loss under the doctrine of mitigation.

(d) It is plain that such loss can be mitigated by accepting Wirsol's offer to enter into new agreements upon the same terms

as the O&M Contracts for the period up to 16 October 2018. Indeed, it is well-recognised that a claimant may have failed to mitigate and consequently be unable to recover its losses if it unreasonably refuses to accept an offer made by the defendant. For the avoidance of doubt, this is not a circumstance where Toucan can say that the relationship with Wirsol has irretrievably broken down or that Wirsol has proven untrustworthy since your letter makes it clear that Toucan remains prepared to work with Wirsol up to 16 October 2018. Acting reasonably, Toucan is perfectly entitled to mitigate its loss by accepting Wirsol's offer without prejudicing its own legal position. It follows that there is no basis for Toucan to turn off the PV plants at the sites and, therefore, lose revenue. Therefore, a claim against Wirsol for associated loss and damage would fail, even on the basis of Toucan's own case.

(e) Finally, the above proposal has been put forward by Wirsol not simply on the basis that it is legally expedient to do so. Wirsol has consistently sought to adopt a constructive and commercially reasonable approach in its dealings with Toucan, which unfortunately has not been reciprocated. As a result, Wirsol is prepared to enter an arrangement to enable an orderly hand-over between Wirsol and Toucan but not in a way which would prejudice its legal rights.” (footnotes omitted)

795. Eversheds responded on 7 September 2018:

“On 5 September 2018 Wirsol unilaterally ceased to perform its obligations under the O&M Contracts and abandoned the sites. Wirsol left the sites and the HV equipment unmonitored and unmaintained, making no attempt to hand over the sites. Wirsol has not even handed over keys and access codes to the sites.

This evidences a wholesale and flagrant disregard for health and safety by Wirsol. It is entirely inconsistent for Wirsol now to say it is trying to achieve an orderly hand over.

In the circumstances the SPV Companies cannot reasonably be expected to enter into any further contracts with Wirsol for the operation and maintenance of the sites.

In the circumstances the SPV Companies fully expected Wirsol immediately to deliver up all keys, access codes, records and documents (in any form) relating to the sites and services performed by Wirsol under the O&M Contracts. As part of the handover an authorised person will be required to transfer across the HV control (to include a switch of the site and verification of drawings). The SPV Companies will provide a list of dates that facilitate this handover.

The SPV Companies reserve all their rights under the O&M Contracts and more generally.”

796. In my judgment the clear effect and intention of Enyo Law’s letter of 5 September 2018 was to provide a means by which Wirsol could continue to look after the sites during the termination period on a basis which would not involve either side having to act inconsistently with its legal position. If accepted, it would have avoided any need to shut down the sites and the losses now claimed. There is no suggestion in the letter that Wirsol was seeking to demand any additional consideration for continuing to provide the services: the objective was simply to do so without any risk that it had acted inconsistently with its contractual position. The Claimants’ position, on the other hand, would have required Wirsol in effect to accept that the existing contract had been validly terminated by the Claimants.
797. The Claimants put forward five reasons why they did not act unreasonably in not accepting the Defendant’s proposal.
798. First, the Claimants say the proper characterisation of Wirsol’s proposal is that it constituted a refusal by the Defendants to carry out their contractual obligations coupled with a demand that the SPVs enter fresh contracts in order for the Defendants to carry out what they were required to do in any event. That is true but does not meet the point. The premise is that Wirsol was in breach, but the question is whether in mitigation of the loss the Claimants ought reasonably have accepted the proposal – which carried no practical or legal disadvantages from the Claimants’ point of view – in order to mitigate the loss arising from the breach.
799. Secondly, the Claimants contend that there was no ‘benign statement’ in the ‘offer’ that any acceptance would be treated by the Defendants as being without prejudice to the parties’ position as to whether the O&M Agreements had been validly terminated. That is incorrect. Enyo Law’s letter of 6 September made clear that it regarded the proposal as one which Toucan would accept “*without prejudicing its own legal position*”, just as Wirsol wished to enable an orderly hand-over in a way that would not prejudice its own (perceived) legal rights. It is unrealistic to suggest that, had the offer been accepted, Wirsol could have treated that as in any way undermining the SPVs’ position as regards the termination of the EPC Contracts.
800. Thirdly, the Claimants object that any such new arrangement on fresh contracts would have deprived the SPVs of the contractual rights that would otherwise have subsisted had Wirsol simply carried on working under the existing contracts, such as the ability to set-off against the sums due to the Defendants for the period to 16 October 2018 the costs incurred by the SPVs arising as a result of the termination and in procuring a replacement contractor as provided in clause 20.7. That is not an objection raised at the time, and could no doubt easily have been addressed. In any event, taking the specific example the Claimants now raise, it seems overwhelmingly likely that the two contracts (the EPC and the new temporary contract) would have been so closely connected as to entitle the Claimants to set off at least in equity any cross-claims.
801. Fourthly, the Claimants say the ‘offer’ was merely a statement of an intention to enter legal relations, but not an offer capable of acceptance, noting the phrase “*...is prepared to enter new agreements...*”. However, had Wirsol’s proposal been accepted in

principle, a binding contract could without difficulty have been entered into by simple means such as an exchange of letters.

802. Fifthly, the Claimants say the relationship with Wirsol by that time had irretrievably broken down and Wirsol had proven untrustworthy, for example, by what the Claimants characterise as Wirsol's failure to be open, transparent and honest with the Claimants as to the nature, scope and extent of the defects present at the sites, failure to remedy notified defects since April 2018, and botched remedial works such as Project Coolio, installation of cowls and hoods that were ineffective, desensitising the protection settings, and clipping inverters, without consulting with or seeking appropriate permission of the SPVs properly or at all and without ensuring that Burnell both gave permission and agreed that the warranties would remain valid. This complaint, even if and to the extent it were true, is beside the point. The whole premise of the Claimants' complaint is that it *did* wish Wirsol to continue to look after the sites during the 30 day termination period.
803. In my judgment none of the Claimants' objections has merit. The Claimants acted unreasonably by failing to mitigate their loss by accepting Wirsol's proposal. The claim for damages therefore fails.

(4) Clause 13.4 of the O&M Agreements

804. Given my conclusions above it is not strictly necessary to consider the Defendants' alternative argument that the Claimants' claim for loss of income is excluded by the terms of the O&M Agreements. For completeness, I address this briefly below.
805. Clauses 13.1 and 13.2 of the O&M Agreements impose various limits on the contractor's liability (subject to the provisos in § 13.3), including, under § 13.2, where costs are incurred due to the termination of the agreement on certain grounds. The Defendants accept that the costs of reconnection would be recoverable on this basis, and that it does not appear the limits of liability are engaged.
806. However, § 13.4 provides:
- “Save as provided in Clauses 12 and 3.6, the Contractor shall have no liability to the Employer under or in connection with this Agreement in respect of loss of profits, loss of use, loss of production, loss of business, loss of business opportunity, or any claim for consequential loss or for indirect loss of any nature notwithstanding that the Contractor shall be liable in respect of any claim by the Employer for any costs arising as a result of termination of this Agreement.”
807. Clauses 3.6 and 12 are not relevant for present purposes. The claim for lost income falls squarely within § 13.4 as being a claim for loss of profits, use, production and/or business. The Claimants point out that the separate limitations of liability in §§ 13.1 and 13.2 do not apply to any liability caused or contributed to by abandonment by the contractor. However, that proviso does not apply to the exclusion of particular heads of loss under § 13.4. The claim for lost income would therefore have failed in any event.

(T) DELAY LIQUIDATED DAMAGES

(1) Introduction

808. The Claimants seek delay liquidated damages (“*DLDs*”) in the total sum of £1,953,570 in respect of Wirsol’s failure, in breach of EPC § 8.2, to complete the Works within the contractual Time for Completion of construction at 14 solar parks, being (under § 1.1) 6 months after the Target Commissioning Date specified in each EPC. In such circumstances, clause 8.6 of the EPC provides for Wirsol to pay DLDs to compensate for the delay. A demand for payment was made by letter on 15 February 2019. The method of calculation is common ground, as is the fact that 14 of the Solar Parks failed to meet the Time for Completion.
809. The purpose of DLDs is to compensate the employer at a fixed daily rate for losses in revenue suffered as a consequence of the contractor failing to ensure the park is generating electricity by a specified date. The contractual timetable in outline is summarised in § 20 above.
810. By way of context, the Defendants point out that all fourteen of the solar parks in respect of which the Claimants claim DLDs were exporting power and generating revenue months in advance of the Time for Completion. In the year June 2017 to June 2018, the actual revenue performance of the portfolio exceeded the budgeted performance by approximately £208,000. The claim now made, belatedly, for DLDs may thus appear opportunistic. The SPVs did not in fact claim DLDs at the time they signed PACs, which would have been the obvious moment to make such a claim, even in the ten cases where this occurred after the May 2017 sale of the sites to the Claimants. Nor was any such claim advanced in 2018 after the relationship between the parties deteriorated in 2018, nor in the original Particulars of Claim. The claim for DLDs was introduced only in March 2019, by way of amendment.

(2) Legal principles

811. The Defendants alleged equitable waiver, which requires:
- i) a promise or representation by A that it will not enforce its strict legal rights against B;
 - ii) an intention or knowledge on the part of A that B will rely on the representation, or reasonable foreseeability of such reliance;
 - iii) reliance by B on the representation; and
 - iv) circumstances making it inequitable for A to resile from the representation.

See, e.g., *Chitty on Contracts* (33rd ed.) § 4-87 and *Snell’s Equity* (34th ed.) § 12-25.

812. As Chitty notes, the Court of Appeal in *Argo Systems v Liberty Insurance* [2011] EWCA Civ 1572 held that:

“Saying nothing and “standing by”, ie. doing nothing, are, to my mind, equivocal actions. This court has stated that, in the absence of special circumstances, silence and inaction are, when

objectively considered, equivocal and cannot, of themselves, constitute an unequivocal representation as to whether a person will or will not rely on a particular legal right in the future. In my view, there are no special circumstances in this case that are capable of turning the silence and inaction of Liberty into an unequivocal representation to Argo that it did not intend to enforce its strict legal rights based on a breach of the Hold Harmless Warranty.” (§ 46)

citing Robert Goff LJ in *Allied Marine Transport Ltd v Vale Do Rio Doce Navigado SA* (“*The Leonidas D*”) [1985] 1 WLR 925, 937E. As Chitty also notes, such special circumstances may exist where the relevant party is under a duty to speak if it wishes to rely on a matter, an example being Teare J’s decision in *MIOM 1 Ltd v Sea Echo ENE (No.2)* [2011] EWHC 2715 (Admlty).

(3) Representation

813. In order to achieve Taking Over under § 10 of the EPC Contracts, seven conditions had to be satisfied. These included:

“(c) the Contractor has paid (or the Employer has recovered) all Delay Liquidated Damages and Performance Ratio Damages due and payable under this Contract”

814. In the weeks leading up to signature of the PACs for the ten sites where Taking Over occurred after the Claimants’ purchase in May 2017, the Wirsol team discussed the status of the sites with the Claimants. There is no evidence that the Claimants suggested that they considered DLDs to be payable. RINA, on behalf of BLB, produced PAC Reports for the ten sites, confirming that the technical requirements for Taking Over had been satisfied. These were then attached to and referenced in the PACs themselves.

815. For example, the PAC in relation to Carrowdore, dated 9 October 2017, stated:

“We make reference to the EPC Contract between WEL Solar Park 16 Limited and Wirsol Energy Limited, dated 27th October (the “Contract”) and the PAC Report issued by Technical Advisor RINA Limited. Terms defined in the Contract shall have the same meaning when used herein.

This is the Provisional Acceptance Certificate and Provisional Acceptance Report issued for the purpose of Clauses 10 and 11 of the Contract.”

816. The PAC Report to which the PAC thus referred, and which was appended to it, included a table setting out the PAC requirements, whether each had been achieved and RINA’s comments. The row relating to the requirement “*All accrued Delay Liquidated Damages have been paid (if any)*” stated “*N/A*” in the “*Achieved*” column and “*Not applicable*” in the comments column. Further, the Report stated that “*All accrued Delay Liquidated Damages have been paid*”. The PAC was signed by Mr Andrew Williams as Employer’s Representative as well as by Mr Hogan on behalf of the SPV and by RINA.

817. Pausing there, the PAC would in my view *prima facie* constitute a representation by the SPV that no DLDs were payable: payment of any DLDs due was a condition precedent of the PAC being issued, and the PAC Report expressly referred to in the PAC stated that none were due.
818. The Claimants object, first, that the PAC itself makes no reference to DLDs. However, it indicated by clear implication that the conditions precedent to its issue were satisfied, and expressly referred to (and in my view incorporated by reference) a PAC report stating that no DLDs were due.
819. The Claimants also object that EPC § 10.1 is simply a condition precedent to the issuing of a PAC, and does not operate to extinguish Wirsol's liability to pay any accrued DLDs. It could not do so, because under EPC Contract § 8.6 the amount to be paid in DLDs cannot be finally quantified until the PAC is issued as it is calculated by reference to the date of the TOC. I do not accept that submission. Payment of any DLDs due is an express pre-condition to the issue of a PAC, and the employer would be entitled to withhold it until any such DLDs had been paid. Once the other pre-conditions set out in EPC § 10 to the issue of a PAC (completion of the works and related matters) have been satisfied, the Employer becomes obliged to issue it in accordance with the timetable set out in that clause, so no real difficulty should arise in relation to the calculation and payment of any DLDs due.
820. The PACs were provided to Wirsol under cover of letters stating:

“Further to clause 10 of the EPC Contract please find enclosed the signed PAC certificate, which also formally acts as the Taking Over Certificate.

This is provided strictly on the basis that the issue of this Taking Over Certificate does not release the Contractor from any of its obligations under the EPC Contract and shall not be interpreted as a waiver by the Employer of the performance by the Contractor of any of its obligations under the EPC Contract. The Employer reserves all its rights under the EPC Contract.

Please confirm your receipt and acceptance of this as the Taking Over Certificate for this site.”

The pdf document comprising the cover letter, PAC certificate and RINA report was transmitted to Mr Hogan by an email from the Claimants on 10 October 2017 which repeated the wording in the letter that it “*shall not be interpreted as a waiver*” and that the Employer “*reserves all its rights under the EPC Contract*”. The email requested that Mr Hogan “[p]lease confirm your receipt and acceptance of this as the Taking Over Certificate for this site”, to which Mr Hogan replied “*Confirmed*”.

821. Had matters rested there, I would have concluded on balance that the general reservation of rights in the covering communication was insufficient to dispel the effect of the clear and express statements in the PAC Report attached to the PAC that no DLDs were due. Those statements are unequivocal, and the general disclaimer on the covering communication, and ancillary communication, making no reference to any intention to

retain a right to DLDs in direct contradiction of the contents of the PAC and PAC Report themselves, did not render the latter ambiguous or equivocal.

822. However, matters did not rest there. EPC Contract § 2.4 provided *inter alia* that:

“If the Employer considers himself to be entitled to any payment under any provision of this Contract or otherwise in connection with this Contract, and/or to any extension of the Defects Notification Period, it shall give notice and particulars to the Contractor. However, notice is not required for payments due under Sub-Clause 4.19 (Electricity, Water and Gas) or for other services requested by the Contractor.

The notice shall be given as soon as reasonably practicable after the Employer became aware of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.”

823. Any DLDs due under EPC § 8.6 would have been a payment to which the Employer (the SPV) was entitled under a provision of the EPC. The PACs were issued on various dates between 18 October 2016 and 9 October 2017. However, neither any of the SPVs nor the Claimants themselves intimated any claim for DLDs until February or March 2019, during the course of this litigation.

824. The position therefore is that the SPVs issued PACs containing representations to the effect that no DLDs were due; stated in their covering communications that the PACs should not be interpreted as a waiver and reserved their rights under the EPC Contracts, albeit without making any express reference to any claim for DLDs; but then failed to assert any right to DLDs for a period of well over a year notwithstanding an express contractual requirement to give notice of any such claims “*as soon as reasonably practicable*” after becoming aware of the events or circumstances giving rise to the claim, i.e. a duty to speak. The SPVs were well aware of the relevant events or circumstances, which depended solely on the terms of the EPC Contracts and the dates of the PACs. In these circumstances taken together, the SPVs in my judgment represented that no entitlement to DLDs would be asserted.

825. The Claimants submit that any such conclusion is precluded by EPC § 21.1, which provided that “*No failure to exercise, nor any delay in exercising, any right, power or remedy under this Contract shall operate as waiver ...*”. However:

- i) the failure to give notice pursuant to § 2.4 was not merely a failure to exercise or delay in exercising a right, power or remedy but a failure to comply with a positive obligation, and
- ii) in any event, the positive representation constituted by the combination of the statement in the PAC and the subsequent failure to assert, as required by § 2.4, any rights reserved by the covering communications to the PAC amounted to a positive representation and not merely a failure to exercise rights.

(4) SPVs' intention or knowledge

826. In the context of the mechanisms set out in the EPC, in relation to both PACs and Employers' claims, it was obvious that Wirsol would rely on the issue of PACs indicating that no DLDs were due, followed by a long failure to assert any right to DLDs as § 2.4 would have required, as a representation that no DLDs were claimed. The SPVs must in my view have known that, and it was in any event objectively clearly foreseeable. Though this point was not put in express terms to Mr Kavanagh, it was clearly put to him that he had waived any right to DLDs, and in any event the Claimants did not dispute that the test is at least in part an objective one.
827. Mr Kavanagh said in his witness statement that from his point of view the SPVs had preserved their position. He referred to reports commissioned from Fichtner reviewing the status of the TOC requirements, which in relation to EPC § 10(c) (DLDs) said "*N/A – To be confirmed by Rockfire*". Mr Kavanagh says he was satisfied that the reports left the DLDs point 'intentionally blank'. Mr Kavanagh accepted in cross-examination that Fichtner would have expected the Claimants' asset management team then to have confirmed the position. In those circumstances, had the SPVs in fact taken the position that DLDs remained due, one would naturally have expected the PACs to say so. Instead, by referring to and attaching the RINA reports, they said the opposite. Moreover, there was another obvious explanation for the general reservation of rights in the covering letter, because (as Mr Kavanagh accepted) there were outstanding technical issues regarding EPC compliance at some sites. Mr Kavanagh said he was happy that the wording in the covering letters to the PACs preserved the SPVs' right to claim the DLDs in the future. However, his evidence did not address (i) the fact that one would in the circumstances have expected a specific reservation of rights in relation to DLDs, had the SPVs intended to retain the right to claim them later, or (ii) the lack of any subsequent prompt assertion of a right to DLDs even though the contract called for one.

(5) Reliance

828. Mr Hogan's evidence was partly to the effect that he had agreed with the directors of the SPVs that the deadlines under the EPC Contracts would be varied so that time for completion ran from the date of the DNOs' G59 test certificates: a point which was not, however, pursued at trial. He also noted that the PACs should have set out any DLDs due and payable, and said "*At this stage, Toucan did not claim any sums by way of DLDs thereby, I believe, waiving any entitlement to the sums.*" Mr Hogan suggested that Toucan had later looked for points of attack including "*revisiting issues which had previously been settled as between the parties*".
829. The notion that the DLDs issues were regarded as having been settled is entirely consistent with the way in which, shortly after the final PAC in early October 2017, a dispute relating to charges under the O&M Agreements was resolved. In late October 2017 the parties were debating the starting date for charges for O&M services, with the Claimants taking the position that the commencement date was the date of the 'TOC' or Taking Over Certificate. Wirsol's position was that PAC and TOC were synonymous, and that the fact that Rockfire took time to sign and return the certificate should not affect the start date for the O&M charges. It sought outstanding charges totalling £181,616. It will be noted that this issue involved consideration of the PAC dates, as any claim for DLDs would have done. Mr Hogan initially adhered to Wirsol's

position, noting among other things that “*should you have had an issue, then Rockfire should have issued a notice and failure to do so thus assumes acceptance*”. Ultimately, however, Wirsol accepted a compromise, Mr Hogan indicating in his email of 22 November 2017 to Rockfire that “*just for the record, your position regarding PAC and TOC dates is wrong, but we are making a concession in the spirit of a partnership. I trust you understand this point.*”

830. I find it inconceivable that Wirsol would have taken this position had the SPVs not (a) signed off PACs indicating that no DLDs were due and (b) refrained from asserting any right to DLDs as EPC § 2.4 would have required. In these circumstances I am satisfied that Wirsol relied on the representations which the SPVs thereby made.
831. The Claimants submit, however, that the parties’ conduct is inconsistent with any waiver. According to Mr Kavanagh, Mr Hogan did not mention any waiver or variation in relation to DLDs during discussions on or about 2017 when Mr Hogan was seeking ratification of amendments to the EPC Contracts and O&M Agreements in connection with the acquisition. Mr Kavanagh says he was very clear that he needed the sites finished to the EPC taking-over standard. However, since the SPVs had issued PACs indicating that DLDs were not applicable, subject to a very general reservation of rights, and had then failed to assert any such claim, I see no reason to expect Mr Hogan to have raised the topic. Indeed, the fact that he did not do so tends to support the view that Wirsol did indeed regard the matter as settled.

(6) Inequitable for Claimants to resile from waiver

832. In these circumstances it would be inequitable for the Claimants now to be permitted to resile from the representations made. They are in my judgment estopped from doing so. The claim for DLDs fails.

(U) ABAKUS BYES DELAY LIQUIDATED DAMAGES

833. Under this head of claim, Toucan Gen Co claims damages from Wircon UK and Wircon Germany for breach of warranty under the SPA, through their failure to disclose compromise agreements made between the SPVs and Abakus in respect of DLDs payable under the EPC Contracts for the Abakus Sites.

(1) Background

834. As noted earlier, Abakus acted as the Contractor under the EPC Contracts in respect of the Abakus Sites. Each of those EPC Contracts provided for Abakus to pay liquidated damages in respect of any delay in achieving Taking Over by the agreed Time for Completion, in the same way as the EPC Contracts for the Wirsol Sites considered in the previous section.
835. For each of the four Abakus Sites, there was a delay in achieving Taking Over such that liquidated damages were payable at the contractual rate (the “**Abakus Delay Liquidated Damages**”). It was common ground that the total sum of the relevant SPVs’ entitlement to the Abakus Delay Liquidated Damages was £1,138,945.
836. In September 2016 (in respect of Upper Wick and Trowle) and February 2017 (in respect of Shuttleworth and Mill Farm), Mr Hogan on behalf of the SPVs came to an

agreement with Abakus as to the amount of Abakus Delay Liquidated Damages that should be paid. Those agreements involved a commercial decision on behalf of the SPVs to accept a lesser amount than their full liquidated damages entitlement under the EPC Contracts. Following those agreements, Taking Over Certificates were issued for those sites on 30 September 2016 and 7 February 2017 respectively.

837. There is some disagreement between the parties as to whether the amount agreed and paid to the SPVs was £303,612 (as Wirsol suggests) or £397,403 (as Toucan suggests). It is, however, agreed that if the breach of warranty is made out, the damages payable should be valued at the difference between the full amount of the contractual entitlement to the Abakus Delay Liquidated Damages and the amount in fact paid. The parties' experts proceeded on the basis of Toucan's figure for the latter amount, valuing the claim at £741,542. Mr Slark had originally suggested that the damages valuation should take into account whether Toucan Gen Co had a reasonable expectation to realise any value from the liquidated damages when determining its offer price, but this position was dropped at trial.
838. As the Defendants point out, there is reason to believe that this claim, introduced in June 2019, is opportunistic:
- i) By the time the Claimants purchased the Abakus SPVs, all four sites had successfully passed the milestone of Taking Over: Taking Over Certificates had been issued for Upper Wick and Trowle on 30 September 2016 and for Mill Farm and Shuttleworth on 7 February 2017. These claims therefore arise out of entitlements accruing to the SPVs before the Claimants owned them, for periods of construction delay which began and ended well before the Claimants' purchase.
 - ii) There is no evidence that the Claimants thought that further DLDs were actually payable by Abakus when they bought the SPVs. To the contrary: Mr Kavanagh accepted in cross-examination that at the time the SPAs were agreed, he did not believe there were any outstanding claims against Abakus. There can thus be no suggestion that the price paid by the Claimants under the SPA reflected such a belief.

(2) The provisions of the SPA

839. Toucan Gen Co relies, first, on the warranty given in clause 14.1 of the SPA:
- “No Group Company is party to or subject to any material agreement, arrangement, obligation or commitment except the Contracts.”
840. “Contracts” are defined in § 1.1 of the SPA to mean the contracts specified in Schedule 6.
841. Toucan Gen Co alleges that the compromise agreements were material agreements or arrangements so as to fall within warranty 14.1, but were not disclosed prior to Toucan Gen Co entering the SPA.
842. The Claimants' Reply also alleges a breach of warranty 14.3:

“14.3 In relation to each Contract for the relevant Subsidiaries, they are legally binding on the Subsidiaries and, so far as the Seller is aware on the other parties to them and are in full force and effect. Each of the Contracts is valid and binding and has been complied with in all material respects by the relevant Group Company and all payment obligations thereunder have been fulfilled (in full) by that Group Company by the applicable contractual due date where the contractual due date was on or before the date of this Agreement. So far as the Seller is aware, there are no events or circumstances likely to give rise to the termination, rescission, avoidance or repudiation of any of the Contracts and no notice of termination or of intention to terminate has been given or received in respect of any of them.”

843. Toucan Gen Co also alleges that the compromise agreements represented a breach by the SPVs of the obligation in clause 31.5.1.2 of Facilities Agreement 1 (or the corresponding provision on Facilities Agreement 2) to “*ensure (so far as this is within its control) that each other party to a Project Document complies with its material obligations under that Project Document*”: the other party here being Abakus and the Project Documents the Abakus EPC Contracts. (The Claimants’ Reply also makes reference to condition 32.4.1 of Facilities Agreement 1, but the relevance of that provision is unclear and no such case was advanced at trial.)

844. By reason of that alleged breach, Toucan Gen Co claims an indemnity under clause 11.1.3 of the SPA:

“11.1 The Seller shall indemnify and hold the Purchaser harmless against any Losses and Expenses arising in relation to:

...

11.1.3 any breaches occurring on or before the date of this Agreement, of the Facility Agreement and/or any agreements entered into in connection with the Facility Agreement...”

845. The Defendants rely on the disclosure provisions in the SPA Schedule 5 § 2.1:

“The Seller shall not be liable in respect of a Claim (save for any Claim under the Tax Deeds) to the extent that such Claim, or its subject matter, arises from or in connection with, or consists of, any fact, matter or circumstance which has been Disclosed.”

846. “*Claim*” is defined in Schedule 5 § 1.3:

“1.3 For the purposes of this Schedule, except where expressly provided otherwise “*Claim*” includes any claim against the Seller arising out of or in connection with:

1.3.1 Warranties; and/or

1.3.2. the Tax Deeds.”

847. Further relevant definitions are provided in SPA § 1.1:

““Disclosed” means fairly disclosed (with sufficient details to enable a reasonable purchaser to identify and reasonably evaluate the nature and scope of the matter disclosed) by the Disclosure Documents (and "Disclosure" shall be construed accordingly);

"Disclosure Documents" means the Disclosure Letter and the DVD-rom(s) copy (or copies) of the Data Room collated by or on behalf of the Seller, the index for which will be agreed and signed for identification as soon as reasonably practicable after Completion between the Seller and Purchaser (each acting reasonably) on the basis that the index will include all documents to [sic] which the Purchaser and its advisers have accessed prior to the date of this Agreement and for the avoidance of doubt shall not include those underlying documents reported on in the

Certificates of Title or any other documents relating to real estate or planning”.

(3) Disclosure by Wircon UK and Wircon Germany

848. Wircon UK and Wircon Germany rely on two documents in support of the contention that the compromise agreements were properly disclosed in accordance with the provisions of the SPA.

849. The first is the “Q&A” spreadsheet prepared by CMS during the due diligence process undertaken as part of Toucan’s acquisition of the Wirsol portfolio (the “*Q&A Spreadsheet*”). The spreadsheet contains a separate sheet for each of the sites, with a column for questions raised by Eversheds (acting for Toucan) and for responses by CMS. The relevant sheet for each of the Abakus Sites contains an exchange in relation to liquidated damages. Taking the content of the Upper Wick sheet as an example (with CMS’s responses shown in bold):

“If the Time for Completion was not met, please confirm whether any liquidated damages were claimed from the Contractor.

Yes damages claimed and agreed with EPC contractor

Please confirm the value of the liquidated damages claimed. Please also confirm whether these have been paid by the EPC contractor to the SPV.

See below, answered in Q35 = £76,781 was claimed and yes all invoices paid

Was this claimed in relation to the failure to meet the Time for Completion only or is this the total amount of liquidated

damages claimed in relation to the failure to meet both the Target Commissioning Date and the Time for Completion?

The LD's were for PAC Delays”

850. The relevant content is substantially the same for each of the four Abakus Sites, save that the sheet relating to Trowle does not expressly state that the invoices were in fact paid (in response to the second question above).
851. The second document is the Taking Over Certificate issued in respect of Mill Farm on 7 February 2017, which was signed on behalf of Abakus. The relevant provisions of the certificate are as follows:

“IV. By countersigning this Taking-Over Certificate, the Contractor acknowledges and agrees that:

- a. an amount of £63,000 will be deducted from Payment Milestone 9 to take into account an amount of Delay LDs [i.e. liquidated damages] due from the Contractor to the Employer [i.e. WEL Solar Park 10 Limited, the SPV in relation to the Mill Farm site];

...

VI. This Taking-Over Certificate and the terms set out herein are not intended to release the Contractor from any of its obligations under the EPC Contract, nor shall it be interpreted as a waiver of the duties therein. The Employer reserves all its rights under the EPC Contract.”

852. It was not disputed that each of these documents was included in the “*Data Room*” and accessed by Toucan or its advisers such that they were “*Disclosure Documents*” for the purposes of the SPA provisions set out above. The Taking Over Certificates in respect of the remaining three Abakus Sites, however, were not Disclosure Documents.

(4) Discussion

853. As a preliminary point, despite the Defendants’ apparent concession, I am not persuaded that agreements by which claims were compromised with a counterparty well before the SPA fall within warranty 14.1. Though the SPVs could in a literal sense still be regarded as parties to them, they were fully performed contracts and probably not material for the purposes of the transaction or warranty 14.1.
854. In any event, Wircon UK and Wircon Germany say there was sufficient disclosure, submitting that the Q&A Spreadsheet and the Mill Farm Taking Over Certificate clearly refer to the amount agreed to be payable in respect of the Abakus Delay Liquidated Damages which, under the EPC Contracts, had to be paid before Taking Over could be achieved. There could be no doubt that the sum identified in the two documents was the total sum of the damages agreed to be payable by Abakus. Taken individually and together, there is no fair reading of the documents that would have led Toucan Gen Co

to believe that there was a residual entitlement to claim further liquidated damages. This amounts to adequate disclosure for the purposes of the SPA.

855. Toucan Gen Co, on the other hand, submits that there was no such adequate disclosure, as the documents did not make clear that sums claimed for the Abakus Liquidated Damages were significantly less than the SPVs' entitlement under the applicable EPC Contracts. The impression given by the documents relied upon, it is said, is that SPVs were receiving the full amount of their entitlement to liquidated damages, rather than compromising on a lesser amount. Further, the Mill Farm Taking Over Certificate states expressly that it is "*not intended to release [Abakus] from any of its obligations under the EPC Contracts*", which, Toucan Gen Co submits, indicates that the sum payable by Abakus was not in fact a binding compromise of the liquidated damages that would otherwise be due.
856. The key question is essentially precisely what is required to be "*fairly disclosed (with sufficient details to enable a reasonable purchaser to identify and reasonably evaluate the nature and scope of the matter disclosed)*". Specifically, is it necessary (as Toucan Gen Co submits) that the documents disclose not only the sum Abakus agreed to pay, but also details of the full value of the liquidated damages entitlement to enable the reasonable purchaser to identify that the sums agreed represented a significant discount?
857. I do not accept that there was any such requirement. It was clear from the Q&A Spreadsheet that the SPVs had reached an agreement with Abakus as to the amount of liquidated damages payable. The Q&A Spreadsheet said so in express terms. The questions posed in the Q&A Spreadsheet were clearly directed at eliciting whether any such agreement had been reached.
858. This position is strengthened by the Taking Over Certificate for Mill Farm (although, even putting this document aside, I consider that the position is sufficiently clear from the Q&A Spreadsheet alone). The Taking Over Certificate records an agreement to ascribe a value to the Abakus DLDs payable, which is the very subject matter of the compromise agreements. These disclosures were sufficient to enable the reasonable purchaser to evaluate the nature and scope of the SPVs' position in relation to the Abakus DLDs.
859. Nor do I consider that this conclusion is altered by the second point raised by Toucan Gen Co, regarding the reservation of rights in the Taking Over Certificate. As Wircon UK and Wircon Germany point out, it was a requirement of the Taking Over process for the amount of the liquidated damages to be set and paid. Toucan Gen Co must have appreciated, on reading the certificate, that this amount would have been paid by Abakus to allow the Taking Over of the sites to go ahead. If any doubt did remain, it would have been removed by the Q&A Spreadsheet, which clearly confirmed that the amount of liquidated damages had been claimed, agreed, and (in respect of all but one of the sites) paid. There was in my judgment no breach of warranty 14.1.
860. The Claimants' apparent alternative claim based on warranty 14.3 was alluded to in the introductory section of their written opening submissions, but not thereafter developed either in those submissions, at trial, or in the Claimants' written closing submissions. In any event, it does not appear to me that any claim based on that warranty could be made out (quite apart from the question of disclosure). The compromises with Abakus

did not mean that any of the EPC Contracts had ceased to be binding on the SPVs or on Abakus, or had ceased to be in full force and effect, nor that any relevant Group Company had failed to comply with them or with any payment obligations thereunder.

861. Turning finally to SPA § 11.1.3, the Claimants say § 31.5.1.2 of the Facilities Agreement required the SPVs to ensure that Abakus complied with its obligations under the EPCs, including as to DLDs. The compromise agreements were in breach of that clause, and resulted in an Event of Default under the Facilities Agreement. The Claimants accordingly claim by way of indemnity the difference between the DLDs accrued and the amount recovered from Abakus.
862. Leaving aside the question of whether the compromise agreements did or did not constitute a breach of the Facilities Agreements, the Claimants' claim is hopeless in principle. Clause 11.1.3 obliges the sellers to "*indemnify and hold the Purchaser harmless against any Losses and Expenses arising in relation to...any breaches ... of the Facilities Agreement...*". Any breach of the Facilities Agreement has given rise to no loss. The type of loss that would flow in the ordinary course from a breach of the Facilities Agreement would be loss flowing from the exercise by the bank of its rights or remedies under that Agreement. No such loss has occurred. Clause 11.1.3 does not confer a right of recovery for a matter which is alleged to have caused loss entirely independently of it having constituted a breach of the Facilities Agreement.

(V) THE OUTWOOD OPTION

863. This is a further claim under which Toucan Gen Co claims damages from Wircon UK and Wircon Germany for breach of warranty under the SPA. The claim here relates to an option held by the Outwood SPV to take a lease over a second plot of land adjoining the Outwood site (the "*Outwood 2 Site*") for the purposes of developing an additional solar park on that land (the "*Outwood Option*").

(1) Background

864. The Outwood Option was granted in favour of the Outwood SPV, then called MSP Outwood Limited and owned by Island Green Power UK Limited, pursuant to an agreement dated 16 July 2015 (the "*Outwood Option Agreement*").
865. Wirsol purchased the Outwood SPV (and, as a result, the Outwood site) from Island Green Power on 30 October 2015. Island Green Power wished to retain the Outwood Option; this was achieved by its assignment by the Outwood SPV to another company, IGP Solar PV Plant Number 2 Limited, on 26 October 2015. The assignment took place before the Outwood SPV came into Wirsol's ownership (and approximately eighteen months before the portfolio sale to Toucan Gen Co).
866. Subsequently, Wirsol was itself able to develop a new solar park at the Outwood 2 Site as a result of a separate option granted by the site's landlord at a later stage. Wirsol's later development and exploitation of the Outwood 2 Site appears to have been a source of significant dissatisfaction to Toucan Gen Co.

(2) Toucan Gen Co's claims

867. Toucan Gen Co has put its breach of warranty claim in a number of inconsistent ways, which I summarise below. As Wircon UK and Wircon Germany raised an issue at trial regarding the lateness of the changes in Toucan Gen Co's case, it is necessary to consider the different bases on which the case has been advanced.
868. First, in its original Particulars of Claim (at a time when it was not aware of the assignment of the Outwood Option), Toucan Gen Co alleged that Wircon UK and Wircon Germany were in breach of warranty 14.1 because the list of "*Contracts*" in Schedule 6 did not include the Outwood Option Agreement; that this agreement was a material agreement or arrangement within the scope of clause 14.1; and that, as a result of its non-disclosure, the Outwood Option was allowed to expire without being exercised, thereby denying Toucan Gen Co the chance to exploit the opportunity of developing the Outwood 2 Site as an additional solar park. The Defendants pleaded in response that the Outwood Option had been assigned in October 2015 as noted above, and so was not a disclosable Contract by the time of the SPA. The Claimants' Reply expressly made no admission in that regard; noted that the Outwood Option was referred to in a certificate of title for the Outwood site, and put the Defendants to proof of the fact and validity of the alleged assignment.
869. Secondly, at the start of trial Toucan Gen Co changed tack. By consent, it amended its pleadings so as to allege that the Outwood Option Agreement "*or any agreement to assign and assignment thereof*" were material agreements or arrangements required to be disclosed; and that, if the Outwood Option did not exist as at the date of the SPA, then "*the failure to disclose the said option and any agreement to assign and the assignment thereof in Schedule 6 meant that [Toucan Gen Co] paid for a non-existent asset and thus overpaid the SPA consideration by an equivalent sum*". Toucan Gen Co says that the commercial value of being able to develop the site upon exercise of the option shows why these agreements were material and should have been disclosed.
870. Thirdly, Toucan Gen Co sought to modify its position again at trial. It suggested that the Outwood Option was in fact included amongst the assets that Toucan Gen Co purchased under the SPA, by virtue of being identified in a number of documents produced as part of the SPA process; and that in those circumstances the non-disclosure of the assignment was "*materially misleading*". Toucan Gen Co claimed to be entitled to damages reflecting the difference between what it now claimed to have bargained for (a package of assets including the Outwood Option) and what it actually received. The Outwood Option is said to have been disclosed and formed part of the package of assets bought by reason of having been:
- i) referred to in the form of lease annexed as Schedule 8 to the lease for the main Outwood site (the "*Outwood Lease*"), which was itself a contract specified in Schedule 6 to the SPA and included in the Data Room;
 - ii) itself provided in the Data Room; and
 - iii) referred to in a certificate of title prepared by Stephenson Harwood in relation to the main Outwood site.

871. Toucan Gen Co on this basis sought to contend that as the Outwood Option was ‘shown’ in the Outwood Lease, it was a Contract specified in Schedule 6 to the SPA, to which warranties 14.2 and 14.3 applied. For ease of reference, those warranties provide:

“14.2 The copies of the Contracts, and any material variation to such Contracts, as contained in the Data Room are true and complete copies and, save as Disclosed, there have been no material variations to such Contracts.

14.3 In relation to each Contract for the relevant Subsidiaries, they are legally binding on the Subsidiaries and, so far as the Seller is aware on the other parties to them and are in full force and effect. Each of the Contracts is valid and binding and has been complied with in all material respects by the relevant Group Company and all payment obligations thereunder have been fulfilled (in full) by that Group Company by the applicable contractual due date where the contractual due date was on or before the date of this Agreement. So far as the Seller is aware, there are no events or circumstances likely to give rise to the termination, rescission, avoidance or repudiation of any of the Contracts and no notice of termination or of intention to terminate has been given or received in respect of any of them.”

872. Thus Toucan Gen Co now seeks to argue that Wircon UK and Wircon Germany accordingly warranted that the Outwood Option was valid and subsisting and capable of being exercised, whereas in fact it was not.

(3) Toucan Gen Co’s pleaded case

873. The Outwood Option Agreement and the assignment were in my view not material agreements or arrangements for the purposes of warranty 14.1. As the Defendants submit, the effect of the assignment was that the Outwood Option was an historic asset of the Outwood SPV that had been sold out of the corporate structure long before Toucan Gen Co came on the scene.
874. The evident purpose of warranty 14.1 is for Toucan Gen Co to understand any key contracts and agreements that could affect the operation of the SPV going forward. The warranty allows Wircon UK and Wircon Germany to disclose those contracts in Schedule 6 (or to rely on the overarching disclosure defence, as it has done for the Abakus DLDs), which in turn allows Toucan Gen Co to determine the agreements benefitting and burdening the SPVs it was purchasing. Warranty 14.1 cannot have been intended to cover all agreements that the SPV had ever been party to, even those that have been fully performed and could have no effect on the future operation of the SPV.
875. In any event, no loss would flow from any such breach of warranty 14.1. Any damages would be calculated so as to put Toucan Gen Co as purchaser into the position in which it would have been had the warranty been true. The position as warranted was (on this footing) that the SPV was not a party to, or subject to, the Outwood Option or the assignment. In those circumstances, the SPV would not have had the benefit of the option. No damages would therefore be payable.

876. Further, the allegation in the amended RRRAPoC makes no sense:

“If, as the Defendants allege, no such Option existed as at the SPA date, then the failure to disclose the said Option and any agreement to assign and the assignment thereof in Schedule 6 meant that RFE paid for a non-existent asset and thus overpaid the SPA consideration by an equivalent sum”

877. The premise of the pleaded claim is that the Defendants failed to disclose the Outwood Option Agreement or any assignment of it (or any agreement to assign it) in the list of Contracts in SPA Schedule 6. That does not mean Toucan Gen Co paid for a non-existent asset: rather, it suggests the opposite. No warranty was even arguably breached by non-disclosure of the Outwood Option Agreement or any assignment of it (or any agreement to assign it). Moreover, Mr Kavanagh accepted in cross-examination that he did not know about the Outwood Option Agreement before the SPA was concluded, and that he “*would not have factored the existence or otherwise of the option into [his] purchase price*”.

878. In these circumstances, there is no remotely arguable basis in Toucan Gen Co’s pleaded case for any damages based on the alleged value of the option.

(4) Toucan Gen Co’s proposed new case

879. Toucan Gen Co’s apparent proposed new case is fundamentally inconsistent with the case initially advanced. The original pleaded case is that the Option Agreement was wrongly not disclosed, leading Toucan Gen Co to fail to exercise it in time: because Toucan Gen Co was unaware of it. Toucan Gen Co now seeks to contend that it did know about the Outwood Option Agreement and paid for it. The new case seeks to turn the original case on its head, and I accept the Defendants’ submission that it is far too late for Toucan Gen Co now to seek to advance such a case. That is so *a fortiori* insofar as Toucan Gen Co appears now to seek to rely on not only warranty 14.1 but also warranties 14.2 and 14.3.

880. The proposed new case is in any event hopeless.

881. The Outwood Lease itself was a Contract listed in Schedule 6 to the SPA. Schedule 8 to the Outwood Lease was entitled “*Adjacent Site Lease*”, and set out the text of a form of lease in the same form as the draft lease attached to the Outwood Option Agreement. The Outwood Lease defined the “*Adjacent Site Lease*” as “*a lease of the Adjacent Site in the form attached at Schedule 8*”. It made reference to the Adjacent Site Lease only in a provision relating to “*Reserved Rights*”, which were excepted and reserved from the demise granted to the tenant under the Outwood Lease. The Reserved Rights included “*All rights granted in Schedule 1, Part II of the Adjacent Site Lease in so far as they relate to the Premises*”. The scheduled text of the Adjacent Site Lease envisaged that that lease would be granted pursuant to an option agreement between the landlords and the SPV. The text of the option agreement itself was not annexed to the Outwood Lease (or the form of Adjacent Site Lease in Schedule 8).

882. The fact that the Outwood Lease, a Schedule 6 Contract, made reference to a contemplated lease that might be granted over the adjacent site, and annexed the form in which any such lease would be granted, did not make either the Adjacent Site Lease

itself, or any option pursuant to which that lease were granted, into a Schedule 6 document. The Outwood Option Agreement formed no part whatever of the Outwood Lease, either in form or in substance.

883. Nor did the fact that the executed Outwood Option Agreement itself was included in the Data Room convert that agreement into a Schedule 6 Contract. The SPA drew a clear distinction between the voluminous items in the Data Room on the one hand, and the Schedule 6 Contracts on the other hand.
884. Equally, the reference to the Outwood Option Agreement in a certificate of title prepared for an earlier transaction did not make the Outwood Option Agreement a Schedule 6 Contract.
885. As a result, none of warranties 14.1., 14.2 and 14.3 could apply to the Outwood Option Agreement in any event. Nor is it remotely arguable that the existence of the Outwood Option Agreement and its assignment had the result that (contrary to the warranties) the Outwood Lease itself had been materially varied, was not valid and legally binding, or had not been complied with by the SPV.
886. I would accordingly have refused permission to amend, had such permission been sought, both on the ground of lateness and on the ground that the proposed new claim had no realistic prospect of success.

(5) Conclusion on the Outwood Option

887. For the reasons explained above, Toucan Gen Co's breach of warranty claim in respect of the Outwood Option fails.

(W) BREACH OF WARRANTY: DEFECTS

888. Toucan Gen Co alleges that Wircon UK breached warranty 14.3 of the SPAs by reason of the alleged defects (or failure to disclose them). It seeks to recover, under this head of claim, damages equivalent to the blight claim pursued by Toucan Energy (as assignee of the SPVs) against Wirsol under the EPC Contracts. The two claims effectively seek recovery of the same loss, at Toucan Gen Co/Wircon UK/Wircon Germany level (under the SPAs) and SPV/Wirsol level (under the EPC Contracts), as Mr Johnson in substance accepted in cross-examination.
889. For ease of reference, warranty 14.3 states (so far as relevant) that:
- “... Each of the Contracts is valid and binding and has been complied with in all material respects by the relevant Group Company... So far as the Seller is aware, there are no events or circumstances likely to give rise to the termination, rescission, avoidance or repudiation of any of the Contracts and no notice of termination or of intention to terminate has been given or received in respect of any of them.”
890. SPA Schedule 5 § 17.1 provides that “...*a matter is within the awareness, knowledge, information or belief of the Seller if it is within the actual knowledge and after due and*

careful enquiry in the context of [the SPAs] of Mark Hogan, Dr Peter Vest, Markus Wirth, James Richardson, Andrew Standing and Simon McCarthy.”

891. Each SPA also provides that a claim for breach of warranty cannot be sustained if such a claim arises from matters which either (a) have been “*Disclosed*” in accordance with the SPA’s disclosure provisions, or (b) are within the actual knowledge of Toucan Gen Co or its employees.
892. As to disclosed matters:
- i) SPA Schedule 5 § 2.1 provides that there can be no claim for breach of warranty “*to the extent that such Claim, or its subject matter, arises from or in connection with, or consists of, any fact, matter or circumstances which has been Disclosed*”;
 - ii) “*Disclosed*” is defined in § 1.1 as “*fairly disclosed (with sufficient details to enable a reasonable purchaser to identify and reasonably evaluate the nature and scope of the matter disclosed) by the Disclosure Documents...*”; and
 - iii) the “*Disclosure Documents*” are defined in § 1.1 by reference to the contents of the “*Disclosure Letter*” and associated DVD, which included all documents that the Purchaser (Toucan Gen Co) had accessed in the Data Room. The Disclosure Letter itself, which was agreed shortly after the SPAs were executed, referred to about 1,300 such documents, out of the 20,000 total documents in the Data Room.
893. As to the Purchaser’s actual knowledge, SPA Schedule 5 § 17.2 states:
- “The Purchaser shall not be entitled to make a Claim (other than a Tax Claim) after Completion in respect of any matter, fact or circumstance within the actual knowledge of the Purchaser and the Purchaser’s employees”
894. The Claimants claim that all the alleged defects gave rise to breaches of warranty 14.3, save for (a) the use of forced air cooling and (b) the capacity defects at Five Oaks, Newton and Outwood. That is presumably because the Claimants accept that those matters were Disclosed/within their actual knowledge. (For example, as to transformer capacity, Mr Kavanagh was shown in cross-examination an email exchange between Mr Baber of Toucan and Mr Richardson of Wirsol following Mr Baber’s site visits prior to signature of the SPAs. In the email Mr Richardson replied to Mr Baber’s question about performance at Trowse Newton by explaining: “*Inverters curtailed. Oversizing performance higher in summer months. Busbar sizing, transformer sizing.*” Mr Kavanagh accepted that this exchange showed that Mr Baber was informed about the inverter clipping at the sites and said that the email refers to “*transformer issues and oversizing performance questions*”.)
895. The Defendants contend that, even to the extent I have found defects to exist, the warranty claim is misconceived insofar as it is based on the design of the transformers or the design of the substations to prevent humidity and/or water ingress, since these matters were Disclosed and/or known to the Claimants. The EPC Contracts for each of the SPVs were Disclosed. Schedule 8 (“*Contractor’s Proposals*”) of the EPC Contracts

set out the capacity of the transformers, the numbers of inverters and their ratings. If the combination of this equipment was defective then this would have been apparent on the face of the EPC Contracts. The Claimants must be assumed to have read the EPC Contracts and enclosures, which were included within the Data Room index on that very basis, and so also had knowledge of the matters within Schedule 8.

896. Further, the Defendants say the design of the transformer substations, including the intake and exhaust vents giving rise to water ingress issues and the potential impact of those factors upon the substation interiors, was readily apparent to Mr Baber of Toucan, who conducted site visits to the affected solar parks on behalf of Toucan Gen Co in April 2017.
897. As to transformer and busbar capacity, the sites where I have found a lack of capacity and where a warranty claim is made are Moor House (TX1) and Wilbees. I am not persuaded that disclosure of the EPC Contracts including the transformer capacities, numbers of inverters and their ratings amounted to fair disclosure within the definition quoted above of “*Disclosed*” of the fact that, in operation at the sites and given the connection agreements with the DNOs, those transformers and busbars lacked capacity. The evidence also does not establish actual knowledge of the Purchaser of those defects.
898. Equally, I am not persuaded that the inspection of the sites carried out by Mr Baber, which resulted in fairly brief summary reports on each one, gave the Purchaser actual knowledge of the other defects I have found to exist or which are now common ground. I therefore conclude that there was, to that extent, a breach of the warranty that the EPC Contracts had been complied with in all material respects.
899. For completeness, the Claimants suggested in opening that they could rely on Schedule 5 § 12.2:

“Exclusions from clause 12

12.2 Notwithstanding any other provision of this Agreement, the provisions of this Clause 12 and Schedule 5 (*Limitation of Seller's liability*) shall not apply to any claim made against the Seller in the case of fraud.”

Mr Cogley QC, for the Claimant, submitted that since Mr Hogan knew of the Defendants’ breaches of the EPC, he knew that the warranties given by the Defendant in the SPA were untrue, and that that constituted “*fraud*” within this provision. As a result, the protections set out in Schedule 5, including the provisions relating to “*Disclosure*” and actual knowledge, were disappplied.

900. However, the Claimants’ Statements of Case contain no allegation of fraud, nor that clause 12.2 applied. It is, moreover, notable that whilst EPC Contract § 17.6 includes an exception for ‘fraud’, the Claimants’ Statements of Case, whilst alleging deliberate default and gross negligence, make no allegation of fraud.
901. In any event, the Claimants’ proposed contention is hopeless. The relevant protections in SPA Schedule 5 apply where a matter either has been “*fairly disclosed (with sufficient details to enable a reasonable purchaser to identify and reasonably evaluate the nature and scope of the matter disclosed) by the Disclosure Documents...*”, or

where it is within the actual knowledge of the Claimant or its employees. In either case, it is impossible to see how the Defendant could have been fraudulent by reason of its (alleged) knowledge of the breaches.

902. Given my conclusion on the blight claim, I find that the Claimants have not established any loss flowing from the breach of warranty over and above the remedial costs arising from the relevant defects. The Defendants are liable to Toucan Energy, as assignee of the SPVs' claims, for those remedial costs pursuant to my earlier conclusions. It was not of course suggested by the Claimants that Toucan Gen Co and Toucan Energy could both pursue claims derived from the same loss, thus doubling the Defendants' liability for the defects. Moreover, to the extent that the SPVs had causes of action against the Defendants for the relevant defects, it is unclear what loss flows from the breach of warranty in any event. But for the assignment of their claims to Toucan Energy (for which the Defendants are not responsible), the SPVs could have recovered from the Defendants and remedied the defects, leaving Toucan Gen Co in the position it would have been in but for the breach of warranty. Since this point was not canvassed at trial, I shall invite further argument about it. It seems clear that the loss cannot be double counted. What is open to debate is whether Toucan Gen Co can, subject to avoiding double recovery, claim damages for breach of warranty measured in the same way as the SPVs' claims for the cost of remedial work.

(X) THE ALE CLAIMS

(1) Introduction

903. Wirsol counterclaims £6,405,820.80 pursuant to a contract set out in a letter dated 25 May 2017 headed "*Asset Life Extension Payment*" ("**the ALE Contract**"). The ALE Contract provided for sums to be payable to Wirsol if it obtained asset life extensions, as defined, in relation to some or all of the solar parks and also procured the satisfaction or waiver of a list of conditions subsequent.
904. The Claimants deny that any sum is due under the ALE Contract. They contend that one of the conditions subsequent was not satisfied, and that Wirsol in any event failed to obtain asset life extensions complying with the ALE Contract.

(2) Relevant provisions

905. The ALE Contract is between Toucan Gen Co, Toucan Energy and Wirsol. Clause 1 cross-refers to the two SPAs by which Toucan Gen Co acquired the Topcos, and adopts the definitions used in one of them.
906. Clause 2 provides:

"The Purchaser agrees and authorises Wirsol Energy Limited ("WEL") to use all reasonable endeavours (A) to seek an Asset Life Extension (as defined in paragraph 10 below) for each of the Projects listed in the schedule to this deed on behalf of Subsidiaries and (B) satisfy the Conditions Subsequent, in each case prior to 31 December 2017 (the "Asset Life Extension End Date")."

907. As to limb (A) of Wirsol’s obligations, clause 10 defines “*Asset Life Extension*” as:

“the extension of the asset life of a Project from its asset life as at the date of this deed... by a minimum of five years, as evidenced by the following:

(a) an extension of the term of the lease of the Property (or option to obtain an extension of the relevant lease or a lease option in respect of such Property...) and any rights necessary and ancillary to the relevant lease or lease option... (in each case, a “Property Variation”), in a form satisfactory to the relevant Subsidiary (acting reasonably), with the relevant landlord which the landlord has confirmed in writing to the relevant Subsidiary that he will execute and deliver subject only to the receipt of the counter-signature by the relevant Subsidiary to such lease extension or option;

(b) all information required by the Purchaser to register the relevant Property Variation at HM Land Registry...; and

(c) a copy of up to date planning permissions in connection with the ongoing operation, maintenance and decommissioning of the Project allowing... for an electricity generation period which extends asset life of the Project as at the date of this deed... by an additional five years.”

908. As to limb (B) of Wirsol’s obligations, the “*Conditions Subsequent*” are defined as the conditions set out in Schedule 2 to the ALE Contract.

909. Schedule 2 is headed:

“BAYERISCHE LANDESBANK / PROJECT WIRSOL

Conditions Subsequent in accordance with the Facilities Agreement
Status as at: 24 May 2017”

and notes that:

“All paragraph, Clause and Schedule references are to the relevant paragraph, Clause or Schedule of the Facilities Agreement.

Unless otherwise defined in this Checklist, terms used in this Checklist have the meanings given to them in the Facilities Agreement.”

910. Schedule 2 then reproduces the checklist in table form of 55 Conditions Subsequent attached to Facilities Agreement 1, as at 24 May 2017. The Conditions Subsequent primarily consist of requirements to deliver certain documents to BLB.

911. Condition Subsequent 49 (“*CS 49*”) states:

“Each ProjectCo [i.e. SPV] shall procure delivery to the Agent [i.e. BLB] of a certified true copy of each Final Acceptance Certificate within ten (10) Business Days of the date of issue”.

The checklist allocates responsibility for this item to the Borrower, and states the “*Delivery Date*” as:

“10 Business days from the date of issue of the Final Acceptance Certificate (2 years after the PAC [Provisional Acceptance Certificate])”

and in the “*Status*” column says:

“Outstanding (not yet due)”

912. The latter entry reflects the fact that the need to satisfy CS49 under the Facilities Agreement would arise only once the Final Acceptance Certificate had been issued, which would (as the preceding entry noted) occur only two years after the Provisional Acceptance Certificate. As at the date of the ALE Contract, this could for most sites not occur until mid 2019 at the earliest.

913. Clauses 7, 9 and 13 provide as follows:

“7. ... The Guarantor undertakes to pay to WEL... within 10 Business Days of the later of (i) the Payment Date and (ii) receipt of a valid invoice issued to the Guarantor from WEL an amount equal to the greater of (a) £2,000,000; and (b) the aggregate value of each of the Asset Life Extension Amounts for each Asset Life Extension received by the Asset Life Extension End Date.

...

9. If all the Conditions Subsequent have not been satisfied in accordance with this deed by no later than 30 June 2018 then WEL shall not be entitled to any payment under this deed.

...

13. “Payment Date” means the later of (i) 31 December 2017 and (ii) the date that all the Conditions Subsequent have been (i) satisfied or (ii) waived by [BLB] and by the Guarantor [i.e. Toucan Energy] (acting reasonably).”

914. As at the date of the ALE Contract, it was already clear that Final Acceptance could not occur in relation to any site before 30 June 2018.

915. Clause 16 provides:

“Save as expressly modified herein, Clauses 18 (*Confidentiality*), 19 (*Assignment*), 20 (*Variation*), 21 (*Invalidity*), 22 (*Costs and Expenses*), 24 (*Entire Agreement*), 25 (*Counterparts*), 26 (*Time of the Essence*), 27 (*Notices*), 29

(*Governing Law and Jurisdiction*) of SPA1 shall apply to this deed mutatis mutandis, save for any reference to the Seller shall be construed as a reference to [Wirsol] and any reference to the Seller’s Guarantor shall be disregarded.”

916. Clauses 20.1 to 20.3 of the SPA provide:

“No waiver by omission, delay or partial exercise

20.1 No right, power or remedy provided by law or under this Agreement shall be waived, impaired or precluded by any delay or omission to exercise it, by any single or partial exercise of it on an earlier occasion, or by any delay or omission to exercise, or single or partial exercise of, any other such right, power or remedy.

Specific waivers to be in writing

20.2 Any waiver of any right, power or remedy under this Agreement must be in writing and may be given subject to any conditions thought fit by the grantor. No waiver will take effect if the person seeking the waiver has failed to disclose to the grantor every material fact or circumstance which (so far as the person seeking the waiver is aware) has a bearing on its subject matter. Unless otherwise expressly stated, any waiver shall be effective only in the instance and only for the purpose for which it is given.

Variations to be in writing

20.3 No variation to this Agreement shall be of any effect unless it is agreed in writing and signed by or on behalf of each Party

917. Clause 31.23 (“*Conditions Subsequent*”) of the Facilities Agreement provided *inter alia* that:

“31.23.1 Each ProjectCo shall procure delivery to the Agent of:

...

31.23.1.1 a certified true copy of each Provisional Acceptance Certificate within five (5) months of the date of this Agreement (other than in the case of Project Wrea Green, in respect of which Wrea Green ProjectCo shall procure the delivery of the same within ten (10) Business Days of the date of issue);

31.23.1.2 a certified true copy of each Final Acceptance Certificate within ten (1) Business Days of the date of issue;

...”

918. Clause 31.23.1.1 above may be viewed as requiring the solar parks to have reached a certain stage of construction by a certain date, as the deadline (except for Wrea Green) ran from the date of the Facilities Agreement. Clause 31.23.1.2 was different, as the obligation was merely to provide a copy of the Final Acceptance Certificate within a certain period from its issue. Separately, § 32.22 of the Facilities Agreement made it an Event of Default if, for any site, the Final Completion Certificate was not issued within 2 years and 3 months from the date of the Provisional Acceptance Certificate.
919. Clause 31.23.1.1 of the Facilities Agreement is reflected in CS 46 in the Schedule to the ALE Contract, which notes in the “*Status*” column that the Provisional Acceptance Certificates had already been provided for most sites and that the certificate for Wrea Green was expected to be issued on 1 July 2017. Clause 31.23.1.2 was reflected in CS 49, quoted above.
920. Clause 45.2.1 of the Facilities Agreement provided that:
- “Subject to Clause 45.3 (*Exceptions*) any term of the Finance Documents [which included the Facilities Agreement itself] may be amended or waived only with the consent of the Majority Lenders and the Borrower and any such amendment or waiver will be binding on all Parties.”

(3) Facts

921. An early draft of the ALE Contract was proposed by the Defendants’ financial advisor, Mr Simon Middleton, in April 2017. A draft agreement was sent by Mr Currier of CMS to Mr Hussey of Eversheds, and others, on 20 April 2017. This version did not refer to conditions subsequent. It already contained a clause incorporating by cross-reference §§ 14-18, 20-23 and 25 of the SPA.
922. On 17 May 2017, Mr Hogan forwarded Mr Kavanagh a summary of his understanding of the proposed deal, noting that “*Rockfire reduced the initial consideration by £2m, this was accepted on the basis of the following:- Lease Extension Agreement has a minimum payment of £2m (even if unsuccessful on all projects)*” .
923. Similarly, on 18 May 2017, Mr Currier emailed Mr Hill and Mr Hussey, copying in Mr Kavanagh, stating his understanding that “*the commercial deal is that WEL always receives a minimum of £2m, whether it is successful in negotiating an extension or not*”. On 19 May 2017, Mr Middleton emailed Mr Kavanagh and others stating that “[a]s currently set out Rockfire will pay just over £57m at FC, of which £7m goes into Escrow and another £2m will be paid later in respect of the Lease Extension...”. The same point is reflected in a later internal email, on 13 November 2017, in which Mr Croucher of Toucan stated to Mr Williams that he “*assume[d] we are expecting to pay the £2m*”, and that as he understood it the minimum payment “*was [linked] to the price chip to delay the £2m being paid out*”.
924. The provisions of the ALE Contract relating to conditions subsequent, including the relevant parts of what became clauses 9 and 13 quoted earlier, appear to have been inserted at a very late stage. Mr Hogan said in cross-examination that they were added at midnight on 24 May 2017, the day before the ALE Contract was signed. He said:

“The reason [Mr Kavanagh] wanted the CSs to be included was because under the facilities agreement further distributions could not be made until the CSs were satisfied.”

Mr Hogan said Toucan wished Wirsol to fulfil the conditions because Wirsol was in a better position to do so given its knowledge of the sites. He added that he did not believe any party had really thought through their ramifications.

925. Mr Kavanagh’s evidence in his witness statement was that:

“[t]he conditions subsequent principally related to the matters arising under the EPC Contracts and OMs and I wanted to make sure RFE’s investment under the SPA was preserved by them being properly and promptly closed out. Incorporating the conditions subsequent under the Banking Facilities to the ALE was a sensible way of approaching this.”

926. The Schedule to the ALE indicates that there were, by the time the ALE was signed, six outstanding conditions subsequent in relation to Facilities Agreement 1. The evidence of both parties is that, due to a drafting mistake, the ALE Contract omitted to include the corresponding schedule of conditions subsequent for Facilities Agreement 2; and the parties appear to have proceeded on the basis that those too comprised conditions subsequent for the purposes of the ALE Contract. There was a longer list of outstanding matters in relation to Facilities Agreement 2. The conditions subsequent in the two lists related to a variety of matters including provisions in site leases, planning conditions, connection agreements, and perfection of BLB’s security by the provision of consents from EPC Performance Bond providers to assign the bonds to the Security Trustee by way of security. In the Facilities Agreement 1 schedule, CS46 (as noted earlier) concerned the supply to the facility agent of Provisional Acceptance Certificates by stipulated dates, but the Schedule indicates that only the PAC for Wrea Green remained outstanding and that was expected to be issued on 1 July. CS49 in the Facilities Agreement 1 schedule, but which had no counterpart in the schedule relating to Facilities Agreement 2, was an obligation to provide FACs to the facility agent within 10 days of their respective issue. However, it was clear from the outset that that condition could not possibly be satisfied by the 30 June 2018 deadline stated in § 9 of the ALE Contract.

927. It is difficult to see how the commercial rationale of the inclusion as conditions subsequent in the ALE Contract of CS 46 and 49 relating to Facilities Agreement 1 went beyond than that identified by Mr Hogan, namely to incentivise Wirsol to ensure that the conditions subsequent *in the Facilities Agreements* were promptly satisfied. Indeed, in one of his answers in cross-examination Mr Kavanagh appeared to accept this:

“Q. ... My question to you is, its right, isn't it, condition subsequent 49 does not purport to impose an obligation to comply with the EPC contracts or O&M agreements, generally?

...

A. ... What I was saying is that the context of the ALE document has these conditions subsequent in it for purposes of compelling Wirsol to ensure that they carry out all of their obligations to do with the banking facility. I go back to my original point, which is it was always implied within the ALE these matters would be closed out in accordance with that schedule. So I don't agree with your version of that. I don't know what more I can say about that."

928. Mr Kavanagh went on to state that the positions of BLB and Toucan were "*slightly different in that commercial matrix*". The fact that any waiver had to be given both by BLB and by Toucan Energy supports that view. However, it is unclear what difference existed save perhaps to the extent that Toucan Energy might have some specific and (given the reasonableness requirement) legitimate reason to wish one of the conditions subsequent in the Facilities Agreement to be satisfied rather than being waived.
929. Mr Hill of Eversheds suggested in his witness statement that the conditions subsequent annexed to the ALE Contract were "*principally related to matters arising under the EPC Contracts and O&Ms*", and Toucan Energy would not wish to be bound to pay under the ALE Contract if, for example, Wirsol breached the EPC Contracts. However, he accepted in cross-examination that nothing in the ALE Contract made it a condition that Wirsol comply with the EPC Contracts or O&M agreements.
930. The ALE Contract was signed on 25 May 2017.
931. Over the ensuing months, there were discussions of a potential waiver of CS49. It was initially proposed that the corresponding condition in the Facilities Agreement be replaced by an undertaking from Toucan to BLB. On 16 October 2017 Ms Lim of Eversheds (acting for BLB) distributed a draft waiver letter incorporating an undertaking by Toucan "*to procure delivery to the Agent of a certified true copy of each Final Acceptance Certificate within ten (10) Business Days of the date of issue.*" The draft letter referred to the Facilities Agreement and was to be signed by the parties to that agreement i.e. BLB, the Toucan 'Holdco' and 'Topco' as borrowers, and the relevant SPVs as guarantors.
932. However, on 25 October 2017 Ms Burns of CMS reported to Mr Hogan that:
- "After chasing Eversheds (Rockfire) and Gowlings in relation to a number of matters on their side of the fence, including the proposed waiver letter to be signed by BLB and Rockfire in respect of the FACs (draft waiver letter attached), we have been informed by today by Gowlings that Rockfire would prefer the requirements to deliver the FACs to remain an ongoing condition subsequent. No reason has been provided other than an indication that this is a commercial decision on the part of Rockfire and that any concerns on our part should be picked up directly with Rockfire."
933. On 26 October 2017, Mr Currier of CMS emailed Mr Hogan and the CMS team with a proposed solution. He identified other provisions in the Facilities Agreement which he considered meant BLB had all the information rights and control they needed, even if

CS49 were waived, and without the need for an undertaking from Toucan. These were, in particular, an express right to require the borrower to provide all such information in relation to the transaction documents as the facility agent reasonably required (clause 29.6.1), and clause 31.15.4: *“None of the Obligors shall agree to issue, or agree to the deferral of issue of, the Final Acceptance Certificate or any similar certificate of completion under the relevant EPC Contract without the approval of the Agent acting reasonably and in consultation with the Lender’s Technical Adviser”*.

934. Mr Hogan forwarded Mr Currier’s email to Ms Schramm of BLB, stating:

“... in relation to BLB unilaterally dropping the requirement for the FCA CS, it would seem that you are able to and moreover, you are completely covered in the facilities agreement per the mail and terms below. This matter is “uber” important to me, and something that I really need to quash ASAP – once again your help is appreciated. I am not copying anyone else as I’d rather leave it to you to determine the best route of communication, nevertheless, feel free to forward both internally and to [Eversheds]. Thank you.”

935. Ms Lim of Eversheds responded on 27 October 2017 indicating that she believed that “we/BLB” had already agreed to waive CS49 against an undertaking to deliver the FACs on the same timing. Mr Hogan replied the same day explaining that that was not possible because Rockfire had said they preferred it to remain as a condition subsequent. He added that *“Rockfire see this as an opportunity for us not to be in a position to fulfil the CS requirements by the longstop date of our ... ALE agreement (long stop being 30th June 2018) which would mean payment would be rendered null and void.”* He added that BLB was fully protected already, and that one of the two facilities agreements did not contain CS49 at all. Mr Hogan said Wirsol might have an argument that Toucan could not insist on something that was not possible to implement within the stated timescale, but that would require litigation. He saw the only solution as being for BLB “unilaterally” to drop CS49, and said he was *“seeking (hoping) for a solution that does not involve Rockfire’s consent, as I know I will struggle to obtain it”*. Both emails were copied to Ms Schramm and Ms Webb of BLB.

936. It appears that Mr Hogan thereafter spoke to Ms Schramm and succeeded in reassuring her that BLB could safely waive CS49 without requiring an undertaking from Toucan, in light of the protection afforded to BLB by the provisions identified by Mr Currier on 26 October 2017. At 18:36 on 31 October 2017, Mr Hogan emailed CMS as follows:

“Seek solution to the FAC CS - Action Mark

I have spoken with BLB and they are happy to accept dropping the CS without an undertaking from the borrower (important point and the[y] understand the commercial sensitivity).

Now it is more a question of mechanics, we have agreed the following steps:-

MH [Mr Hogan] will write to BLB / EVS to agree the language and that they can sign-off

Upon agreement on point 1 – MH will write to BLB / EVS with RFC / CMS in copy citing the signed ALE and that WEL [Wirsol] are authorised by the Purchaser to satisfy both (A) and (B) below [clause 2 of the ALE Contract], specifically the Conditions Subsequent in each case prior to 31st Dec

BLB will respond giving said confirmation

CMS will seek waiver of said CS via Gowlings who will struggle to resist given that the bank do not need an undertaking.

...”

937. It is apparent from the last sentence that Mr Hogan by this stage understood that a waiver from BLB alone was insufficient, and that Toucan also had to be approached for a “waiver” via Gowlings. However, he evidently considered that once BLB had confirmed that it would waive CS49 under the Facilities Agreement, Toucan would – presumably in the light of their express obligation to act reasonably in this regard under the ALE Contract – ‘struggle to resist’ giving a waiver themselves.
938. Later the same evening, 31 October 2017, Mr Hogan sent Ms Schramm proposed wording for an email, drafted by CMS, to be sent to her and Mr Mangat of Eversheds (acting for BLB) formally the next day. The draft email indicated that it would attach a copy of the ALE Contract for reference. Mr Hogan asked Ms Schramm to review the proposed email with Mr Mangat and “confirm acceptable (in some fashion)”.
939. At 9.43am on 1 November 2017, Mr Hogan emailed Ms Schramm, copying in “ops@RockfireEnergy.com”, the CMS team, the Eversheds (BLB) team, Ms Webb of BLB, and several Wirsol personnel. The subject heading of the email was “Asset Life Extension – WEL45 facilities Agreement – Condition Subsequent Waiver Request”. The email stated as follows:

“Dear Karin –

I am writing to you as we are in the process of meeting our obligations under the Asset Life Extension (“ALE”) document that has been agreed between RFE Gen Co Ltd. (the “Purchaser”) and Wirsol Energy Ltd (“WEL”), as we discussed previously. Whilst I am not attaching the ALE, per the agreement the Purchaser agrees and authorises WEL to use all reasonable endeavours to seek an asset life extension to the projects AND satisfy the conditions subsequent (“CS”) prior to 31st December 2017.

I draw your attention to a specific CS regarding obtaining FAC on the WEL45 portfolio whereby the CS cannot be satisfied by 31st December 2017 given PAC only occurred during the summer of 2016. We also note that FAC is not required as a CS within the subsequent WEL60 portfolio. We are still at a loss as to why FAC would be a CS given that the bank are protected in multiple ways, namely –

- The EPC contract has a specific requirement to deliver FAC
- The EPC contract has an on-demand bond attached until FAC is achieved
- Furthermore clause 29.6.1 and 31.15.4 of the facilities agreement give BLB all the necessary protections required.

These have been discussed previously and Rockfire (via Gowlings) do not wish to give an undertaking for the delivery of FAC on the WEL 45 portfolio... Therefore, in the capacity of having the authority to make the request for a full and final waiver of this specific CS, per the ALE, we hereby request that Bayern LB confirm approval for dropping the requirement for said waiver without any further undertakings of the Borrower. Would you please confirm at your earliest convenience – all parties are copied accordingly?

Thank you for your attention to this matter.

Kind regards,

Mark Hogan”

940. At 9.47am on 1 November 2017, Ms Schramm replied to all recipients as follows:

“Mark,

Fine for BayernLB.

Best regards

Karin

Sent from my iPhone”

941. At 10.42am on 1 November 2017, Mr Currier forwarded the email exchange set out above to Mr Hill and Mr Hussey of Eversheds (acting for Toucan), saying

“Please find below confirmation from BLB that they have waived the FAC condition subsequent in the WEL 45 facilities agreement”.

Mr Currier said at trial that the purpose of this email was to keep Eversheds informed as to the status of the conditions subsequent under the ALE Contract, in the knowledge that his colleagues would separately forward the relevant exchange to Gowlings.

942. At 12.35pm on 1 November 2017, Ms Burns of CMS forwarded the exchange between Mr Hogan and Ms Schramm to Ms Pircher-Eschig of Gowlings, saying:

“Please see below confirmation on behalf of BLB that condition subsequent 31.23.1.2... of the RFE 45 Facilities Agreement has been waived”.

943. At some point between 12.35pm on 1 November 2017 and 4.37pm on 2 November 2017 (according to Mr Kavanagh, at 4.32pm on 2 November 2017) Gowlings forwarded the exchange between Ms Schramm and Mr Hogan to individuals within Toucan, including Mr Croucher. The copy of that email disclosed by Toucan, including its recipients, has been entirely redacted on the ground of privilege.
944. At 4.37pm on 2 November 2017, Mr Croucher forwarded the chain of emails, including the exchange between Ms Schramm and Mr Hogan and Ms Burns’ email to Gowlings, to Ms Williams and Mr Williams (both of Toucan, and neither of whom was called to give evidence). Mr Croucher said:

“I very much doubt this was agreed with us.

The original proposal was that we took on the responsibility for delivering the FAC to BLB, which we pushed back on. The new approach just looks like Business As Usual, where FAC has to be delivered as part of the Facilities agreement, but it is no longer a condition subsequent for us or Wirsol.

The CS was impossible given the deadline of 31/12/2017 to complete FAC for sites that have only recently been through PAC or IAC, so this seems like the most sensible conclusion.

I think we should agree to this.

Andy, let me know what you think or if you want to chat this through at all?

Thanks, Steve.”

945. Mr Kavanagh said in his witness statement:

“Mr Hogan did not send me (or anyone in my team, including either Eversheds or Gowlings) the email of 9:43 1 November 2017. It is directly at odds with the recent discussion between us. It took until 4:32pm on 2 November 2017 for it to be sent to us from Gowlings (this email is privileged and redacted) and by this time BLB had already commented. I did not see Mr Croucher's response before he sent it to Gowlings 5 minutes later but I saw it on the following morning and I agree with it. He is correct when he stated

“I very much doubt this was agreed with us”

I confirm this is correct and there was no such agreement.”

Mr Kavanagh notably omits to make any reference to the remainder of Mr Croucher’s email.

946. In cross-examination, Mr Kavanagh confirmed that by “*Mr Croucher’s response*” he meant the email quoted above. Mr Kavanagh said he could not remember when he saw Mr Croucher’s email and did not agree with it “*in that context*”. It is, however, clear from Mr Kavanagh’s evidence that he did read Mr Croucher’s email as a whole, since he states in his witness statement that he “*saw*” what he describes as Mr Croucher’s repetition of Mr Hogan’s mistake about the date, in the phrase (from Mr Croucher’s email) “*impossible given the deadline of 31/12/2017*”. This passage in Mr Kavanagh’s witness statement reads:

“I saw Mr Croucher repeated Mr Hogan's mistaken text to BLB (on the basis the due date was not 31 December 2017 under Banking Facility 1 or in fact the ALE) regarding the date of 31 December 2017 describing it as:

"impossible given the deadline of 31/12/2017".

I believe this date would have been adopted from Mr Hogan in his request to Karin Schramm of BLB which we had only just seen when Mr Hogan stated

"the CS cannot be satisfied by 31st December 2017 given PAC only occurred during the summer of 2016."

Again, I considered all this would be sorted in the documentation of the matter. Consistent with our discussions in September 2017 I was told that BLB was in principle happy to provide the SPV Obligors a waiver in this respect. Mr Croucher discussed that the SPV Obligors should proceed with documenting the proposed waiver and amendment to Banking Facility 1”

947. At 09.35am on 3 November 2017, Mr Croucher separately emailed Mr Williams of Toucan saying among other things, that:

“On W45, we need to agree the waiver with regard to FAC that was agreed by Mark Hogan and BLB. Effectively this removes the requirement to deliver FAC notices before the end of this year, as this will be impossible to do.

...

Hopefully we can get the CSs complete without further drama.”

948. Mr Croucher provided a short witness statement, in which he suggested that the suggestions in his email of 2 November 2017 that “*I think we should agree to this*”, and in his email of 3 November 2017 that “*we need to agree the waiver with regard to FAC that was agreed by Mark Hogan and BLB*”, related solely to waiver under the Facilities Agreement and had nothing to do with any waiver under the ALE Contract. He stated (repeatedly) that any waiver under the ALE Contract would have been a matter for Mr Kavanagh and “*beyond my ‘pay-grade’*”.

949. With the possible exception of the point about Mr Croucher's own authority, I find that evidence implausible. The subject heading of the 1/2 November email chain referred explicitly, as the first item, to the "*Asset Life Extension*". Mr Croucher's reference in his 2 November 2017 email to the new approach meaning that delivery of the FAC was no longer a condition subsequent "*for us or Wirsol*" made sense only if he was referring to the ALE Contract as well as the Facilities Agreement. Wirsol was not a party to the Facilities Agreement. Moreover, Mr Croucher's reference to "*the deadline of 31/12/2017*" was plainly to the Payment Date stated in § 13 of the ALE Contract. There was no relevant deadline of 31 December 2017 under the Facilities Agreement. Conversely, there *was* a reference to the 31 December 2017 deadline under the ALE Contract in Mr Hogan's email to Ms Schramm, which formed part of the email chain that Mr Croucher was considering.
950. Equally, Mr Croucher's reference in his 3 November 2017 email to the removal of the requirement to deliver FAC notices "*before the end of this year*" can only have referred to the CS under the ALE Contract; and his concluding wish to "*get the CSs complete without further drama*" would have made no sense at all if he envisaged CS49 remaining in the ALE Contract as a condition subsequent which, as was clear, was impossible to fulfil.
951. In cross-examination, Mr Croucher accepted that he would have appreciated at the time that Mr Hogan, in his email forming part of the chain, was seeking waiver of CS49 in relation to the ALE Contract as well as the Facilities Agreement. However, he denied that the words "*or Wirsol*" in his own email of 2 November were intended to refer to the ALE Contract, and said he could not remember whether the 31 December 2017 deadline arose under that contract and doubted that he would have known that at the time. It was suggested to Mr Croucher twice that he could not have thought that that deadline arose under the Facilities Agreement. On the first occasion, he did not give a direct answer to the question. On the second occasion, in the context of his email of 3 November, Mr Croucher said his best recollection was that he believed at the time that there was an end of year deadline relating to CS49 under the Facilities Agreement. I am unable to accept that evidence. For the reasons given above, Mr Croucher's emails are clearly referring to the position and the deadline under the ALE Contract. I reject Mr Croucher's evidence on this issue.
952. I have already noted that Mr Kavanagh in his witness statement referred only to the first line of Mr Croucher's email of 2 November. In cross-examination about the remainder of the email, it was suggested to Mr Kavanagh that Mr Croucher's reference to the FAC delivery obligation no longer being a condition subsequent for Toucan "*or Wirsol*" must have been a reference to the ALE Contract because there was no other obligation on Wirsol in relation to it. Mr Kavanagh replied that he did not agree, because "*the context in which he's saying what he's saying here relates clearly back to what I have been saying, which is that FAC is a really key important part of this process*". That is not, however, a coherent explanation of the references in Mr Croucher's email, which Mr Kavanagh said he saw at the time, to the ALE Contract, its 31 December 2017 deadline or to FAC delivery no longer being a condition subsequent for Wirsol. I reject Mr Kavanagh's evidence on this point.
953. At 4.26pm on 3 November 2017, Ms Pircher-Eschig of Gowlings replied to Ms Burns' email of 12.35pm on 1 November 2017 as follows:

“Jenny,

Rockfire have confirmed that they are fine with this waiver.

...

Kind regards,

Erika

[Personalised email signature]”

Ms Burns forwarded this email to Mr Hogan, stating that “*we have ... now had confirmation from Gowlings that Rockfire have accepted the waiver of the FAC CS*”. Mr Hogan replied “*that is great news*”.

954. Toucan have refused, on grounds of privilege, to reveal their communications with Gowlings in relation to this matter. However, Toucan at the same time seek to assert that, if and in so far as Gowlings’ response might be interpreted as relating to the ALE Contract, they had no authority to send it. In circumstances where Toucan seek to assert lack of authority whilst simultaneously refusing to disclose what if any instructions were actually given, the court is entitled, and indeed bound, to form a view on what is most likely to have occurred, drawing inferences to the extent necessary.
955. It is unlikely in the extreme that Gowlings would have sent this response without instructions. Moreover, the response is entirely consistent with the suggestion made by Mr Croucher in his email internally within Toucan. In the absence of any further documentary evidence, nor any witness evidence to the effect that (for example) Mr Croucher’s proposal was rejected or countermanded, the natural and obvious inference is that Ms Pircher-Eschig’s response to Ms Burns on 3 November 2017 resulted from instructions to take the course proposed in Mr Croucher’s email of the preceding day. Moreover, given Mr Croucher’s insistence that only Mr Kavanagh could have made the decision, it is highly probable that Mr Kavanagh himself gave or approved the giving of the instruction to Gowlings to send the response. Mr Kavanagh’s evidence was that he saw Mr Croucher’s email the following morning, i.e. the morning of 3 November; and there is no evidence that he expressed any disagreement with it at the time. That was prior to Ms Pircher-Eschig’s response to Ms Burns. Mr Kavanagh certainly had the authority to cause Gowlings to be instructed to grant a waiver on Toucan Energy’s behalf (or, for that matter, to grant a waiver by Toucan Gen Co on Toucan Energy’s behalf). Mr Kavanagh denied in cross-examination that any such waiver was granted:

“Q. I put to you, Mr Kavanagh, that what has happened here is clear: you have agreed with Mr Croucher in saying that you should give a waiver under the ALE contract of CS49, and then Gowlings had been instructed, either directly on your authority or on behalf of Mr Croucher, who had authority for this purpose, to respond on that basis?

A. No. The only waiver that was granted was in relation to the banking obligation. That was it. Not the ALE.”

However, I conclude for the reasons indicated above that Mr Kavanagh did authorise instructions to be given to Gowlings to take the course proposed in Mr Croucher's email, which was to grant a waiver by Toucan Energy under the ALE Contract.

956. I mention in parentheses that, taken at face value, Mr Kavanagh's witness statement appears to indicate that Mr Croucher's email was in fact sent *to Gowlings* five minutes after Toucan received a copy of Ms Burns' email at 4.32pm on 2 November. On that basis, it would again be clear that the instruction given to Gowlings, taking (on this version of events) the form of Mr Croucher's email of 2 November, was to remove CS49 as a condition subsequent for Wirsol: which in substance meant granting Toucan Energy's consent to the waiver. Mr Kavanagh's reference to Mr Croucher emailing Gowlings five minutes later may be a mistaken reconstruction based on the five-minute interval between the times Mr Kavanagh gives for Gowlings' incoming email and Mr Croucher's email to Ms Williams and Mr Williams. Either way, for the reasons given above, I am satisfied that Mr Kavanagh authorised Gowlings to be instructed to give effect to the recommendation set out in Mr Croucher's email.
957. On 13 November 2017, Mr Croucher emailed Mr Kavanagh (and others) saying "*[i]t looks like we will be liable to pay across the £2m*". Later the same day, Mr Croucher emailed Mr Williams of Toucan suggesting that Toucan "*decide whether to approach Wirsol to try to agree they down tools and we just pay them the £2m*", and saying "*I assume we are expecting to pay the £2m...*".
958. On 16 November 2017, Mr Croucher emailed Mr Walsh, on the subject of "*Wirsol*", saying "*[m]ost of the conditions subsequent are now closed... There are no outstanding points on W45...*", i.e. the portfolio in relation to which CS49 appears.
959. On 27 November 2017, Mr Croucher emailed Mr Williams in relation to the asset life extensions Wirsol had so far procured, saying "*this is now over £3m*".
960. Mr Hogan emailed Mr Kavanagh on 30 November 2017, saying "*the only open CS's are below on WEL60*", identifying two conditions subsequent not including CS49, and stating that once those were satisfied, "*we will then have all CS's closed*". The following day, 1 December, Mr Kavanagh wrote internally to Mr Croucher and Mr Williams saying: "*[t]he WIRSOL stuff has been going on for too many months what's the issue? Can this not just all be closed off now?*" In an internal email later the same day, Mr Kavanagh said: "*[t]he latest weekly update I have seen from them says out of 19 they have got 11 sites and the amount to pay is the original 2m plus £700k can you kindly break all this down against the contract so everyone at Rockfire is very very clear on all liabilities to Wirsol*". Also the same day, Mr Croucher said in an email to Mr Kavanagh: "*Wirsol – We are working through the CS list, which is nearing completion. The key ones being chased are the planning permission sign-offs.*"
961. All of those communications are inconsistent with the notion that either Mr Kavanagh, Mr Croucher or Mr Hogan believed CS 49 still to be outstanding following Mr Croucher's email of 2 November and Gowlings' response to CMS.
962. On 4 December 2017, Mr Croucher sent Mr Williams an email entitled "*Wirsol updates*", attaching an ALE tracker ("*Wirsol ALE with comments*"). Mr Croucher listed each of the outstanding Conditions Subsequent under the ALE Contract; the list did not include CS49.

963. On 30 December 2017 Mr Hogan issued Wirsol’s invoice under the ALE Contract in the sum of £6,405,820.80, in expectation of fulfilling the final requirements of the ALE Contract well in advance of the 30 June 2018 deadline. It appears from the parties’ communications that two conditions subsequent were regarded as outstanding (numbers 39 and 48), relating to the substation leases for Carrowdore and Lisburn; and the ALE Invoice stated that the payment was due *“10 Business Days from the Payment Date as specified under the asset life extension agreement.”* The accompanying letter explained the basis on which all the requirements for securing asset life extensions were said to have been satisfied.
964. Mr Hogan sent a WhatsApp message to Mr Kirk on 8 January 2018 to the effect that once the *“[Northern Ireland] CS’s”* were closed, *“all CS’s are closed and deferred considerations and ALE money becomes due...”*. Similarly, on 9 January 2018 Mr Hogan emailed Mr Kirk saying that once the *“Final Northern Ireland CS”* was closed, *“[t]his will mean we have a clean sweep of accreditation and CS’s across both portfolios and projects...”*; and, in another email the same day, *“we hope to have the two final CS’s on WEL60 (condition 39 and 48) closed within the next 24-48 hours”*. Mr Kirk did not express any disagreement or query. On 22 January 2018 Mr Hogan sent a WhatsApp message to Mr Kirk saying *“final 2 CS’s for NI sites are done... that everything closed off”*, to which Mr Kirk responded *“[w]ell played”*.
965. On 8 February 2018, Mr Hogan emailed Mr Kirk saying *“FYI – sub-station leases signed, just need to see them and then CS 39 and 48 closed – all CS’s fully satisfied – fingers crossed today !”*. Mr Kirk forwarded that email to Mr Kavanagh, saying *“[s]ee below... CS’s look very close. Then we all need Widehurst before the Calculation Date...”*.
966. Also during February 2018, discussions took place leading up to the signature by BLB of a formal waiver letter in relation to CS49. Ms Webb of BLB provided a form of waiver letter to Toucan, copying Ms Schramm, on 2 February 2018. It was proposed at the same time to make a revision to § 32.22 of the Facilities Agreement. Ms Lim of Eversheds on 12 February circulated *“revised CS checklists showing that all the CSes are satisfied (except for the FAC CSes for Wirsol 1, which are subject to the waiver letter we are waiting for Rockfire to sign)”*. The attached table, bearing Eversheds’ logo, was headed:

“BAYERISCHE LANDESBANK / PROJECT WIRSOL

Conditions Subsequent in accordance with the Facilities
Agreement
Status as at: 12 February 2018”

In relation to CS49, the table stated in the “Status” column *“To be waived pursuant to waiver letter”*.

967. Mr Hogan responded to Ms Mangat of Eversheds the same evening, 12 February 2018, copying Ms Schramm of BLB, stating *“can you deal with this as this is not what was agreed and Karin has already waived FAC as a CS”*. In another response at about the same time he said to Ms Lim *“Sorry JL I thought this FAC waiver was closed off [f] months ago – BLB confirmed same. This is an important point and we had previously agreed that BLB waiver was sufficient.”* Ms Lim responded: *“Yes, we are referring to*

the same thing, BLB has confirmed that they will need a waiver letter signed.” Mr Hogan replied that that was not his understanding but he would leave it with Eversheds to liaise with BLB. Mr Hogan then had the following exchanges with Ms Schramm the same evening:

[Ms Schramm] If I am not mistaken this is what JL [Ms Lim] is on the case with us. We are chasing RF [Rockfire, i.e. Toucan] for the signed waiver letter and they are coming back since two weeks with some questions rather than signing the doc.”

[Mr Hogan] Ok but I thought that was the point of us coordinating the email/phone call several months ago if you remember – the point was not to include RFE

[Ms Schramm] Yes, all CPs are fulfilled or waived, but we wait for the signed waiver letter and RF is coming up with all forms of excuse why not to sign. The signed letter is the last bit.

[Mr Hogan] The point is on the FAC one we agreed with [Mr Mangat] that Rockfire wouldn’t need to sign as they can then screw me over – that was the whole point of us coordinating your email confirming a waiver – Rockfire won’t sign as they are then liable for the ALE – the FAC CS cannot be fulfilled before the Longstop date ... that was the entire point! It’s a £5m hit for me, we had a it all agreed previously that RFE didn’t need to be involved.”

968. Since the approach formulated on 26 October 2017 and executed on 1-2 November 2017 had been to approach BLB first and then Gowlings, Mr Hogan’s references to Toucan (Rockfire) not needing to be involved make sense only if he was referring to the first of these two stages. What appears to have been overlooked at that stage is that § 45.2.1 of the Facilities Agreement, quoted earlier, required both BLB and the borrower to consent to any waiver under that agreement.
969. In the event, however, Mr Kavanagh signed the waiver letter on behalf of the relevant Toucan entities the following day, 13 February 2018.
970. On 28 February 2018, Wirsol wrote to Toucan Energy “*[f]or the attention of: Liam Kavanagh*” and copied to Mr Kirk and Mr Williams, stating that “*on 16 February 2018 all Conditions Subsequent (as defined under the ALE Letter) had been satisfied or waived by [BLB] and by RFE... the amounts invoiced under the ALE Invoice are due and payable by RFE within 10 Business Days of [that] date... ”.*
971. Mr Hogan sent a message to Mr Kirk on 8 March 2018 asking him to “*address and advise*” in relation to Toucan’s failure to acknowledge the ALE invoice or Wirsol’s “*letter re CS’s being satisfied*”. Mr Kirk responded that “*we have been working through list... ”.*
972. On 14 March 2018 Mr Hogan asked why Mr Kirk was “*silent on ALE*”. Mr Kirk responded that “*[w]e just need to work through the contracts*”.

973. A message from Mr Kirk to Mr Hogan on 20 March 2018 mentioned a proposal on behalf of Toucan Energy to “[allow] non contentious sites to progress” and “the £2m to be made”.
974. Further chasers from Mr Hogan and Mr Kirk on 9 April, 22 April, 23 April and 2 May 2018 elicited no suggestion that CS49 remained outstanding. Mr Kirk on 22 April 2018 indicated his understanding that “*liam [Kavanagh] will personally fund the £2m I think*”, and on 23 April identified a proposal pursuant to which Wirsol would receive a “*chunk of cash*” under the ALE Contract.
975. From April 2018 the SPVs began to issue the defects notices that now form part of the Claimants’ claim.
976. In May 2018, Mr Kavanagh met Mr Hogan in a final attempt to reach a negotiated solution to Wirsol’s claim to be entitled to payment under the ALE Contract. In his witness statement, Mr Kavanagh said he put forward a proposal to Mr Hogan in respect of Wirsol’s ALE claim, one item in which was an unquantified “*reduction to remove Wirsol’s obligation to deliver FAC by 30 June 2018*”. At trial, however, Mr Kavanagh said he was not suggesting that he mentioned CS49 at the meeting. His oral evidence was:

“I am saying that meeting was two years ago. From my memory of that meeting, I was very, very clear to Mr Hogan why I was making an offer of 2.5 million.

What was discussed at that meeting, again, was very clear, that Wirsol’s conduct in relation to the sites, that we paid very good money for, was a massive concern, and that we needed to come to some sort of resolution of all of these issues, where he would take his responsibility for actually making sure that the sites, that we had paid good money for were going to last for 85(?) years.

And we would seek to deal with the ALE part in this manner, without avoiding -- needing litigation. And the point of CS49 was not discussed by your client and it wasn’t discussed by me either. The vast majority of that conversation, from my recollection, was actually how to resolve the dispute between us on both camps.

And no, I didn’t mention CS49 at that meeting. But neither did your client.”

977. In re-examination, Mr Cogley QC reminded Mr Kavanagh of the reference in his witness statement to having included in his proposal a “*reduction to remove Wirsol’s obligation to deliver FAC by 30 June 2018*”, to which Mr Kavanagh replied that “*this is one of the items on our side, if you like, of the dispute that was to be removed if we reached agreement*”; and, asked to what extent it was a live issue in May 2018, replied “*very live*”.
978. There is no mention of CS49 in Mr Hogan’s internal email of 18 May 2018 in which he described the upshot of the meeting to colleagues. His note included the following:

“The meeting today wasn't as productive as I would have hoped, but on the positive side we are still talking. Liam is basically saying that his guys "screwed" up on the valuation and overpaid us — this is not true but that's his perception. He also said that the Asset Life Extension ("ALE") doesn't give him any benefits, that's also not true. My response to this was "why get us to do it in the first place, if that's the case" ? His recollection of events is screwed but ultimately, it doesn't help us. As of now he is offering to pay £2.5m on the basis that we write off the entire balance — that clearly doesn't work as it would mean a £2.7m P&L hit (we invoiced £5.2m for the ALE). Furthermore, the timeline for this £2.5m wasn't clear. He has said that he needs a clean break settlement and if we cannot find a solution, he may as well pay nothing...”

979. Mr Kavanagh was asked what Mr Hogan’s reaction was to Mr Kavanagh having said he “*may as well pay nothing*”, to which he replied that Mr Hogan didn’t really say anything about it.
980. In my judgment it is highly probable that nothing was said about CS49, either explicitly or implicitly, at this meeting at all. Toucan had made no suggestion of any kind in the correspondence leading up to the meeting that CS49 remained outstanding, despite explicit statements from Wirsol about the satisfaction of all conditions subsequent. Nothing in Mr Hogan’s email suggests that the topic was raised, and I do not read the reference to the possibility of Toucan paying nothing as any form of implicit reference to it. I conclude that the subject was not raised at the meeting, and Mr Kavanagh’s suggestion to the contrary in his witness statement is wrong.
981. In June 2018 Toucan Energy put forward defences based on the invalidity of the ALE invoice, an alleged variation of the payment date, and estoppel. This led Wirsol (after further correspondence) to issue a summary judgment application. Those defences were later abandoned in October 2018.
982. In September 2018 Toucan Energy took steps to rely on alleged defects at the solar parks as a defence to Wirsol’s claim under the ALE Contract, by procuring the assignment of the SPVs’ claims to Toucan Energy and claiming an equitable set-off.
983. In October 2018 Toucan Energy asserted, for the first time, that CS49 had not been satisfied or waived by Toucan Energy before the backstop date of 30 June 2018 under the ALE Contract. On that basis it said that no sum at all was due under the ALE Claim.
984. In March 2019 Toucan Energy introduced a new argument, that the ALE Contract contained implied terms relating to the sites’ performance under the EPC Contracts for 30 years i.e. the EPC periods plus the asset life extension periods. I consider that argument later.
985. In March 2020, two years after the ALE invoice was issued, Toucan put forward witness evidence to the effect that the asset life extensions had not been procured in accordance with clause 10 of the ALE Contract. I also consider those arguments later.

(4) Type of waiver required by § 13 of the ALE Contract

986. As quoted earlier, § 13 of the ALE Contract defines the “*Payment Date*” as the later of 31 December 2017 and the date on which all the Conditions Subsequent “*have been (i) satisfied or (ii) waived by [BLB] and by [Toucan Energy] (acting reasonably).*” This provision evidently contemplates two different types of waiver.
987. First, waiver by BLB would be a waiver under the Facilities Agreement. Nothing less than that would achieve the objective of helping ensure that the conditions subsequent under that agreement were met, with consequent benefits for Toucan. Any such waiver would need to comply with whatever formalities or other requirements applied under the Facilities Agreement. (I do not accept the Defendants’ suggestion that BLB might grant a waiver for the purposes of the ALE Contract but not the Facilities Agreement: since BLB was not a party to the ALE Contract, it is hard to see how any such waiver could arise, and in any event it would not achieve the objective of ensuring that the Facilities Agreement conditions were satisfied.) The “*acting reasonably*” requirement would not apply to BLB, because that is not the natural sense of § 13, and because the parties to the ALE Contract could not hope to fetter BLB’s discretion as to whether or not to agree to a waiver of a condition subsequent under the Facilities Agreement.
988. Secondly, waiver by Toucan Energy, which was not a party to the Facilities Agreement at all, would be a waiver under the auspices of the ALE Contract itself. In deciding whether or not to waive, Toucan Energy had an express obligation to act reasonably. As indicated below, that factor has relevance to the type of waiver which the parties must have envisaged would be required in this particular context.
989. The Claimants refer to the following passages from *Chitty on Contracts* (33rd ed.) chapter 22:

“22-040 Where one party voluntarily accedes to a request by the other that he should forbear to insist on the mode of performance fixed by the contract, the court may hold that he has waived his right to require that the contract be performed in this respect according to its original tenor. Waiver (in the sense of “waiver by estoppel” rather than “waiver by election”) may also be held to have occurred if, without any request, one party represents to the other that he will forbear to enforce or rely on a term of the contract to be performed or observed by the other party, and the other party acts in reliance on that representation.”

noting, however, that waiver by election is not contended for or relevant in the present case.

“22-041 A waiver may be oral or written or inferred from conduct even though the provision waived is found in a contract required to be made in or evidenced by writing. It has been noted that any variation of a contract required to be made in or evidenced by writing must itself be made in or evidenced by writing.

...

The distinction between variation and waiver is, however, a difficult one to apply in practice, particularly since a waiver may be consensual and be just as far reaching in its effect as a variation of the agreement. ...”

“22-042 The party who forbears will be bound by the waiver and cannot set up the original terms of the agreement. If, by words or conduct, he has agreed or led the other party to believe that he will accept performance at a later date than or in a different manner from that provided in the contract, he will not be able to refuse that performance when tendered. However, in cases of postponement of performance, if the period of postponement is specified in the waiver, then, if time was originally of the essence, it will remain so in respect of the new date. If the period of postponement is not specified in the waiver, the party forbearing is entitled, upon reasonable notice, to impose a new time-limit, which may then become of the essence of the contract. Similarly, in other cases of forbearance, he may be entitled, upon reasonable notice, to require the other party to comply with the original mode of performance, unless in the meantime circumstances have so changed as to render it impossible or inequitable so to do. ...”

“22-044 A waiver is also distinguishable from a variation of a contract in that there is no consideration for the forbearance moving from the party to whom it is given. It may therefore be more satisfactory to regard this form of waiver, that is “waiver by estoppel”, as analogous to, or even identical with, equitable forbearance or “promissory” estoppel. Although consideration need not be proved, certain other requirements must be satisfied for such an estoppel to be effective: first, it must be clear and unequivocal; secondly, the other party must have altered his position in reliance on it, or at least acted on it.”

“22-045 It is not uncommon for contracting parties to seek by a term of their contract to exclude or restrict the operation of the doctrine of waiver. Thus a contract term may provide that in no event shall any delay, neglect or forbearance in enforcing any term of the contract be or be deemed a waiver of that term. Another frequently encountered term is one which provides that the contract can only be altered if the parties go through a prescribed formality (such as a written amendment, signed by both parties). Contracting parties are free to stipulate that a particular act, such as payment of a rental instalment under an equipment lease, should not be taken to waive a right to terminate for an earlier breach. The freedom of contracting parties also extends to agreeing that any amendment to their contract must be made in writing and signed by both parties and the courts will give effect to such a clause. English law therefore permits contracting parties to bind themselves as to the form of

any variation to their contract and in this way to restrain their autonomy of action for the future. There has been held to be no “conceptual inconsistency” between a general rule which enables contracts to be made informally and a specific rule that effect will be given to a contract term which requires that any variation be made in writing ...”

(footnotes omitted in each case)

990. A number of points arise from this.
991. First, the Claimants submit, that the Defendants’ only case is one of ‘contractual waiver’, by which it appears (from their written and oral closing submissions) the Claimants mean an “*agreement*” in binding form which is a contract in itself; or, at least, a waiver that is binding and cannot be resiled from (unlike a forbearance with merely suspensory effect).
992. If and to the extent the Claimants suggest that the Defendants’ case is limited to waiver in the form of a free-standing contractual agreement, I am not persuaded of that. The issue relating to CS49 was raised for the first time (in pleadings terms) in the Claimants’ Defence to Counterclaim, which alleged that CS49 was not satisfied by the stipulated date and had not been waived. The Defendants did not serve a Reply to Defence to Counterclaim. It has though been the Defendants’ clear position since at least their summary judgment application that CS49 was waived. The witness statement of the Defendants’ solicitor Mr Allen dated 2 November 2018 in support of the Defendants’ summary judgment application stated that “*Wirsol sought a written waiver from Bayerische Landesbank and Toucan Energy (who had to act reasonably) in order to receive payment under the ALE Letter*”. Mr Allen also noted that, the ALE Contract having incorporated SPA § 20.2, any waiver needed to be provided in writing. After setting out the key email exchanges of 1-3 November 2017, Mr Allen said:

“I believe that the natural reading of this email exchange is clear and unambiguous. The purpose for the waiver was clearly spelled out in Mr Hogan’s email as well as the email title: it was a request to waive the Condition Subsequent in the ALE Letter. The parties that had to give the relevant waiver were Bayerische Landesbank and Toucan Energy (then known as Rockfire Energy Holdings Limited). Bayerische Landesbank confirmed that the waiver was “Fine for BayernLB”. Gowlings echoed this form of confirmation on behalf of Rockfire Energy Holdings Limited when they stated “Rockfire have confirmed that they are fine with this waiver”. In the context of providing the waiver required under the ALE Letter, it is clear that Gowlings were providing the waiver on behalf of the Rockfire entity that was required to provide the waiver (i.e. on behalf of what is now called Toucan Energy). Indeed, Gowlings had no choice but to provide the waiver since satisfaction of Condition Subsequent 49 was impossible by 30 June 2018 and Toucan Energy had to act reasonably in addressing any requests for a waiver. Further, it is inherently improbable that Gowlings would have purported to give a waiver

on behalf of Toucan Energy without authority and instructions, since this might expose the firm to claims from its Toucan Energy and/or third parties.

As such, I believe that this email thread is determinative of the first defence raised on the Summary Judgment Application: the condition subsequent now relied upon by Toucan Energy was waived.”

993. Secondly, the Claimants submit that whilst the parties have referred to “*waiver*” in the context of this dispute, in fact what Wirsol is contending for is a variation. As a result, the more stringent requirements under clause 20.3 of the SPA would have to be satisfied, namely an agreement in writing signed on behalf of each party. The Claimants note that the alleged waiver is contained in an exchange of emails almost seven months before the required date for satisfying the CSs, 30 June 2018. Wirsol is asserting, as a matter of legal consequence/construction, that Toucan agreed to treat CS49 as if it were never included in the ALE, and that deletion would in fact be a variation.
994. I do not accept that submission. Clause 16 of the ALE Contract contemplates waiver in the same way that many written contracts include provisions such as SPA clause 20 to cater for the possibility of future variations or waivers. However, the ALE Contract goes further, making specific provision in § 13 for waivers of conditions subsequent and, moreover, imposing an express requirement that Toucan Energy act reasonably in that regard. (As the Defendants point out, there is a potential parallel with the obligation imposed by § 6(b) on Toucan Gen Co to “*do or cause to be done all such things as WEL may from time reasonably require for the purposes of...satisfying any outstanding Condition Subsequent in relation to any of...the Projects*”.)
995. Thus whilst in one sense a waiver of a condition subsequent would be equivalent to an alteration in the provisions of the contract, a waiver by Toucan Energy would also be an act done *pursuant to* the ALE Contract. Moreover, a variation would ordinarily require consensus (typically arising from offer and acceptance) and consideration. Those features cannot be squared with a provision such as § 13 of the ALE Contract, pursuant to which Toucan Energy may be obliged to waive a condition subsequent, without any need for a further consensus between the parties or for consideration, simply on the basis that reasonableness requires it. Further, it would be surprising, had the parties intended the requirements of SPA clause 20.3 (variation) to apply, that the parties chose to refer to the conditions subsequent being ‘waived’ rather than using the language of variation.
996. I consider that a waiver pursuant to § 13 does not need to amount to a variation of the Contract. Accordingly I do not need to consider the Defendants’ alternative case that a binding contractual variation occurred.
997. Thirdly, insofar as the Claimants submit that (regardless of whether or not the Defendants’ case is so confined) any waiver by Toucan Energy pursuant to § 13 needed to be contractual in the sense of amounting to a freestanding agreement, I do not accept that submission. The considerations I set out above in relation to the variation argument again apply. Toucan Energy was obliged to waive a condition subsequent if acting reasonably so required. There is no reason to believe the parties to have intended that

that would require offer and acceptance, a fresh agreement, or consideration. Toucan Energy was simply bound to provide a waiver if the relevant circumstances arose.

998. Fourthly, the Claimants submit that any waiver by Toucan Energy needed to comply with SPA § 20.2, because it would be a “*waiver of a right, power or remedy under*” the ALE Contract. As a result, (a) it would need to be in writing and (b) it would not take effect unless the person seeking it, i.e. Wirsol, had disclosed to Toucan Energy “*every material circumstances which (so far as the person seeking the waiver is aware) has a bearing on its subject matter*”.
999. As a preliminary point, the Claimants suggest that § 16 of the ALE Contract, incorporating SPA § 20 by reference, must apply to a waiver by Toucan Energy under § 13 because that is the only type of waiver referred to in the ALE Contract. I do not accept that submission. Provisions such as SPA § 20 are common and useful provisions in contracts whether or not such contracts make any other express provision for waiver. (For example, the earlier draft of the ALE Contract itself incorporated SPA § 20 by reference even before what became § 13 was inserted.)
1000. As to the Claimants’ broader point, I am not persuaded that a waiver given by Toucan Energy pursuant to § 13 would be a waiver of a ‘right, power or remedy’ under the ALE Contract. To suggest that Toucan Energy had a ‘right’ under the contract to have the conditions subsequent satisfied, or a power to withhold payment unless they were satisfied, is circular: it was inherent in the contract from the outset that Wirsol could earn the right to be remunerated for its work in procuring asset life extensions provided that the conditions subsequent were *either* satisfied *or* waived, Toucan Energy being obliged to act reasonably as to the question of waiver. In case I am wrong in that view, I consider later whether SPA § 20.2 was satisfied by the waiver which Wirsol alleges.
1001. Fifthly, the Claimants submit that any waiver by Toucan Energy needed at least to be clear, unambiguous and unequivocal, those being standard requirements for any common law or equitable waiver under the general law. The Defendants accept that the waiver would need to be sufficiently clear that objectively speaking the parties understood the condition to have been waived. As a matter of principle, however, the Defendants do not accept that the usual requirements of the general law on waivers apply. That is because the question is not whether the terms of a contract have been altered by reason of extra-contractual matters: the relevant kind of waiver in the present case is one which the contract not merely makes provision for but also mandates if the circumstances are such that a party acting reasonably would grant it. As a result, the Defendants submit, what was required was simply that Toucan Energy communicate in sufficiently clear terms that it did not require the condition subsequent to be met for the purposes of the ALE Contract.
1002. In my view, to the extent that this difference of approach matters, the Defendants are right about it. The requirements of the general law reflect the starting point that contracts are to be upheld, with the result that the derogation from contractual rights brought about by a waiver will arise only if certain more or less strict requirements have been satisfied. Here, by contrast, Toucan Energy had an express obligation to waive a condition subsequent if that was what acting reasonably required. Further, as noted earlier, the conditions subsequent fundamentally concerned BLB’s requirements under the Facilities Agreements, subject to a form of qualified veto given to Toucan Energy

under the ALE Contract. In these circumstances, a waiver by Toucan Energy could in substance amount to no more than a clear statement by Toucan Energy that it concurred with BLB's decision to waive the condition subsequent for the purposes of the Facilities Agreement.

(5) Whether Toucan Energy waived CS49 under the ALE Contract

1003. The Defendants' case is that Toucan Energy waived CS49 under the ALE Contract by Ms Pircher-Eschig's email of 3 November 2017 in response to Ms Burns' email of 1 November 2017 (read in the light of the email chain which the latter attached).
1004. The Claimants' case is that Ms Pircher-Eschig's email did not amount to a waiver of any kind; that it related to BLB's waiver of CS49 under the Facilities Agreement; and that it was not sent on behalf of or with the authority of Toucan Energy. At best it was unclear and/or ambiguous and therefore could not amount to a waiver.
1005. A relevant question in assessing the significance of Ms Pircher-Eschig's email is on which Toucan entity's behalf it was sent, and (hence) to which agreement(s) it related.
1006. A relevant consideration in that regard is the identity of the author. The Claimants say Gowlings, the solicitors' firm for whom Ms Pircher-Eschig worked, were not instructed in relation to the ALE Contract but only in relation to the migration of the banking facilities under the SPA, and only then because of a conflict. Further, the Claimants say, the waiver of a condition subsequent in the ALE Contract was not a banking matter, and there is no suggestion that it would fall within Gowlings' domain due to conflict.
1007. Starting with the latter point, it is part of the Claimants' own case that BLB and Toucan Energy had different interests in relation to the inclusion and satisfaction/waiver of conditions subsequent in the Facilities Agreement and the ALE Contract respectively. That would suggest that there would or might be a conflict of interest had both interests been looked after by representatives of the same firm, namely Eversheds: a team from whom were acting for BLB, and another team acting for Toucan in relation to non-banking matters. Indeed, it might have been surprising to find teams from Eversheds acting for both BLB and Toucan Energy on any issue as to whether (if, so, on what terms) BLB and Toucan Energy should both agree to waive CS49. That would have been an entirely different issue from the matters Eversheds dealt with regarding the satisfaction of the asset life extension requirements of the ALE Contract, on which there was no reason for Eversheds not to act for Toucan.
1008. Mr Newbery of Gowlings gave evidence that his firm had been approached to act for Toucan Gen Co solely in respect of the banking documentation, that his firm never acted for Toucan Energy, and that its bills were addressed to Toucan Gen Co. He said that Eversheds had drafted the ALE Contract and Gowlings did not know anything about the acquisition side of the transaction. Gowlings' engagement letter was not disclosed, and Ms Pircher-Eschig herself was not called to give evidence about the events leading up to her email of 3 November 2017 to Ms Burns. Mr Newbery said he was not specifically involved in those events, but that Ms Pircher-Eschig discussed matters with him.
1009. Mr Newbery's evidence as to which Toucan entity had retained Gowlings is, however, not conclusive on two key points. The first is whether Toucan Energy in fact authorised

Ms Pircher-Eschig to send her email to Ms Burns on 3 November 2017. I have addressed that matter in §§ 948-954 above. I have concluded that Gowlings were given authority to give a waiver on behalf of Toucan Energy under the ALE Contract. The second question is whether in early November 2017, Wirsol would naturally have expected any issue as to Toucan Energy's willingness to be dealt with by Eversheds or by Gowlings. For the reason given in § 1007 above, they would in my view have thought it more likely that Gowlings would have to deal with any such issues, because Eversheds would be representing BLB's interests in relation to the very same condition subsequent. As I note below, that was indeed the view taken by Mr Currier of CMS. Mr Kavanagh himself stated twice in cross-examination (including after the Defendants' counsel pointed out that Mr Kavanagh may have mis-spoken the first time) that Gowlings were instructed by *Toucan Energy* in relation to banking matters, albeit Mr Kavanagh maintained that those did not include the ALE Contract.

1010. Mr Hill of Eversheds said that his firm "*acted for Toucan Energy and dealt with the ALE*", but was never asked to grant a waiver of CS49. He suggests that Wirsol would have known that Eversheds would have been the right firm to approach in that regard, because CMS had corresponded on Wirsol's behalf with Mr Hill's team to agree the option template required under the ALE, i.e. the template for arrangements with site landlords in connection with asset life extensions. He goes so far as to suggest that Mr Hogan and Mr Currier "*cannot have believed that Gowlings were also acting for Toucan Energy in respect of the ALE*", and proceeds in effect to make submissions in his witness statement to the effect that Wirsol never sought a waiver from Toucan Energy.
1011. I am unable fully to accept Mr Hill's evidence. The option template and other real estate matters related to the ALE Contract had no real connection with the conditions subsequent under the Facilities Agreement, and carried no risk of conflict with the interests of BLB. The fact that Mr Hill's team were able to act for Toucan to correspond with Wirsol's solicitors in relation to those matters does not demonstrate that Eversheds would have been the appropriate firm to deal with a waiver of CS49. Still less does it establish that Wirsol must have known that: a matter on which Mr Hill could not properly give evidence. Mr Hill accepted in cross-examination that Rockfire Capital's email of 26 April 2017 informed Wirsol and CMS only that "*Gowlings have been instructed in connection with the banking work*", not that they were instructed solely by Toucan Gen Co.
1012. Moreover, it was Gowlings who had told CMS on or about 25 October 2017 that Toucan ('Rockfire') declined to facilitate the form of BLB waiver originally proposed, involving an undertaking from Toucan in place of CS49 (see § 932 above). That is why Mr Hogan's email of 1 November 2017 to Ms Schramm referred to "*Rockfire (via Gowlings)*" having been unwilling to give the undertaking in that context. It was not unnatural in those circumstances for the new approach, involving waivers without the need for an undertaking, to be put to Gowlings.
1013. Mr Currier's evidence was that, at least so far as he knew, Gowlings were not involved in the drafting of the ALE Contract. However, the documents show that once the ALE Contract had been made, Gowlings were involved in correspondence relating to the conditions subsequent which appeared in the Facilities Agreement and were replicated in the ALE Contract. Mr Currier said he regarded the conditions subsequent as 'banking matters' because they were the conditions subsequent to the Facilities

Agreement. Mr Currier expressed the view in cross-examination that Eversheds would have had a conflict in terms of dealing with the satisfaction and waiver of the condition subsequent. Moreover, he stated in terms that it was *not* known to him at the time that Gowlings were acting for Toucan Gen Co but not for Toucan Energy. He believed Gowlings to be well aware that the only reason CMS were involved in the conditions subsequent was because of the ALE Contract. He said he understood Gowlings to be dealing with the conditions subsequent for Toucan, and his banking colleagues were liaising with Gowlings in relation to all the conditions subsequent. Mr Currier assumed Gowlings to be acting for all the Toucan entities, and noted that Toucan was not a large group but in reality involved a very small number of people. Clause 3(a) of the ALE Contract required Wirsol to send monthly email updates in relation to the Asset Life Extensions to “*the Purchaser*”, Toucan Gen Co, apparently blurring the distinction between entities. I accept Mr Currier’s evidence as to his and his firm’s understanding of the position.

1014. Equally, Mr Hogan clearly intended to approach Gowlings in order to seek a waiver on behalf of Toucan Energy. The whole premise of his 31 October ‘action Mark’ email was that Toucan as borrower under the Facilities Agreement had declined to co-operate in obtaining a waiver by BLB of CS49, by refusing to give an undertaking in its place. However, if BLB could be persuaded to waive CS49 *without* the borrower having to provide an undertaking, then CMS would then seek “*a waiver*” of CS49 via Gowlings, who would “*struggle to resist given that the bank do not need an undertaking*”. It is unlikely that Mr Hogan’s plan was to do no more than seek Toucan Gen Co’s consent as borrower to BLB’s proposed waiver under the Facilities Agreement. That would have left the required waiver from Toucan Energy outstanding and not achieved Wirsol’s objective; and it is more likely that, as he indicated in his witness statement, Mr Hogan considered that in approaching Gowlings, Wirsol was seeking a waiver from Toucan Energy, who following BLB’s confirmation would “*struggle to resist*” given Toucan Energy’s obligation to act reasonably.
1015. Another relevant consideration is the content of Ms Burns’ email to Ms Pircher-Eschig, read in the context of the two emails set out below it, and to which it referred. There is no doubt, first, that the initial email in the chain, Mr Hogan’s email of 1 November to Ms Schramm, referenced the ALE Contract. It referred in the heading to both the ALE Contract and the Facilities Agreement. Its text indicated that Mr Hogan was writing in the course of meeting Wirsol’s obligations under the ALE Contract, and referred to the 31 December 2017 deadline thereunder. After further explanation, Mr Hogan stated that “*in the capacity of having the authority to make the request for a full and final waiver of this specific CS, per the ALE, we hereby request that [BLB] confirm approval for dropping the requirement for said waiver without any further undertakings of the Borrower*” (emphasis in original).
1016. That email made clear that Wirsol was writing pursuant to the ALE Contract, but the specific request addressed to BLB was in my view for a waiver under the Facilities Agreement. As I have already noted, that was the only relevant agreement to which BLB was a party and under which it could give a waiver. The specific relevance of the ALE Contract to the request directed at BLB was that (as Mr Hogan’s email indicated) it was the ALE Contract that authorised Wirsol to approach BLB to seek the satisfaction, or (in my view) waiver, of the conditions subsequent.

1017. Ms Schramm’s response for BLB may or may not have intended itself to constitute a binding waiver, but on any view it clearly indicated that BLB would be willing to provide the waiver sought.
1018. The next step in the chain was Ms Burns’ email of 1 November 2017 to Ms Pircher-Eschig of Gowlings, attaching a copy of Mr Hogan’s email and Ms Schramm’s response. Ms Burns’ email did not explicitly seek a response. However, Ms Pircher-Eschig’s reply two days later, on 3 November, indicated that “*Rockfire have confirmed that they are fine with this waiver.*”
1019. The Defendants’ case is that “*Rockfire*” in that email meant Toucan Energy. They make the point that that name was used by all parties to refer compendiously to the Toucan group. The Defendants point to examples in the evidence of the parties using “*Rockfire*” where, in context, they are likely to have meant Toucan Energy (such as a message from Mr Hogan to Mr Kavanagh and others on 6 September 2017 suggesting that ‘*Rockfire*’ were hampering the process in relation to lease and planning extensions); Mr Currier writing to Mr Croucher, Mr Hussey, Mr Hogan and others on 20 April 2017 about discussions between Wirsol and “*Rockfire*” about extending the operational life of the projects; and Mr Kavanagh writing to Mr Croucher and others on 1 December 2017 that “*The latest weekly [ALE] update I have seen from them says out of 19 sites they have got 11 sites... can you kindly break this down... so that everyone at Rockfire is very, very clear of all liabilities to Wirsol*”). Mr Kavanagh in cross-examination made the general statement that “*Rockfire to me means Rockfire Energy*”.
1020. The Claimants submit that Ms Pircher-Eschig’s response was at best ambiguous as to which Toucan entity had provided the confirmation to which she referred, and as to which waiver such confirmation referred to; and, on ordinary principles, the response was therefore not capable of amounting to a waiver. They submit that the parties’ subjective intentions are not relevant, and the court when construing Ms Pircher-Eschig’s email objectively should be able to look at the email and know what Ms Pircher-Eschig was agreeing to. The Claimants add that the ordinary principle of contractual interpretation, excluding the admission of evidence of negotiations (see *Prenn v Simmonds* [1971] 1 WLR 1381), should also be applied to the alleged waiver. Conversely, the Claimants suggest that it is permissible to look at Mr Hogan’s emails from February 2018 in order to see what he was, in November 2017, seeking to achieve.
1021. In my view, the natural reading of the sequence of emails is that, having received a favourable indication from Ms Schramm that BLB would grant a waiver under the Facilities Agreement, CMS were then, by writing to Gowlings, seeking Toucan Energy’s agreement to the equivalent waiver under the ALE Contract. That is not only because the emails explicitly referred to the ALE Contract, but also because Wirsol’s clear and obvious interest in the matter was to obtain waivers from both BLB and Toucan Energy so as to satisfy § 13 of the ALE Contract. It would be very strange for anyone to have supposed that Wirsol was confining itself to seeking concurrence from Toucan Gen Co pursuant to the Facilities Agreement and yet not asking Toucan Energy to grant the parallel waiver that was vital to Wirsol under the ALE Contract.
1022. Moreover, as well as considering the words used in the email alleged to constitute the waiver, it is necessary to consider on whose behalf it was sent. That is a question somewhat akin to those which arise in cases where it is necessary to identify the subject matter of, or parties to, a contract. The best evidence about it here is the available

information about the instructions given to Gowlings in the two days between Ms Burns' email of 1 November 2017 and Ms Pircher-Eschig's response at 16.26 on 3 November. Toucan has exercised its right to refrain from disclosing, on grounds of privilege, the actual communications between its officers and Gowlings. However, it has disclosed Mr Croucher's email of 2 November. That email attached and explicitly discussed the appropriate response to Ms Burns' email, and is the only document Toucan has disclosed showing the consideration given to Ms Burns' email.

1023. I have already considered Mr Croucher's email of 2 November. It makes sense only on the footing that what Mr Croucher was proposing, by his words "*I think we should agree to this*", was that Toucan Energy should consent to the waiver of CS49. In addition to the relevance of the 31 December 2017 deadline, Mr Croucher specifically contemplated in his email that the result would be that CS49 would no longer be a condition subsequent either for 'us' or for Wirsol. The only thing that could mean CS49 ceased to be a condition subsequent for Wirsol was Toucan Energy's consent to its waiver. Absent such consent, CS49 would have remained a condition subsequent for Wirsol, and one which as Mr Croucher's email explicitly recognised would be impossible to fulfil. That would have been the opposite of the "*sensible conclusion*" which Mr Croucher proposed. As indicated earlier, I have concluded that Gowlings were authorised on behalf of Toucan Energy to grant the waiver Wirsol sought.
1024. The conclusion that Ms Pircher-Eschig's email was thus sent on behalf of Toucan Energy serves to underline its clear meaning, namely that Toucan Energy was content to waive CS49. Her email was a waiver in the sense required by the ALE Contract. Further, if (contrary to my earlier conclusion) any waiver needed to comply with SPA § 20.2, it was a waiver in writing.
1025. The Claimants object that if that were the case, then Mr Kavanagh and Toucan must have undergone a 'Damascene conversion' from their previous position of refusing to give an undertaking to BLB as part of a waiver of CS49, thereby preventing Wirsol from being entitled to any money under the ALE Contract unless it could negotiate a new arrangement with Toucan. However, Mr Croucher's email of 2 November 2017, which Mr Kavanagh said he saw and concurred with, indicates that Toucan had come round to the view that seeking to hold on to CS49 was not a fruitful way of putting pressure on Wirsol. Once BLB had made clear that it would waive CS49 without the need for an undertaking, there was a strong argument – which Toucan no doubt realised – that it would have been unreasonable to refuse to waive CS49. Moreover, the exchanges of 1 December 2017 referred to in § 960 above belie the Claimants' present assertion that Mr Kavanagh was refusing to waive CS49 because he wished to keep pressure on Wirsol.
1026. The Claimants submit that it would have been reasonable for Toucan to take the position that, rather than waiving CS49, they could instead extend the ALE Contract deadline of 30 June 2018, so that no payment would be made under the ALE Contract until the final FAC were issued. For example, Mr Kavanagh now asserts that he would not have granted a waiver unless he could see that the parks were (a) hitting their performance targets, (b) free from defects, (c) going to last "at least" 25 years, (d) going to achieve final acceptance, (e) going to achieve accreditation from Ofgem, and, further, that Wirsol was conducting itself with "general transparency". The Claimants say it is well established that when construing a term requiring consent "*not to be unreasonably withheld*", it is important to construe the clause in its particular contractual, factual and

commercial context; and that the party being asked to give its consent is entitled to have primary regard to its own commercial interests. They cite Longmore LJ's statement in *Barclays Bank PLC v UniCredit Bank AG* [2014] EWCA Civ 302:

“15. The critical factor in the present case is that the person who has to act in a commercially reasonable manner in determining whether consent is to be given is “the Guarantor” namely Barclays itself. It is from Barclays that consent is to be obtained and it is Barclays who has to determine whether that consent is to be given, albeit in a commercially reasonable manner. It is the manner of the determination which must be commercially reasonable; it does not follow that the outcome has to be commercially reasonable although, if it is not, that would no doubt cause one to look critically at the manner of the determination.

16. One then has to ask whether, in determining whether or not to consent to early termination, Barclays can take account of its own interest in preference to the interest of Unicredit. To my mind the answer is that it can, because any commercial man whose consent to a course of action is required but to whom the determination (whether to give that consent) is entrusted would think it commercially reasonable to have primary regard to his own commercial interests.”

1027. However, Longmore LJ made clear that the meaning of the clause had to be determined as a matter of construction of the particular contract in its particular context (§ 14). The clause in that case granted rights of optional termination in four separate events, two of which required Barclays' prior consent “*such consent to be determined by [Barclays] in a commercially reasonable manner.*” That explains the reference to the “*manner*” of determination in the passage quoted above. On the facts, Longmore LJ noted that:

“19. It is not easy to express a test for commercial reasonableness for the purpose of this (let alone any other) contract but I would tentatively express it by saying that the party who has to make the relevant determination will not be acting in a commercially reasonable manner if he demands a price which is way above what he can reasonably anticipate would have been a reasonable return from the contract into which he has entered and which it is sought to terminate at an early date.”

1028. In the present case, the approach Mr Kavanagh now claims he would have taken would have been inconsistent with the other commercial terms of the ALE Contract. The scheme of the Contract was for payment to be made by Toucan Energy within 14 days of the date of satisfaction or waiver of all the conditions subsequent. The Contract set a backstop date of 30 June 2018 for those conditions to be satisfied or waived. If it had been intended that the date for satisfaction/waiver of CS49 could be extended until Final Acceptance (let alone that Toucan was entitled to insist upon that course), then that date would have been meaningless: the real date for compliance with clause 13 would never have been earlier than the date on which the last site was due to achieve Final Acceptance, which would have fallen in autumn 2019. In addition, the evidence

referred to in §§ 922-923 above suggests that the sums potentially due to Wirsol under the ALE Contract included £2 million of consideration that had originally been intended to be paid for the acquisition of the companies owning the sites. It would in all the circumstances have been unreasonable for Toucan Energy to refuse to waive CS49 once BLB had agreed to do so, and it is probable that Mr Kavanagh realised that in early November 2017. In any event, he would have known that he had other potential remedies in the event of any breaches by Wirsol of the EPC Contracts/O&M Agreements, including performance bonds and the ability to bring an action such as the present one. In these circumstances it is unsurprising that Mr Kavanagh assented to Mr Croucher's suggestion.

1029. Moreover, as the Defendants point out, had it been the case that Mr Kavanagh would only have granted a waiver of CS49 in very specific circumstances and in return for a 'wishlist' of the kind indicated above, then Mr Kavanagh's subsequent conduct would have been inexplicable. Mr Kavanagh knew from at least late February 2018 that Wirsol was seeking payment under the ALE Contract on the basis that all conditions subsequent had been satisfied or waived. If it were true that Mr Kavanagh would never have waived CS49 except in very specific circumstances, he would immediately have noticed and corrected Wirsol's misapprehension that CS49 had already been satisfied.
1030. As to the subsequent events more generally, the Defendants do not make a case of estoppel by convention. They do, however, contend that even if Ms Pircher-Eschig's email of 3 November 2017 needed to fall within one of the general law categories of waiver (as opposed to being an act taken pursuant to an express contractual provision, ALE Contract § 13), then it was an equitable waiver. The Defendants submit that:
- i) the confirmation from Ms Pircher-Eschig of 3 November constituted a clear and unequivocal representation that Toucan Energy did not require CS49 to be satisfied;
 - ii) Toucan Energy intended that Wirsol rely upon that representation and reasonably foresaw that reliance, as the Claimants' internal emails make clear;
 - iii) Wirsol did rely on the waiver: this reliance was immediate, as indicated by Ms Burns' email of 3 November to Mr Hogan. It continued in the following months, as Wirsol worked to satisfy the other ALE Contract requirements and the other conditions subsequent (even after 31 December 2017), and repeatedly confirmed to Toucan that it considered CS49 was closed; and
 - iv) it would now be inequitable to resile from that representation. Toucan Energy permitted the deadline for satisfaction of the Conditions Subsequent to expire in June 2018 without suggesting that CS49 was still required to be satisfied, and it is now too late to resile from its earlier position.
1031. I accept those submissions. The meaning of Ms Pircher-Eschig's email was clear (see above). The contemporaneous documents referred to above show that Toucan Energy knew that Wirsol would rely on it, and took the benefit of such reliance in the form of the valuable asset life extension which Wirsol continued to procure for Toucan's benefit. Not once in the ensuing months after 3 November 2017 did Toucan suggest that CS49 remained outstanding or that all Wirsol's work might be for nothing. As Waksman J observed on Wirsol's summary judgment application:

“What was certainly plain is that, between the 28 February letter in 2018 and this witness statement of 16 October, so that is a period of around eight months, Toucan Energy had never contested the clear suggestion made by the claimant in the letter of 28 February that all of the relevant conditions had been met or waived, and that was a letter addressed specifically to the defendant.

It is absolutely remarkable to me that [Toucan Energy] did not come back and say “What do you mean? Of course, they have not been met and they have not been waived”, if that was something in its mind at the time, because, if that was right and if it could really demonstrate that a condition precedent had not been met and the longstop date had now gone past, that was the end to the claimant’s claim. But [Toucan Energy] never asserted anything of the kind...”

1032. In these circumstances it would clearly be inequitable for Toucan Energy to resile from its representation.

1033. The Claimants further object that if Wirsol and Mr Currier had believed, following BLB’s confirmation, that Toucan Energy would also now feel bound to waive CS49, a more explicit email would have been sent to Gowlings or Eversheds on this topic. It was suggested to Mr Currier that Ms Burns’ email to Ms Pircher-Eschig was unclear. He responded:

“It says clearly "Asset life extension, condition subsequent, waiver request". As I say, I think it's abundantly clear and it was clear to Gowlings and as I say there was email correspondence that makes this clear that Gowlings understood the effect of the condition subsequent on the ALE. At the time I do not believe there was any doubt in their minds or our minds what the effect of this was intended to be. They – and at no point after this, for months and months, beyond the point where my firm ceased to act for it, did they ever raise any concerns that they had not been waived.”

1034. The Claimants suggest that that view is inconsistent with the fact that BLB later, in February 2018, wished its own waiver to be set out in a formal letter. Mr Currier said his understanding was that BLB wished the waiver to be “*formalised*” in the letter. Since under the Facilities Agreement any waiver required the consent of the borrowers, it may well be the case that no waiver took effect until the letter was signed; and the signed waiver letter also makes an amendment to the definition of Event of Default in the Facilities Agreement. However, that does not prevent Toucan Energy’s waiver from having been given in November 2017 following BLB’s confirmation that it was willing to waive CS49: § 13 of the ALE Contract contains no stipulation as to the order in which waivers must occur.

1035. Moreover, the fact that in February 2018 Mr Hogan was concerned that Toucan might be able to prevent BLB’s waiver from actually taking effect does not show (as the Claimants appear to suggest) that he did not believe CS49 to have been waived in

November 2017. As already set out, his thinking in November 2017 was that Toucan Energy would be unable to resist waiving CS49 once BLB had agreed to do so. If, however, Toucan could in fact prevent *BLB* from granting a waiver, then there was a risk of CS49 remaining in place. In the event, no doubt for its own reasons referred to in § 924 above concerning cash flow, Toucan did sign up to the BLB waiver letter.

(6) Non-disclosure under SPA clause 20.2

1036. The Claimants allege that any waiver of CS49 was invalid pursuant to the second sentence of SPA § 20.2:

“No waiver will take effect if the person seeking the waiver has failed to disclose to the grantor every material fact or circumstance which (so far as the person seeking the waiver is aware) has a bearing on its subject matter.”

1037. As I have concluded that § 20.2 did not apply here, the point does not strictly arise. I consider it briefly below in case I am wrong on that point.

1038. The Claimants submit that Wirsol was obliged to disclose breaches of the EPC Contracts, O&M Agreements and Facilities Agreements, some of which I have found to have occurred. However, it is difficult to see how those breaches had any bearing on the decision whether or not to waive CS49, in circumstances where (a) it was clear that CS49 could not be complied with by the deadline stated in the ALE Contract, (b) BLB had made clear that it was willing to waive the provision and (c) Toucan would continue to have all its existing rights in respect of any breaches of the EPC Contracts and other contracts. Further, § 20.2 applies a test of actual awareness that the matter in question has a bearing on the proposed waiver. There is no evidence that Wirsol were so aware.

1039. The Claimants also allege that Wirsol was obliged to disclose the content and/or conclusions of an Ofgem audit into the commissioning and qualification under Renewables Obligations legislation of the Widehurst site, which had been rated as “*unsatisfactory*” and “*the lowest of the four ratings*” and in which “*major issues of non-compliance were found*” including a lack of “*safe performance of this switchgear*”. The Claimants point out that the equipment at Widehurst failed disruptively in July 2018 resulting in significant downtime. However:

- i) Mr Hogan set out in his second witness statement a detailed account of how Toucan were kept apprised of development in relation to these problems; and
- ii) the Ofgem preliminary audit report itself was not received by Wirsol until 24 November 2017, i.e. after it had sought the waiver.

1040. The Claimants also allege that “DNO requirements” were not satisfied in relation to Lisburn at the date of its Taking Over Certificate, dated 4 October 2017, and that the certificate was materially false. However, Mr Hogan in his second witness statement explained how the testing and commissioning process in Northern Ireland involves multiple adjustments and testing rounds; that the DNO altered its requirements; and that Toucan was kept fully informed of the process through its asset manager (Low Carbon). That evidence was not challenged.

1041. There is, in any event, no evidence that Wirsol considered either of the above matters relating to Widehurst and Lisburn to have a bearing on the CS49 waiver.

(7) Other matters concerning the waiver of CS49

1042. The Claimants contend that Mr Hogan had no authority to seek the waiver of CS49. Clause 2 of the ALE Contract authorised Wirsol to seek to procure the satisfaction, but not the waiver, of conditions subsequent. Similarly § 9 set 30 June 2018 as the deadline for “satisfaction” of the conditions subsequent. I consider it very doubtful that § 2 should be limited in this way: it was clear from § 13 that satisfaction and waiver of conditions subsequent were alternatives, and, bearing in mind that the borrower would in any event have to agree to any waiver under the Facilities Agreement, it is hard to see why the parties would have envisaged Wirsol not being entitled to seek waiver as an alternative to satisfaction. The point is irrelevant in any case, as BLB did in fact grant the waiver and the borrower and guarantors agreed to it. Equally, § 9 must clearly be read in the light of § 13, otherwise the references in the latter to waiver would be redundant.

1043. The Claimants further contend that “*Wirsol/Mr Hogan’s conduct in seeking to engineer a situation that emasculated Toucan’s right to choose whether to waive CS49, or amend the same, or countenance any variation of the ALE in the way that Wirsol/Mr Hogan did was impermissible under the circumstances and furthermore placed Wirsol directly in breach of clause 3(b)(i)*”, and that Toucan “*relies on this conduct in support of its case that it would have been perfectly entitled to refuse to waive CS49 under the circumstances, if asked*”.

1044. That is a nonsensical contention. It is absurd to suggest that persuading BLB to waive a condition subsequent in the Facilities Agreement, which represented a burden on the Toucan borrowers and guarantors and an obstacle to their ability to realise dividend payments, was “*materially detrimental to the business, trading relationships or reputation*” of any member of the Toucan group so as to breach § 3(b)(i). Equally, if and to the extent that such a waiver could be regarded as ‘emasculating’ Toucan’s right to choose whether itself to waive CS49, it did so only by creating a situation in which it would have been unreasonable for Toucan to refuse to do so. *Ex hypothesi* it was therefore incapable of amounting to a reason to refuse a waiver; and it was clearly not a breach of § 3(b)(i). Moreover, all the relevant communications were sent or copied to Toucan’s own lawyers: there was no element of underhandedness such as the Claimants’ counsel sought to suggest at trial.

1045. The Claimants also suggest that it was a breach of the confidentiality provisions under SPA § 18 for Mr Hogan to provide Ms Schramm of BLB with a copy of the ALE Contract. The Claimants did not identify any portion of § 18 said to have that effect, and I do not consider it does. In any event, in circumstances where it was the ALE Contract which authorised Wirsol to take action in relation to the conditions subsequent, it was clearly necessary for Wirsol to rely on and disclose the ALE Contract as part of its dealings with BLB.

1046. It was suggested that Mr Hogan deliberately avoided copying Mr Kavanagh into the critical email exchanges in early November 2017. Mr Kavanagh had emailed Mr Hogan two months earlier, on 6 September 2017, requesting that “*all correspondence from now on should be copied in the first instance to [Mr Kavanagh], [Molly Warnock],*

[Andrew Standing] and [Harriet Williams] only”; and that the Rockfire Ops mailbox be used “*for day to day matters not the wirsol open topics*”. Mr Hogan said he sent his email to the Rockfire Ops mailbox, rather than to Mr Kavanagh directly, by oversight. That mailbox was, in any event, regularly monitored, and as already noted Mr Hogan’s key communications were sent or copied to Toucan’s lawyers; and, of course, the critical email chain came to Mr Kavanagh’s attention in any event on the morning of 3 November 2017. There is accordingly nothing in this point.

(8) Implied terms

(a) Proposed implied terms

1047. By amendments to their Particulars of Claim, introduced in March 2019, the Claimants alleged that:

- i) it was an implied condition precedent to Toucan making any payment under the ALE Contract that “*the Works would operate in accordance with the terms and obligations contained in the EPC Contracts and the O&M Contracts throughout any extended asset life of the Project*”; and
- ii) it was an implied term that Wirsol would “*procure the continuation and compliance of the obligations in the EPC Contracts and the O&M Agreements throughout the period of the Asset Life Extension*”.

1048. The proposed terms were reformulated in the Claimants’ written openings:

- i) an implied condition precedent, to payment under the ALE Contract, that “*at the point in time at which the [ALE payment] obligation had to be discharged Wirsol was fully compliant with the EPC and O&M contracts*”; and
- ii) an implied term “*that the express EPC and O&M obligations would be complied with*” (without reference to the period for which compliance was said to have been guaranteed).

(b) Principles

1049. The Supreme Court in *Marks & Spencer Plc v. BNP Paribas Securities Services Co* [2016] AC 742 stated at §§ 18-21 that:

- i) for a term to be implied, “*it must be necessary to give business efficacy to the contract, so that no term will be implied if the contract is effective without it*”, or “*it must be so obvious that ‘it goes without saying’*”;
- ii) “*a term should not be implied into a detailed commercial contract merely because it appears fair or merely because one considers that the parties would have agreed it if it had been suggested to them. Those are necessary but not sufficient grounds for including a term*”;
- iii) “*it may well be that a more helpful way of putting [the ‘necessity’ requirement] is that a term can only be implied if, without the term, the contract would lack commercial or practical coherence*”; and

iv) a term will not be implied where it would be inconsistent with the rest of the agreement.

1050. As to (iv) above, the Supreme Court cited Bingham LJ's conclusion in *The APJ Priti* [1987] 2 Lloyd's Rep 37, 42 that a warranty to the effect that the port declared was prospectively safe could not be implied into a voyage charter-party "*because the omission of an express warranty may well have been deliberate, because such an implied term is not necessary for the business efficacy of the charter and because such an implied term would at best lie uneasily beside the express terms of the charter*". The Defendants similarly draw attention to Rix LJ's phrase "*lie uneasily*" in *Mediterranean Salvage & Towage v. Seamar Trading & Commerce* [2009] EWCA Civ 531, [2010] 1 All ER (Comm) 1 § 48.

(c) Application

1051. The Claimants' essential point is that the asset life extensions would be "*pointless if for example the 25 [year] operational design life obligation is breached and the sites "fail"*", or (as it was put to Mr Hogan in cross-examination) if after the initial 25-year period "*the kit would stop functioning*". Mr Kavanagh asked, rhetorically, why he would "*pay somebody just to move a lease forward by five years, but the equipment breaks down 10 years before?*"

1052. By way of elaboration, the Claimants say that:

i) the asset life extensions are not simply lease extensions: the ALE Contract does not describe them as such, and if all that was required was an extension of the lease, then the contract would have been constructed differently and different language would have been used;

ii) the value of the ALE extension sums was a function of the income stream using the assets on the site over an additional five-year period. The parties did not anticipate the acquisition of the five year lease extensions on a "naked acres" basis. For example, the planning permissions Wirsol had to obtain related to the infrastructure actually on the sites at the time. Toucan cannot be obliged to pay asset life extension sums in circumstances where, due to breaches of the EPC Contracts, the ability to generate electricity from the sites is non-existent or substantially impaired; and

iii) it must be a condition precedent to Wirsol's right to receive payment in relation to any asset life extension that it obtains in accordance with § 10(a), and where it has satisfied all of the CSs, that it is not in breach of the EPC and O&M Contracts in relation to the sites. Any other construction is nonsensical, requiring Toucan to make payments when Wirsol is in breach, and it is known that the Works will not last 25 years, let alone into the extended 25-30 year period.

1053. The definition of "*Asset Life Extension*" in § 10 of the ALE Contract, quoted in § 907 above, is the extension of the asset life of a project by a minimum of five years, "*as evidenced by*" three specified matters relating to lease extensions, land registration and planning permissions. In my judgment, the three specified matters are exhaustive of the express requirements set out in § 10. To read § 10 as non-exhaustive and thus as

importing some further requirement relating to the existing design or quality of the equipment on the sites, would make the requirements unacceptably vague, as well as extending the nature of the obligations under the ALE Contract well beyond their express field of operation. Moreover, had the parties intended any such additional requirement to apply, one would expect them to have negotiated a carefully formulated criterion for that purpose.

1054. The EPC Contracts themselves contain detailed and carefully constructed requirements as to the design and construction of the equipment on the sites, as well as express provision for remedies (including liquidated damages). It is far from obvious that the parties to the ALE Contract, had they been asked, would have considered it went without saying that a further and augmented set of requirements should be inserted into the ALE Contract. After all, in the event of any breach of the EPC Contracts, for example, Toucan would always have remedies. It is fallacious to seek to imply a term to avoid a situation where the equipment no longer works at the end of the 25-year period. First, equipment might fail to last 25 years even without any breach on Wirsol's part. I noted earlier, for example, that the warranty period for the various pieces of equipment varied, and in some cases was only 5 years. Secondly and in any event, if Wirsol were in breach then Toucan would be expected to have a right to damages to put it into the position it would be in had no such breach occurred.
1055. Moreover, the proposed implied terms, far from being ones that the parties would have regarded as obvious, are such that it is very unlikely that they could ever have been agreed. The two pleaded formulations would have made Wirsol's rights under the ALE Contract dependent on complete compliance with the EPC Contracts and O&M Agreements for the next 30 years. That would be flatly inconsistent with the scheme of the ALE Contract, which provided for payments to become due following completion of asset life extensions and conditions subsequent by specified dates in 2017 and 2018. It would also be a vastly onerous provision. The second of the two reformulated versions proposed in the Claimants' written opening suffers from the same defects.
1056. The first reformulated version proposed in the Claimants' written opening – an implied condition precedent of full compliance with the EPC Contracts and O&M Agreements at the time of the asset life extensions – would mean that if Wirsol were in breach of either contract, however slight or localised the breach – it would receive nothing whatever under the ALE Contract, despite having obtained any number of asset life extensions and having procured the satisfaction or waiver of all the conditions subsequent. The suggestion that any such term was so obvious that it 'went without saying' is absurd. Indeed, it is obvious that no sensible party would ever have agreed to such a term.
1057. The evidence also indicates that Toucan sought extended warranties as to operational life in relation to other solar assets but the counterparty declined to give them. Mr Kirk's first witness statement referred to such negotiations in late 2017 between himself (acting for his former employer) and Mr Kavanagh:

“Mr Kavanagh had concerns some of the equipment would not have an operational life long enough to justify the asset life price. As a seller we were not the developers or EPC but a fund and we

were not able to give the representations and warranties he required to progress asset life...”

1058. Mr Kirk confirmed this in cross-examination:

“Q. Just to unpack that, what has happened here is that Mr Kavanagh has sought specific assurances and warranties, hasn’t he, in relation to the lifetime of the equipment of your previous employer?

A. Yes.

Q. And they have refused to give those, haven’t they?

A. Yes.

Q. It is right, isn’t it, if those issues were to be part of an asset life agreement, you would expect them to be negotiated specifically, wouldn’t you?

A. As my role as seller, yes, in that transaction, yes.

Q. And, in fact, if they had been demanded it would have been reasonable to refuse. That’s what you did, isn’t it?

A. Yes.”

1059. That evidence serves merely to confirm that, in the market in question, terms of the kind which Toucan now suggests were so obvious as to be implied were in fact unacceptable to the seller of the assets.

(9) Whether compliant asset life extensions obtained

1060. Clause 10(a) of the ALE Contract required:

“an extension of the term of the lease of the Property (or option to obtain an extension of the relevant lease or a lease option in respect of such Property, or new reversionary lease in respect of such Property) ..., in a form satisfactory to the relevant Subsidiary (acting reasonably), with the relevant landlord which the landlord has confirmed in writing to the relevant Subsidiary that he will execute and deliver subject only to the receipt of the counter-signature by the relevant Subsidiary to such lease extension or option”.

1061. The Claimants submit that that required the landlord to have executed an irrevocable offer to execute the relevant lease extension or option agreement, which would remain in place at least until 30 June 2018, by which time it would be known whether or not the conditions subsequent had been satisfied. Otherwise, the relevant SPV would face the choice of executing the lease extension or option without knowing whether the conditions subsequent had been (or ever would be) satisfied, or risking the landlord

changing his mind between provision of his written confirmation and the time at which the conditions subsequent were satisfied, which could be several months.

1062. I reject that submission. The clear natural meaning of § 10(a) is that what had to be provided was a confirmation in writing that the landlord was willing to execute the document in question. If what in fact was required was a contract unilaterally binding the landlord, clause 10 (a) would have said so. That would have been a radically different and much more onerous obligation, since the landlord would have had legally to tie its hands for a period of several months, and no doubt would have been willing to do so (if at all) only in return for valuable consideration – for which the ALE Contract makes no provision. Moreover, the forms and leases and options were extensively discussed between the parties at the time, i.e. in the months leading up to the 31 December 2017 deadline, and it was at no point suggested that irrevocable offers to enter into them were required. Had that been the position, the terms of the offers would no doubt have been the subject of detailed discussions between CMS and Eversheds.
1063. The Claimants also submit that § 10(a) requires the landlord’s written confirmation to be provided *to* the SPV, which did not happen. That is an unpleaded point which in my judgment cannot now fairly be advanced. In any event, the procedure which the parties in fact adopted was that Eversheds had the task of reviewing the proposed documents in order to decide whether they were satisfactory from the SPVs’ point of view, and CMS/Wirsol were to receive the landlords’ confirmations on behalf of the SPVs. Wirsol confirmed in its letter to the Claimants dated 30 December 2017 that these consents had been obtained (saying “[t]he relevant landlord’s solicitor has confirmed they are holding an option signed by the relevant landlord. A copy of the engrossment form of option has been provided to the solicitors acting for [RFE Gen Co] and [Rockfire Energy Holdings]”). Toucan was plainly aware that the confirmations had not physically been provided to the SPVs. Were this insufficient, it would have been apparent to Toucan on 1 January 2018 that no asset life extensions had been achieved at all, yet the point was never taken. In my view, given the parties’ accepted *modus operandi*, this unpleaded point is without merit.
1064. By an amendment to their Reply made in July 2020, the Claimants alleged that Wirsol did not pay costs due to the landlords as required by ALE Contract § 4, and that Toucan Energy could deduct any such costs from the sums otherwise due to Wirsol. I do not understand the Claimants to have pursued this point at trial. In any event, the documents indicate that Wirsol had put its solicitors in funds to discharge any costs to the landlords, and any outstanding costs can be deducted pursuant to ALE Contract § 15 from the amounts otherwise due to Wirsol.
1065. The remaining areas of dispute concern points of detail as to whether asset life extensions were in fact obtained in relation to the relevant sites. In order for any payment to be due, the extensions had to be obtained by 31 December 2017.
1066. For six sites the existing lease already contained an option for extension, and on 15 November 2017 Eversheds confirmed to CMS that this “*satisfied the first limb of the definition of Asset Life Extension*” for five of the sites. The documentation for the sixth, Woodhouse, was provided shortly afterwards and no objections were raised.
1067. For the remaining nine sites, a lease option was negotiated with the landlord, provided to Eversheds for approval, and then confirmed by the landlord to be either ready for

execution or to have actually been executed. Planning permissions were also obtained. Wirsol's position, and the documents on which it relies for each site, were set out in a letter dated 1 September 2020 to Toucan's solicitors from its solicitors Enyo Law.

1068. I consider the disputed matters below on a topic by topic basis, using the table helpfully provided by the Claimants' legal team as an annex to their written closing submissions, to which the Defendants responded in their own written closing.
1069. It is worth noting at the outset that, so far as lease documents are concerned, § 10(a) required these to be "*in a form satisfactory to the relevant Subsidiary (acting reasonably)*". The evidence indicates that on 26 October 2017 Toucan Energy changed its requirements and instructed Wirsol to obtain options to lease for the further five-year term, instead of lease extensions. Wirsol set to work on this, and CMS was in frequent and often daily contact with Eversheds (on behalf of Toucan Energy) during December, updating Eversheds as to negotiations with the landlords and providing updated copy documents. CMS also corresponded with Eversheds (on behalf of BLB) regarding the putative options and BLB provided signed copies of letters of consent in two tranches on 20 and 22 December 2017. Wirsol was also in regular direct contact with Toucan Energy, providing weekly reports, *ad hoc* emails and access to a data room.
1070. In early 2018 it emerged that Toucan had instructed TLT solicitors to review the documentation provided by Wirsol in December 2017. On 19 March 2018 Ms Maria Connolly, head of real estate at TLT, emailed CMS to request an overview of the asset life extension matters and documentation, in advance of a client meeting with Toucan on 26 March 2018. Ms Connolly stated that she was working with Mr Kirk on this matter. In reply Ms Doherty of CMS telephoned Ms Connolly to discuss and subsequently sent an email summarising the position. Ms Doherty then sent Ms Connolly six emails attaching the relevant documents.
1071. TLT then scrutinised this documentation, and provided what was described in correspondence as a 'full report' to its clients, though Toucan has claimed privilege in respect of it. TLT also refrained from complying with requests from CMS to communicate the result of its appraisal of the documents. However, there appears to have been no suggestion from the Claimants prior to the issue of these proceedings that Wirsol had failed to provide the documentation required under the ALE Contract. Nor was any such suggestion advanced by Toucan in response to Wirsol's summary judgment application, or (aside from a bare denial) in its statements of case in these proceedings.
1072. That is an unpromising start for the contention now advanced by Toucan that Wirsol failed to provide lease documentation "*in a form satisfactory to the relevant Subsidiary (acting reasonably)*".

(a) *Use of template*

1073. A template was used as a starting point to negotiate specific options with each landlord. Eversheds approved the original template form of option by email on 31 October 2017.
1074. Over the following weeks CMS negotiated terms with the landlords and provided updated drafts of the options to Eversheds, with Eversheds agreeing or rejecting various

amendments. Ultimately the forms of the options were finalised, and CMS sent each of the individually amended final versions to Eversheds for approval, as set out in detail in Enyo's letter of 1 September 2020. This process was also summarised on page 2 of Wirsol's 30 December 2017 letter claiming the achievement of the ALEs for fifteen sites.

1075. There was no requirement under the ALE Contract for the final form of any document to match the template. It simply had to be in a form satisfactory to the relevant SPV acting reasonably, and it was. It was not suggested in 2017 that the final option had to be in the same form as the template. Nor was that required under § 10. The template point is therefore irrelevant.

(b) Whether BLB consented to the final form option agreement

1076. The Defendants accept that BLB was required to consent to the relevant form of option agreement, apparently on the basis that in order to be "*satisfactory to the relevant SPV (acting reasonably)*" it needed to be in a form acceptable to Toucan's bankers BLB. I infer that was so because BLB held a legal charge of the properties.
1077. In five cases the Claimants have identified differences between the final form of option and the version reviewed by BLB, which the Defendants say would not affect the substance of BLB's consent.
1078. In relation to Five Oaks, the Claimants allege a discrepancy in Schedule 1 § 3 to the option (the draft form of option notice), whereby the party exercising the option is referred to as "*the Company*" and not "*the Buyer*". The final options agreed by the landlord and approved by Eversheds refer to "*the Buyer*" in Schedule 1 § 3; the version consented to by BLB refers to "*the Company*" in that clause. However, § 10.1.1 of the option states "... *references in the Conditions to "buyer" shall be read as referring to the Company*", and Schedule 1 § 2 states that "*Words and phrases defined in the Option Agreement bear the same meanings in this notice.*" Thus, as the Defendants say, the two terms are interchangeable. There is nothing in this point.
1079. The form of option for Home Farm approved by BLB cross-referred at § 2.3 to § 4.15 of the underlying lease, rather than to § 4.7 of the underlying Lease as in the form agreed with the landlord. Clause 4.15 in the original 2016 Home Farm lease and § 4.7 in the revised Home Farm lease appended to the agreed option (as negotiated with the landlord and provided to Eversheds) both relate to the same yielding-up provisions, with the latter replacing the former in the later version of the lease. By email dated 11 December 2017 Ms Doherty of CMS explained the clauses to Mr Kelly of Eversheds (acting for BLB):

"Further to the below, I can confirm that the lease references included in the options are all to ensure that the yielding up obligations in the various principal leases are suspended, in the event that the options are exercised and new leases granted. The attached table confirms the details of the specific clauses in respect of each lease. These same yielding up provisions do of course apply to the new leases to be granted should the options be exercised."

Mr Kelly responded:

“Thank you for the below and the table which were very helpful. I have no comments on the forms of Option Agreement. Please send the consent letters and I shall arrange signature.”

1080. On 15 December 2017 Ms Doherty added that:

“There has been a minor amendment to the Home Farm option agreement as follows...and at paragraph 2.3 the lease reference has been amended from 4.7 to 4.15 but please note this is not a variation from the table of lease references sent previously”.

1081. Since BLB evidently consented to the substantive terms in question, the Claimants’ point is without merit.

1082. The Outwood option contained the same feature as for Five Oaks, referred to in § 1078 above, and the same comments apply. In addition, on 3 January 2018 the landlord and its lender, HSBC, requested an amendment to place a ten working day time limit on the procuring of a necessary consent from Toucan in the event that the landlord were to sell the freehold. As CMS explained in an email to Eversheds the following day, it was not an unreasonable amendment: the landlord’s lender simply wanted to ensure that the landlord would in fact get the certificate it needed (in order to register a transfer) if the landlord had done everything it was supposed to under the option; without such an obligation the transaction might stall indefinitely. In any event, Wirsol had obtained consent from BLB to the form of option agreed with the landlord and approved by Eversheds before the 31 December 2017 deadline, and the receipt of a subsequent request for an amendment did not alter that fact. In those circumstances it makes no difference that consent from the Toucan SPV and BLB remained outstanding (for some reason) on 9 April 2018.

1083. In relation to Upper Wick the version of the option approved by Toucan and the landlord differed from that approved by BLB in several respects.

1084. *First*, the BLB version provided for the SPV to pay landlord’s costs (which would be funded by Wirsol) up to £12,500 plus VAT whereas the Toucan/landlord version stated the figure as £13,500 plus VAT. That could clearly be a point of no consequence for BLB or Toucan.

1085. *Secondly*, in the BLB version of the option § 2.4 read as follows:

“The “Initial Rent” as set out in paragraph 1 of Schedule 3 shall be the Increased Rent as applicable and determined in accordance with the provisions of Schedule 3 of the Principal Lease for the last Review Period of the Term of the Principal Lease (or which would then be applicable but for any abatement or suspension of the Rent under the Principal Lease or restriction on the right to collect it) reviewed in accordance with the Schedule 3 as if the date of commencement of the Lease were a Review Date under the Lease and the rent for the remainder of the Term of the Lease shall be determined in accordance with

Schedule 3 of the Lease and for the avoidance of doubt the RPI value for "the Base Figure" in Schedule 3 of the Lease shall be the RPI figure for July 2015."

In the version approved by the landlord and Eversheds, clauses 2.4 and new 2.5 read:

"2.4 The "Initial Rent" as set out in paragraph 1 of Schedule 3 of the Lease shall be the Increased Rent as applicable and determined in accordance with the provisions of Schedule 3 of the Principal Lease for the last Review Period of the Term of the Principal Lease (or which would then be applicable but for any abatement or suspension of the Rent under the Principal Lease or restriction on the right to collect it) reviewed in accordance with Schedule 3 of the Principal Lease as if the date of commencement of the Lease were a Review Date under the Principal Lease and for the avoidance of doubt the RPI value for "the Base Figure" for the purposes of this clause 2.4 shall be the RPI figure for July 2015.

2.5 The rent for the remainder of the Term of the Lease shall be determined in accordance with Schedule 3 of the Lease."

1086. The Claimants say that the additions to clause 2.4 and 2.5 were material, citing paragraphs from Mr Kavanagh's witness statement in which he referred to a problem relating to compounding of inflation increases in rent and continued:

"52. I have reviewed the disclosure provided and can see that this was indeed a problem on Upper Wick and Widehurst. Tom Barnacle represented the landowners for Upper Wick and Widehurst and was attempting to introduce wording which related to compounded inflation. I have seen Eleanor Docherty at CMS wrote to Tom Barnacle and stated:

"Otherwise any reviews which have already been carried out and included in the Base Rent will be subject to review again and result in a compounded rent figure"

"To resolve this in your signed engrossments I propose you deleting the wording in clause 2.4 from "and for the avoidance of doubt" until the end of the clause in manuscript"

53 The result of this was CMS had (after business hours on 21 December 2017) inserted on Upper Wick and Widehurst clauses after BLB's consent and without informing RFE and our solicitors Eversheds at all. This changed the content of proposed lease option regarding clause 2.4 and introduced clause 2.5 which did not exist at all prior to this point. Both changes relate to cumulative inflation and I am sure CMS knew the SPV would not sign which is likely why CMS had informed BLB: *"we have terminated negotiations with the landlords for Upper Wick and*

Widehurst and we could not agree forms of option acceptable to the companies"

54 This is precisely the lack of transparency which concerned me. None of this was reported in the updates from Wirsol.”

1087. This passage in Mr Kavanagh’s witness statement improperly purports to give evidence, in the most tendentious manner, on matters outside his knowledge and which he has misunderstood.
1088. The first email Mr Kavanagh quotes, from Ms Vis of CMS (not Ms Docherty, though she was copied in) to the landlord’s solicitor was dated 19 December 2017. It made the point that as the Base Rent for the proposed new lease (to start after the existing term) would be the rent payable immediately before the commencement of the new lease, it would already have been subject to inflation-based rent increases during the term of the existing lease. Therefore the Base Figure for rent increase under the new lease would need to be adjusted to be the Base Figure for the term commencement i.e. as at the time when the new lease commenced. The email indicated that a lease amendment was needed, and suggested deletion of the words “*and for the avoidance of doubt the RPI value for "the Base Figure" in Schedule 3 of the Lease shall be the RPI figure for July 2015*” at the end of clause 2.4.
1089. It is evident that this problem was resolved, since at 12.49 on 21 December 2017 Ms Vis sent revised documents back to the landlord’s solicitor, explaining *inter alia* that “*As discussed, we have split the clause in two so that there is one clause dealing with the initial rent review and another dealing with rent for the remainder of the lease. We have then included your “for the avoidance of doubt” provision in the clause for the initial rent review.*” In other words, the splitting of clauses 2.4 into clauses 2.4 and 2.5 was part of the solution, avoiding any risk of the 2015 base cost being applied to rent reviews under the *new* lease thereby resulting in compounding.
1090. Then, as Mr Kavanagh was obliged to accept in cross-examination, at 17.53 the same day (21 December) CMS sent the redlined form of option agreement to Eversheds for approval, including the revised clauses 2.4 and 2.5.
1091. Accordingly, Mr Kavanagh’s allegation that CMS unilaterally, after business hours on 21 December, inserted revised wording including a new clause 2.5 contrary to Toucan’s interests is entirely wrong. On the contrary, the new wording improved Toucan’s position, was inserted during normal hours, was then sent to Toucan’s own solicitors (Eversheds) for approval, and Eversheds raised no objection. Moreover, the second email Mr Kavanagh cites, referring to termination of negotiations, dated from 8 December 2017 i.e. some 2 weeks previously. His suggestion that the change in the wording of clauses 2.4 and 2.5 was something which CMS knew the SPV would not agree to, leading to the termination of negotiations, is thus both chronologically and substantively misconceived. None of this ‘evidence’ should have been put forward at all in Mr Kavanagh’s witness statement.
1092. It is also clear that the modest changes to §§ 2.4 and 2.5 could not on any view have been detrimental to BLB’s interests. BLB would in practice have been bound to consent to them, and on that basis they were in a form satisfactory to the SPVs acting reasonably.

1093. *Thirdly*, a new § 4.2 was added in the Toucan/landlord version of the Upper Wick option as compared to the BLB version, providing that “*If the Option Notice is served, then the Landlord will procure that Thomas Rea and Katie Rea execute and complete the Lease in accordance with 4.1 above, unless Thomas Rea and Katie Rea no longer have an interest in the Landlord’s Property*”. As explained in a CMS email of 21 December 2017 to the landlord’s solicitors, Thomas and Katie Rea were the registered proprietors of one of the titles that made up the “*Landlord’s Property*”. The addition of this obligation on the grantors of the option (Colin and Louise Rea) to procure their signatures to the option lease, if they still retained an interest when the time arose, was thus an improvement to the SPV’s position as compared to the version BLB saw. It thus could not possibly be adverse to BLB’s interests.
1094. *Fourthly*, the version seen by BLB did not contain the signature page which was added later. That omission does not affect the bank’s consent.
1095. In relation to Widehurst, clauses 2.4/2.5 of the option agreement were changed in the same way as for Upper Wick, and the revised version was sent to Eversheds at 17.53 along with the Upper Wick document. The Claimants and Mr Kavanagh repeat the same error.
- (c) *Whether Toucan, acting reasonably, would have consented to the form of option*
1096. The Claimants refer to features of the forms of option agreement which they suggest would be grounds on which “*Toucan*”, presumably meaning the SPVs, would (acting reasonably) have declined to consent to them.
1097. These contentions do not in my view get off the ground. Each final form of option was sent to Eversheds, as set out in Enyo’s letter of 1 September 2020. No objections were raised by Eversheds, either before the deadline for compliance (31 December 2017) or later. Nor were any complaints raised with CMS by TLT when it conducted its review in March-April 2018. In the circumstances, the natural inference is that the proposed options were “*in a form satisfactory to the relevant Subsidiary (acting reasonably)*”.
1098. In any event, none of the points the Claimants identify is of any substance.
1099. In relation to Upper Wick and Widehurst, the Claimants rely on the changes to §§ 2.4 and 2.5, an objection which for the reasons I give above is baseless.
1100. In relation to Five Oaks, the ultimate landlords of the site were Mr Attfield and Mr Morris. Before the SPV (originally named RFE Solar Park 8 Limited and in May 2018 renamed Five Oaks Solar Farm Limited) acquired its lease, there was an agricultural lease over the site between the landlords and Five Oaks Farm Limited, a company controlled by the landlords.
1101. Messrs Attfield and Morris, Five Oaks Farm Limited, and the SPV are all signatories to the lease entered into on 29 January 2016, under which the SPV is granted its existing 30.5 year tenancy expiring in 2046. The same persons are also proposed signatories to the form of lease that would be granted if the option were exercised, for a term commencing on 29 July 2046 and ending on 31 March 2051.

1102. The option agreement, which Messrs Attfield and Morris executed in December 2017, provides in § 4.2 that Messrs Attfield and Morris will procure entry by “*the Existing Tenant*” (Five Oaks Farm Limited) into the new lease if it still has any interest in the land at that time. Messrs Attfield and Morris are directors of Five Oaks Farm Limited, but apparently believed that Five Oaks Farm was unlikely to hold any relevant interest in the land by 2046.
1103. The point which the Claimants appear to be making was not put with any clarity to Mr Hogan in cross-examination. It is apparent from their written closings that the Claimants’ objection is that as Five Oaks Farm Limited was not a party to the option agreement, “*Toucan would, at the very least, have wished to take advice as to whether this [clause 4.2 of the option] would suffice to protect their interests*”. Since, however, the form of option was provided to Eversheds and no objection was taken, Toucan (and, more relevantly, its SPV) *did* have the opportunity to take advice.
1104. In relation to Lisburn, the Claimants suggest that the final version of the option differs from the version sent to Eversheds, and that the final option contained a material error as the lease term was said to expire on 27 February 2017 rather than 27 February 2052.
1105. However, the version sent to Eversheds also stated the “*Lease Term*” to be “*the period commencing on the expiry of the Principal Leases and ending on 27 February 2017*”, so strictly speaking the option was in a form satisfactory to the SPV. That was an obvious typographical error, which could no doubt have been rectified, not least because the intention was clear from the definition of “Leases” in the same document:

“Leases: a lease of the Premises for the Lease Term and otherwise in the form attached, being in the same form and on the same terms as the Principal Leases, save for the term which in each case will expire on 27 February 2052.”

1106. In any event, the mistake was noticed prior to the 31 December 2017 deadline, and the landlords confirmed in a letter to the SPV dated 28 December 2017 as follows:

“As our solicitors offices are currently closed, we are writing to you to confirm that our solicitors are holding a signed option agreement duly executed by us in respect of the Property. Our solicitors are instructed to complete this option agreement as soon as the Company is also in a position to do so.

The option agreement grants the Company the right to new leases of the Property. The new leases to be granted pursuant to the option agreement are to be on the same terms as the Principal Leases save that the lease terms shall commence on the expiry of the Principal Leases and end on 27 February 2052. We note that the signed option agreement incorrectly refers to an end date for the leases of 2017, which is clearly an error. When our solicitors' offices reopen, we will instruct them to amend this error. Otherwise the signed option agreement accords with the heads of terms dated 11 December 2017.

We trust this letter is of assistance in evidencing our readiness to complete”

1107. The Claimants also submit that the Lisburn option was non compliant because it was contingent on side deals to which Toucan did not consent and would not have consented. The chronology in outline is as follows.

1108. Wirsol’s Belfast solicitors, Cleaver Fulton Rankin (“CFR”) emailed Wirsol on 15 December 2017 to say:

“Further to your email of this morning I have received a 'phone call from John McBurney's office to advise that the Option is approved and signed by the Lewis brothers, but that it will not be released unless you personally provide a written assurance that all of the previous agreements discussed between you and the Lewis brothers will be fulfilled.”

Mr McBurney was the solicitor for the landlords, the Lewis brothers.

1109. On 17 December Mr Hogan emailed a colleague at Wirsol (Simon McCarthy) saying “*Over the weekend I have been thinking up an undertaking that we can provide on Lisburn which will not require Rockfire's consent and be agreeable to the landowners*”.

1110. The following day, 18 December, CFR emailed the landlords’ solicitor saying:

“... To enable the Option Agreement to be released by your client our client has confirmed the following:-

1. It will not enter into any easement agreement with NIE without your client's consent.
2. It will undertake a tree management programme with the trees running parallel with Ballinderry Road. This has been agreed and a purchase order is attached herewith for your information. All costs in relation to this will be borne by Wirsol for the works to take place at the first available opportunity.
3. Your client will be able to continue to graze subject to the signing of a grazing licence.
4. Wirsol will monitor and maintain the drainage measures that have been implemented on site.

We trust that this is sufficient for your client to release the Option Agreement.”

1111. The landlords’ solicitors replied on 20 December:

“Further to our telephone conversation earlier, our clients have instructed that in addition to the matters you have covered they wish to have a term incorporated confirming that your client (Wirsol) will monitor and maintain the drainage measures that

have been implemented on site and any additional remedial measures occurring at any stage and produce (at Wirsol expense) written verification by an independent expert to our clients as and when requested from time to time.

To proceed further in relation to the April 2017 document mentioned our clients instruct that they require payment of an amount of \$218,500.00.”

1112. CFR emailed the landlords’ solicitors on 22 December at 11.51am:

“I refer to your email of 20 December. I understand that there have been discussions between Simon McCarthy, my client, and your clients and that various matters have been agreed between them which hopefully can alleviate the release of the executed Option Agreement. My client has given me to understand that it believes that this particular Agreement can be dealt with via exchange of correspondence. I set out the terms below instructed to me:

1. Wirsol will not enter into any easement agreement with NIE without your client's consent;
2. Wirsol will undertake a tree management programme of the trees running parallel with Ballinderry Road. This has been agreed and a purchase order has already been produced for your information. All costs in relation to this will be borne by Wirsol and the works are to take place at the first available opportunity;
3. Your client will be able to graze subject to the signed grazing licence;
4. During Wirsol's Operation and Maintenance (O&M) contract it agrees to monitor and maintain all drainage measures it implements. It also agrees to repair any damage caused to existing drainage during the park's construction and pay 50% of the fees of any agreed drainage expert in the event of any dispute;
5. With regard to a verbal agreement between Simon McCarthy, Wirsol and James Lewis on 21 December 2017, Wirsol will pay £12,000 upon receipt of an invoice for: full and final settlement for any outstanding works to the compound area, outside of the Solar Park leased by WEL Solar Park 15 on 14 November 2016.

I should be grateful if you could confirm your client's agreement to these terms and confirm that the exchange of correspondence suffices for this particular purpose.”

1113. The landlords’ solicitors responded at 13.05 the same day indicating that the wording their clients required for point 4 would be “*Wirsol will be liable for all remedial works that occur in relation to drainage at the solar farms*”.

1114. CFR replied, at 13.54 the same day (22 December):

“I now return a revised version of my earlier email. You will see that we have amended your suggested wording at item 4 as there has to be some limit on our client's liability to whatever it is indeed liable for. I trust this can be agreed and look forward to hearing from you.

Quite separately, I understand that your client has confirmed to my client that the Option Agreement which has been executed can be released and I should be grateful if you could arrange to let me have same.”

The revised wording read:

“1. Wirsol will not enter into any easement agreement with NIE without your client's consent;

2. Wirsol will undertake a tree management programme of the trees running parallel with Ballinderry Road. This has been agreed and a purchase order has already been produced for your information. All costs in relation to this will be borne by Wirsol and the works are to take place at the first available opportunity;

3. Your client will be able to graze subject to the signed grazing licence;

4. Wirsol will be liable for all remedial works in relation to drainage at the solar farms caused by the construction and operation of the Solar Park.

5. With regard to a verbal agreement between Simon McCarthy, Wirsol and James Lewis on 21 December 2017, Wirsol will pay £12,000 upon receipt of an invoice for: full and final settlement for any outstanding works to the compound area, outside of the Solar Park leased by WEL Solar Park 15 on 14 November 2016.”

1115. CFR also sent a second email at 13.54 on 22 December saying:

“On looking at this matter further, I had discovered a number of errors in the Option Agreement.

At clause option point 1 the definition of Lease Term and should read "and ending on 27 February 2047", not 2017.

In clause 1.2 the definition of Leases refers to Lease in the singular, whereas that should be plural.

Further in recital 3 on page 2, this should refer to "take leases over the option property".

I have been asked to seek your confirmation to these amendments being agreed prior to 31 December, and perhaps you could make the amendments in manuscript to the signed Option being held by you. I look forward to hearing from you further.”

It is not clear how those points were taken forward, though in the executed option agreement sent to CFR on 24 January 2018 (see below) they had been corrected (save that, correctly, the date stated for the end of the Lease Term was 2052 rather than 2047). Aside from the new lease end date, none of them was substantive, and Eversheds made no objection in relation to any of them.

1116. The landlords then sent the letter of 28 December 2017 quoted in § 1106 above.

1117. The correspondence continued on 3 January 2018, when CFR emailed the landlord’s solicitors:

“Further to our 'phone call this afternoon please see below a copy of our email to you of 22 December at 13:54 which does not seem to have reached you, and which hopefully resolves matters. I look forward to hearing from you further as soon as possible”

1118. The landlords’ solicitors responded the following day, 4 January, requesting further amendments, reported by CFR to Wirsol as follows:

“I have been speaking with Laura at John McBurney's office several times over the past couple of days. She has come back to me this afternoon to say that in relation to point 3 of the assurances set out below, her client would like to add the wording "as well as sub-letting the land for such grazing purposes" — is this acceptable?

In relation to point 5 below the Lewis brothers apparently raised an invoice before Christmas, and are checking if payment has been received”

1119. Wirsol agreed to these by CFR’s email of 5 January:

“Further to our “phone call on 4 January my client is agreeable to the wording of point 3 of the assurances to be amended by the addition of the words “as well as sub-letting the lands for such grazing purposes”. In relation to the payment at point 5 of the assurances, can your client please send the invoice to Andrew Standing, Wirsol’s UK Financial Controller, with a copy to Simon McCarthy. Andrew’s email address is andrew.standing@wirsol.co.uk, and any email should be copied to Simon McCarthy, whose email address is simon.mccarthy@wirsol.co.uk.

Please confirm by return that you are able to send the executed Option Agreements to me.”

1120. On 24 January 2018 the landlord's solicitors wrote to CFR:

“We refer to previous correspondence, discussions and exchanges herein and enclose herewith 3 invoices previously mentioned and with VAT elements included. Strictly on the basis that these are agreed and now being paid forthwith we enclose Option Agreement, in duplicate, duly signed by our clients for execution by your client and on your undertaking to let us have fully completed counterpart in due course.”

1121. The executed option agreement was enclosed with the letter. The three invoices were for (i) the landlord's solicitor's legal fees (§ 4 of the ALE Contract provided that Wirsol would be liable for these), (ii) £12,000 of work carried out at the Lisburn compound, and (iii) the option consideration under the option agreement itself.

1122. Some 2½ years later, the SPV had not entered into the option agreement, and the landlord's solicitors emailed Toucan on 22 June 2020:

“I have been instructed by Mr Lewis that the following arrangements, agreements and assurances are essential components of any Agreement going forward:-

1. Not to enter into any easement agreement with ME without our clients consent;
2. Undertake a tree management programme with the trees running parallel with Ballinderry Road;
3. Allow my clients to continue to graze livestock on the land (subject to signing of a grazing licence) and with the right to sub-let the lands for such purpose;
4. To monitor and maintain the drainage measures which have been implemented on site and any additional remedial measures occurring at any stage and produce (at your expense) written verification by an independent expert to my clients when requested from time to time.

As previously mentioned, there is also the substantial uplift of the Option Fee yet to be determined.”

1123. The critical question is whether, as at 31 December 2017, the landlords had confirmed in writing that they would execute and deliver an option agreement, which was in a form satisfactory to the relevant SPV (acting reasonably), subject only to the receipt of the counter-signature by the relevant SPV to the option agreement. The landlords' letter of 28 December 2017 to the SPV, quoted in § 1106 above, confirmed that they had executed an option agreement and had instructed their solicitors to complete it as soon as the SPV was in a position to do so. The letter also indicated that the landlords were willing to amend the option agreement to correct the one substantive error that had been identified; and (as noted earlier) the option was in a form which Eversheds had approved and was thus satisfactory to the SPV (acting reasonably). The option

agreement did not refer to, and thus would not have bound the SPV to, any of the collateral matters under discussion between the landlords and Wirsol; and the landlords' written confirmation was not qualified by reference to any of these matters. In these circumstances, § 10 of the ALE Contract was satisfied by 31 December 2017. The fact that the landlords later, in January 2018 and June 2020, appear to have changed tack and sought to re-open negotiations does not affect that conclusion.

1124. In any event, the collateral matters under discussion between the landlords and Wirsol were not matters that affected the SPV or, at any rate, could have given rise to any reasonable objection. The Defendants point out that their subject-matter was as follows:

- i) As at 22 December 2017 Wirsol had agreed not to enter into any easement agreement with Northern Ireland Electricity (NIE) without the landlords' consent. There was an historic dispute between NIE and the landlords, and provision of this assurance by Wirsol related to Wirsol's negotiations with NIE, on behalf of the landlords, to seek to agree this matter. It was the landlords who would be in a position to grant any easement over their land, not Wirsol, and Wirsol was not purporting to bind the SPV by its agreement.
- ii) As at 22 December 2017 Wirsol had agreed with the landlords to undertake a tree management programme at the site, for which it would bear all costs.
- iii) In relation to grazing, clause 2.1.1 of the existing lease provided that the landlords were entitled to graze the land the subject of the lease. Wirsol did not purport to grant any additional rights on behalf of the SPVs. The question about subletting grazing rights emerged only after the 31 December 2017 deadline, and in any event (even if it went beyond the lease), there is no reason to believe that the SPV could reasonably have objected to it given the existing grazing rights given to the landlords themselves.
- iv) As at 22 December 2017 Wirsol agreed with the landlords that it would be liable for all remedial works relating to drainage at the solar park caused by the construction and operation of the park. There was no attempt to impose any obligations on the SPV.
- v) On 21 December 2017 Wirsol had agreed to pay a £12,000 invoice for various work carried out to the compound area at the solar park in early 2017. Again, there was no attempt to impose an obligation on the SPV.

(d) Subsequent changes to the forms of option

1125. In relation to Five Oaks, the Claimants asserted under this heading that the option agreement that the landlords signed was created only on 3 January 2018, after the 31 December 2017 deadline. That contention was based on metadata for the copy of the document which formed part of the trial bundle.

1126. However, the relevant date under the ALE Contract was the date on which the landlords confirmed in writing their willingness to enter into an option in that form. As indicated in the Defendants' solicitors' letter of 1 September 2020 to Toucan, that occurred on

21 December 2017, when the landlord’s solicitor confirmed by email to CMS that the landlord would sign an execution copy of the agreement provided to it in hard copy.

1127. In any event, the Claimants’ point is wrong even in its own terms. A CMS email of 27 December 2017 records that the Defendants collected the signed option the previous Thursday. The metadata of the trial bundle copy most likely reflects merely the date on which the document was subsequently scanned.
1128. In relation to Lisburn, the Claimants rely on the corrections and alleged ‘side deals’ which I consider under subheading (d) above.
1129. On Shuttleworth, the Claimants suggest that the landlord’s lender, HSBC, “*did not provide formal approval until 3.1.18*”, citing an email of that date. However, receipt of approval from the landlord’s lender was not a requirement under the ALE Contract, provided the landlord itself had provided the requisite confirmation. In any event, the landlord’s solicitor stated on 22 December 2017 “*I have email confirmation from the relationship manager at HSBC that the consent is approved and will be formally provided by securities in the New Year*”. Thus even if the lender’s consent were required, it had been given.
1130. In relation to Upper Wick, the Claimants refer to the email dated 21 December 2017 from CMS to the landlord’s solicitors, quoted in part earlier, stating:

“Further to your conversation with Eleanor, please find attached the amended option agreements for Upper Wick and Widehurst and redlines of the same.

As discussed, we have split the clause in two so that there is one clause dealing with the initial rent review and another dealing with rent for the remainder of the lease. We have then included your “for the avoidance of doubt” provision in the clause for the initial rent review.

I can confirm that the company has agreed to the further £1,000 in respect of the landlord's costs for putting in place the agreement between Colin Rea and Louise Rea and Thomas Rea and Katie Rea.

For our records, please can you confirm on Upper Wick that you will make the latest amends in manuscript, and that the documents for this property are now agreed.

...”

1131. At 16.43 the same day, the landlord’s solicitor confirmed that the documents were now agreed.
1132. The Claimants’ complaint is that “*no version with the manuscript amendments has been disclosed*”. However, it is clear from the email as a whole that the amendments were the changes to clauses 2.4 and 2.5 discussed earlier, which had been agreed in principle by telephone, and which were reflected in the versions sent to Eversheds at 17.53 the

same day (21 December) noting that “*The landlord has confirmed that there will be no further amendments to the documents.*” There is accordingly no credible case that further changes were agreed with the landlords of which Eversheds were unaware.

(e) Adequacy of the alleged written confirmation from the landlord

1133. For each site, the Defendants identified the final form of option agreed by the landlord, and the confirmation provided in writing to CMS (or in the case of Lisburn, in a letter addressed to the SPV and sent to CMS) that the option was either already executed or that the landlord was ready to execute it. The Claimants do not appear to accept that a compliant confirmation was received in relation to any of the nine relevant sites (though their position in relation to Outwood, Shuttleworth and Upper Wick is unclear).
1134. In relation to Balcombe, the landlord’s solicitor stated by email on 11 December 2017 that his “*client signed the agreement on Friday and posted it back to me*”, and on 28 December confirmed that he was ready to proceed and asked CMS to let him know if they were able to exchange on that day. It is clear that the landlord was ready to proceed on the basis of the agreed form of option.
1135. For Five Oaks, the Claimants refer to the email from CMS to the landlords’ solicitors dated 27 December 2017 referred to in § 1127 above, which stated:

“Just to update you on the above, last Thursday your clients signed the original engrossment you sent to them and my client picked it up. My client's office has today arranged for this to be sent to you via Royal Mail's guaranteed next day delivery service. It should therefore arrive at your offices before 1pm on Thursday 28.12.17, The Royal Mail tracking number for it is: BH830321249GB.

I am now waiting for my client's instructions on completion and will be in touch as soon as I have a further update.”

1136. The fact that the landlord had actually signed the option agreement plainly constituted a confirmation in writing of their willingness to enter into it.
1137. As regards Home Farm, the Claimants refer to an email from the landlord’s solicitor to CMS dated 14 December 2017 stating “*I am now signed up and ready to complete*”. The Claimants fail to identify any basis on which they contend that that did not provide the requisite written confirmation, and I can see none.
1138. Regarding Lisburn, the Claimants make the point that there are unsigned versions in evidence of the landlords’ confirmation letter dated 28 December 2017, but that the metadata for the first signed version indicates that it was created on 2 January 2018, with another version created on 3 January 2018. The Claimants appear to suggest that it has not been established that the letter was signed and/or communicated prior to 31 December 2017. However, the Schedule to Wirsol’s letter of 30 December 2017 indicated that the landlord’s solicitor was holding a signed option and that in a letter addressed to the tenant the landlords had confirmed their agreement to amend a ‘typo’ in this signed option. That indicates that the letter of 28 December 2017 had indeed been communicated by 30 December 2017. Moreover, the Defendants’ written closing

indicated (and the Claimants did not dispute) that on the morning of 21 October 2020 (during trial) the Defendants disclosed for this limited purpose a privileged document in which Ms Eleanor Docherty of CMS confirmed that she received the signed version of the letter on 29 December 2017. In these circumstances, I am satisfied that the letter of 28 December 2017 had been received by the 31 December 2017 deadline.

1139. As to Outwood, the Claimants refer to an email from the landlord's solicitor dated 14 December 2017 saying "*thanks I have the signed document and await hearing from the Bank re consent*", and that the lender (HSBC) provided consent to the landlord on 22 December 2017, who forwarded it to Mr Richardson of Wirsol. My comments in § 1129 above apply again.
1140. As to Shuttleworth, the Claimants note that on 22 December the landlord's solicitor confirmed to CMS that the option agreement could be couriered to the landlord for signature. That confirmation in itself satisfied § 10(a).
1141. For Upper Wick, the Claimants refer to the landlord's solicitor's email of 21 December 2017 confirming that the Upper Wick option was agreed. That confirmation satisfied § 10(a).
1142. For Widehurst, the Claimants refer to the landlord's solicitor's email on 21 December 2017 confirming "*I have signed documents for Widehurst*". The email chain below makes clear that the documents referred to comprised or included the option agreement, and it is unclear on what basis the Claimants suggest that this failed to provide the necessary confirmation. In my view it did.
1143. Similarly, for Wilbees the landlord's solicitor stated on 20 December 2017 that she was "*in receipt of the signed Option Agreement. Please let me know when you are in a position to complete the same*". That communication provided the required confirmation.

(f) Whether an engrossment form of option was provided to the Claimants

1144. The Claimants note that Wirsol's letter of 30 December 2017 to Toucan stated *inter alia* that "*The relevant landlord's solicitor has confirmed they are holding an option signed by the relevant landlord. A copy of the engrossment form of option has been provided to the solicitors acting for [Toucan Gen Co] and [Toucan Energy]*". They contend that that had not in fact been done for any site.
1145. Clause 10(a) did not require an engrossment form of option to be provided to the Claimants. In any event, the final forms of the option agreements were in fact provided to the SPVs' solicitors in every case. Further, CMS by email of 18 December 2017 requested confirmation from Eversheds "*that all the options are approved, and instructions as to where to send engrossments*", but appear to have received no response. There is nothing in this point.

(g) Whether a planning extension was achieved

1146. The Defendants accept that § 10(c) required a planning extension, covering the extended period of the option/lease. The Claimants accept that that occurred, save in relation to Widehurst and Wilbees.

1147. As to Widehurst, apparently by error, the extended planning extension was requested until 18 February 2052, whereas the expiry of the original lease was 28 March 2052, a discrepancy of 39 days. The planning application stated in the proposal “*amendment to extend the expiration date to 18 February 2052 (currently expiry date is 18 February 2047)*”, and the planning authority’s acknowledgment of the application repeated this wording, as did the grant of the application in November 2017.
1148. When the planning permission was provided to Eversheds and Ms Doherty asked if Toucan had any “*queries or concerns in relation to the 11 planning permissions delivered so far*”, this issue was not raised. An internal email from Ms Donoghue of Toucan to Mr Croucher in November 2017 also indicated that Toucan considered everything in order at that time.
1149. The Defendants submit that this error would obviously have been corrected by the Council if requested, and that it could not have been the parties’ intention for a minor error of this type, overlooked by all parties and of very limited scope, to deny Wirsol any entitlement to payment in respect of the ALE for Widehurst. I have some sympathy with that view, but do not consider it can be reconciled with the express requirement in § 10(c) for “*up to date planning permissions ... allowing... for an electricity generation period which extends asset life of the Project as at the date of this deed... by an additional five years*”.
1150. The Defendants also rely on the following portion of the cross-examination of Mr Kavanagh, concerning evidence in his statement that he had seen reference to this issue on the 1 December 2017 iteration of the weekly ‘tracker’ document exchanged between the parties:

“Q. ... Are you saying that you appreciated this in December 2017 or is this a matter that you realised when you reviewed the documents for this trial?

A. Sorry. Did I know about this problem in --

Q. Yes. To summarise, you discussed this point here, but I was unclear whether you were saying "We thought this at the time in December 2017 when we received the planning permission document", or whether this is a point you picked up later once these proceedings began?

A. No. When I instructed Mr Croucher to do this work (inaudible).

Q. You were aware of this in December 2017?

A. From this -- from the tracker, yes.

Q. If you were aware there was a problem on this, why did you not raise that with Wirsol?

A. I assumed Mr Croucher had raised it with Wirsol. That was their job.

Q. So you appreciated that if you had spotted an error, it should be raised with Wirsol?

A. I would have thought so, yes.”

1151. The Defendants suggest that Toucan’s failure to inform Wirsol of the error when it was discovered in December 2017 was a breach of Toucan Gen Co’s obligation under § 6 of the ALE Contract to “*not act in a way which it knows is reasonably likely to frustrate or prejudice the Asset Life Extension*”. I do not accept that submission. The matters identified on the tracker were there for all to see, and I see no reason to believe that Mr Kavanagh or Mr Croucher would have assumed they had been overlooked, rather than that they were on Wirsol’s agenda to be addressed. I would in any event doubt that a failure to point out an apparent error in Wirsol’s part would amount to “*act[ing] in a way ... reasonably likely to frustrate or prejudice*” the ALE. That clause is more likely in my view to relate to positive frustrating action of some kind, or at least to a failure to take action which Toucan Gen Co was required to take in order to make the ALE workable.
1152. As regards Wilbees, the Claimants allege that two planning applications required to be extended, as the Defendants were specifically advised by their planning consultants; that the second extension had been refused and the refusal concealed from Toucan; and that Mr McCarthy of Wirsol knew that this second extension remained outstanding after the 31 December 2017 deadline and impacted on the conditions subsequent under the ALE Contract.
1153. The Defendants have explained, by reference to the documents, that there were in fact three planning applications.
1154. First, Wirsol made the application necessary to comply with § 10(c) of the ALE Contract on 17 August 2017 (Wealden District Council reference WD/2015/2405/FA) for extension of planning permission from 25 to 30 years for the solar park; and that permission was granted on 20 December 2017.
1155. Secondly, by an email of 10 July 2017 a planning consultancy company engaged by Wirsol, known as Aardvark, informed Wirsol that the solar park and the cable route (to enable grid connection) were originally submitted under two separate planning applications and they would need to be separately extended. The Wealden Council reference for the cable route application was WD/2015/2543/F. Mr McCarthy of Wirsol replied to Aardvark on 20 September 2017 explaining his understanding that the separate application for a cable route was made, but that at adoption the cable route fell under the permitted development rights of the DNO and it was not necessary for Wirsol to vary this permission to extend its term. Mr McCarthy enclosed the original cable route application to Aardvark with his email. The Defendants ultimately decided that an extension of the cable route application WD/2015/2543/F was not required, and did not make a corresponding application.
1156. Thirdly, the documents which the Claimants cite for their contention that the second planning application was refused, concealed and eventually granted only in May 2018 (after the deadline) concerns a third (and again different) planning application. That was a partly-granted Non Material Amendment (“*NMA*”) to the planning permission for the solar park, made on 12 June 2017. The rejected element of the NMA concerned

“amendments to the angles of the solar panels, the layout of panels and the position of the internal access road within the site, and the DNO/transformer building, including the addition of external lighting”. The NMA was re-submitted to the Council on January 2018 as a Minor Material Amendment application (Wealden Council reference number WD/2018/0177/MFA) and granted on 2 May 2018.

1157. It appears that Mr McCarthy of Wirsol was concerned about the potential impact of the partly-rejected NMA application, and his email of 27 October 2017 indicates that upon receipt of the notice he asked the Wirsol team not to inform Toucan Energy of the position.
1158. However, the NMA application was separate from both of the two applications referred to above, and did not relate to the extension required under the ALE Contract. I do not therefore consider it relevant.

(10) Conclusion on ALE Contract claims

1159. For the reasons set out above, Wirsol’s claim under the ALE Contract succeeds, save in relation to the Widehurst site where I have concluded that the requisite planning permission was not obtained.

(Y) ADDITIONAL CLAIMS AGAINST THE SPVS

1160. Wirsol seeks declarations against the SPVs in relation to the termination of the EPC Contracts and O&M contracts. In the light of my conclusions in section (S)(1) above, they will be entitled to a declaration at most in relation to the Cranham site.
1161. Wirsol counterclaims against each of the 15 SPVs for recovery of sums called under the Performance Bonds on 24 August 2018. The total sum called was £2,995,716.57. Wirsol agreed to release £209,325.83 as part of a compromise of some of the parties’ claims/counterclaims. Wirsol’s counterclaim relates to the balance of £2,786,390.74.
1162. Clause 4.2 of the EPC Contracts provides for the SPVs to indemnify Wirsol against any claim made under the Performance Bonds, to the extent the claim is improperly made. The call was said to be justified by reference to the defects notices that had been issued as of the date of the call. Whether, and if so to what extent, the calls were justified will depend on the quantification of the damages recoverable in respect of such of the claimed defects as I have found to exist (sections (F) to (N) above).
1163. To the extent that any claim under the Performance Bonds is found to have been excessive, Wirsol claims an indemnity under § 4.2 of the EPC Contracts for its resulting losses. The losses are said to arise because (a) Wircon Germany was required to reimburse the Performance Bond provider (Euler Hermes) for the amounts claimed by the SPVs pursuant to a guarantee facility; (b) Wirsol was then obliged to reimburse Wircon Germany for the same amounts; and (c) Wirsol borrowed funds from Wircon Germany to enable Wirsol to make this reimbursement, pursuant to a Loan Agreement dated 13 September 2018, at an interest rate of 6.5% per annum. Resolution of these claims should be deferred until it is clear whether or not they arise, in the light of the quantification of the Claimants’ successful defects claims.

(Z) OVERALL CONCLUSIONS

1164. My conclusions may be summarised as follows:

- i) The Claimants' claims in relation to transformer and busbar capacity succeed to the extent indicated in sections (F)(9)-(11) above.
- ii) The claim for loss caused by clipping of inverters succeeds to the extent indicated in section (G)(6) above.
- iii) The claim in relation to water ingress succeeds to the extent indicated in section (J) above.
- iv) The claims in relation to HV circuit breakers and miniature circuit breakers succeed to the extent indicated in sections (L)(2) and (6) above.
- v) The claim relating to remote monitoring of transformer temperature at three sites succeeds in principle (section (M)(3) and (6) above).
- vi) The claim relating to landscaping at two sites succeeds (section (N) above).
- vii) The claim for breach of the 25-year design warranty succeeds only insofar as it concerns lack of HV circuit breakers, but does not give rise to any additional damages (section (O)(6) above).
- viii) The Claimants' claims relating to forced air cooled transformers, humidity, plywood floors, LV circuit breakers, bus section circuit breakers, the Wilbees third circuit breaker, other monitoring defects, blight, refinancing costs, delay liquidated damages, Abakus Byes liquidated damages and the Outwood option fail (sections (H), (I), (K), (L)(3)-(5), (M)(1)(2), (4) and (5), (Q), (R), (T), (U) and (V) above).
- ix) The Claimants were entitled to terminate the EPC Contracts and O&M Agreements, save in relation to Cranham, but their claim for damages arising from termination of the O&M Agreements fails (section (S) above).
- x) The Claimants' claims for breach of warranty in principle succeed in part but do not give rise to any additional damages (section (W) above).
- xi) The Defendants' counterclaim under the ALE Contract succeeds except in relation to Widehurst (section (X) above).
- xii) The Defendants' counterclaim relating to the performance bonds falls to be determined in the light of the quantification of such of the Claimants' defects claims have succeeded (section (Y) above).

ANNEX – THE DEFENDANTS’ APPLICATION TO AMEND

(1) Introduction

1. At the start of the trial, both parties applied for permission to amend. In the event, the Claimants’ application was not contested but the Defendants’ was.
2. The hearing of the Defendants’ application occupied the first day of the trial and part of the following day. To avoid further delaying the start of the trial proper, I gave my ruling on the amendment orally on the morning of Day 2 with reasons to follow at a later stage. This Annex sets out my reasons for giving permission to amend in part and refusing it in part. These focus only on those parts of the proposed amendments as remained contentious by the end of the application.

(2) Applicable principles

3. The principles were essentially common ground, and I summarise them below.
4. The Court has a discretion to permit amendments to a statement of case under CPR rules 17.1(2)(b) and 17.3. The Court’s discretion should be exercised in accordance with the overriding objective under CPR r. 1.1(1) to deal with cases “*justly and at proportionate cost*”. CPR rule 1.1(2) indicates that:

“(2) Dealing with a case justly and at proportionate cost includes, so far as is practicable—

(a) ensuring that the parties are on an equal footing;

(b) saving expense;

(c) dealing with the case in ways which are proportionate—

(i) to the amount of money involved;

(ii) to the importance of the case;

(iii) to the complexity of the issues; and

(iv) to the financial position of each party;

(d) ensuring that it is dealt with expeditiously and fairly;

(e) allotting to it an appropriate share of the court’s resources, while taking into account the need to allot resources to other cases; and

(f) enforcing compliance with rules, practice directions and orders.”

5. Further, as this Court held in *Scott v Singh* [2020] EWHC 1714 (Comm) (HHJ Eyre QC):

- i) the proposed amendment must be properly formulated (§18);
 - ii) if the proposed amendment raises a new claim or defence, it must have a real prospect of success (§ 19); and
 - iii) if the proposed amendment is “*very late*” in that it would require the vacation of an existing trial date, there is a heavy burden on the applicant to show that justice requires that they be permitted to advance their amended case (§ 20).
6. In *Quah Su-Ling v Goldman Sachs International* [2015] EWHC 759 (Comm), where the claimant applied two weeks before trial to amend the particulars of claim, it was conceded that the unamended claim was unsustainable and that the proposed amendments “*wholly change the nature of the case*” (§ 32). The lateness of the application led to the trial date being vacated. Carr J summarised the relevant principles as follows:

“Drawing these authorities together, the relevant principles can be stated simply as follows:

(a) whether to allow an amendment is a matter for the discretion of the court. In exercising that discretion, the overriding objective is of the greatest importance. Applications always involve the court striking a balance between injustice to the applicant if the amendment is refused, and injustice to the opposing party and other litigants in general, if the amendment is permitted;

(b) where a very late application to amend is made the correct approach is not that the amendments ought, in general, to be allowed so that the real dispute between the parties can be adjudicated upon. Rather, a heavy burden lies on a party seeking a very late amendment to show the strength of the new case and why justice to him, his opponent and other court users requires him to be able to pursue it. The risk to a trial date may mean that the lateness of the application to amend will of itself cause the balance to be loaded heavily against the grant of permission;

(c) a very late amendment is one made when the trial date has been fixed and where permitting the amendments would cause the trial date to be lost. Parties and the court have a legitimate expectation that trial fixtures will be kept;

(d) lateness is not an absolute, but a relative concept. It depends on a review of the nature of the proposed amendment, the quality of the explanation for its timing, and a fair appreciation of the consequences in terms of work wasted and consequential work to be done;

(e) gone are the days when it was sufficient for the amending party to argue that no prejudice had been suffered, save as to

costs. In the modern era it is more readily recognised that the payment of costs may not be adequate compensation;

(f) it is incumbent on a party seeking the indulgence of the court to be allowed to raise a late claim to provide a good explanation for the delay;

(g) a much stricter view is taken nowadays of non-compliance with the Civil Procedure Rules and directions of the Court. The achievement of justice means something different now. Parties can no longer expect indulgence if they fail to comply with their procedural obligations because those obligations not only serve the purpose of ensuring that they conduct the litigation proportionately in order to ensure their own costs are kept within proportionate bounds but also the wider public interest of ensuring that other litigants can obtain justice efficiently and proportionately, and that the courts enable them to do so.” (§ 38)

7. In *CIP Properties (AIPT) v Galliford Try Infrastructure Limited* [2015] EWHC 1345 (TCC) permission was sought for extensive amendments to the claimant’s case that would necessitate the adjournment of a trial date that Coulson J concluded it was imperative to maintain (see §§ 11 and 13). Coulson J gave the following further summary of the relevant principles:-

“In summary, therefore, I consider that the right approach to amendments is as follows:

(a) The lateness by which an amendment is produced is a relative concept (*Hague Plant*). An amendment is late if it could have been advanced earlier, or involves the duplication of cost and effort, or if it requires the resisting party to revisit any of the significant steps in the litigation (such as disclosure or the provision of witness statements and expert’s reports) which have been completed by the time of the amendment.

(b) An amendment can be regarded as ‘very late’ if permission to amend threatens the trial date (*Swain-Mason*), even if the application is made some months before the trial is due to start. Parties have a legitimate expectation that trial dates will be met and not adjourned without good reason (*Brown*¹).

(c) The history of the amendment, together with an explanation for its lateness, is a matter for the amending party and is an important factor in the necessary balancing exercise (*Brown*; *Wani*²). In essence, there must be a good reason for the delay (*Brown*).

¹ *Brown v Innovatorone Plc* [2011] EWHC 3221 (Comm) at [14] (Hamblen J)

² *Wani LLP v Royal Bank of Scotland Plc* [2015] EWHC 1181 (Ch) (Henderson J)

(d) The particularity and/or clarity of the proposed amendment then has to be considered, because different considerations may well apply to amendments which are not tightly-drawn or focused (*Swain Mason; Hague Plant; Wani*).

(e) The prejudice to the resisting parties if the amendments are allowed will incorporate, at one end of the spectrum, the simple fact of being 'mucked around' (*Worldwide*), to the disruption of and additional pressure on their lawyers in the run-up to trial (*Bourke*³), and the duplication of cost and effort (*Hague Plant*) at the other. If allowing the amendments would necessitate the adjournment of the trial, that may be an overwhelming reason to refuse the amendments (*Swain Mason*).

(f) Prejudice to the amending party if the amendments are not allowed will, obviously, include its inability to advance its amended case, but that is just one factor to be considered (*Swain-Mason*). Moreover, if that prejudice has come about by the amending party's own conduct, then it is a much less important element of the balancing exercise (*Archlane*⁴). (§ 19)

Coulson J also indicated that the starting point for amendments under CPR 17 is no longer to the effect that amendments in general ought to be allowed so that the real dispute between the parties can be adjudicated upon, provided that any prejudice to the other party caused by the amendments can be compensated for in costs (§ 15).

8. As to prospects of success, if there are no real prospects then that is determinative. Apparent lack of prospects, even when not so low as to meet the CPR Part 24 threshold, is also a factor against the granting of permission. The court is not expected to conduct a mini-trial, but that does not mean that the court must take at face value and without analysis anything that a party says in its statements before the court. It may, for example, be clear that there is no real substance in factual assertions made, particularly if contradicted by contemporaneous documents (see *ADVA Optical Networking Ltd v Optron Holding Ltd* [2018] EWHC 852 (TCC) §§ 30-35 (Joanna Smith QC)).
9. It is relevant to have regard to the degree to which the case sought to be advanced by the amendment is one that the parties have in fact already been addressing. In *Hawksworth v Chief Constable of Staffordshire* [2012] EWCA Civ 293 (CA), the Court of Appeal stated, *obiter*, that it might be appropriate to permit an amendment at trial in respect of a matter which, although not raised in the pleadings, had nevertheless been raised in some of the witness statements and experts' reports served before trial. In *Ahmed v Ahmed* [2016] EWCA Civ 686, the claimants applied to have letters of administration revoked on the basis that the will annexed to them had not been duly executed or witnessed. At the start of the trial the claimants obtained permission to amend their particulars of claim so as to allege that the will had been forged. The Court of Appeal dismissed an appeal against that grant of permission: the amendment was no

³ *Bourke v Fayre* [2015] EWHC 277 (Ch) (Nugee J)

⁴ *Archlane Ltd v Johnson Controls Ltd* [2012] 5 WLUK 335 (TCC) (Edwards-Stuart)

more than a formality bringing the claimants' case into line with what had been argued for at least six months; the appellants had not been taken by surprise by the amendment and, indeed, had themselves sought at the pre-trial review permission to call a handwriting expert.

10. On the other hand, the mere fact that an issue has received *some* attention in the preparation of the case and the experts' reports is not necessarily sufficient to make permission to amend appropriate. In *Willmott Dixon Construction Ltd v Robert West Consulting Ltd* [2016] EWHC 3291, Coulson J refused to grant permission for amendments by a defendant to its technical case. He did not consider the proposed new case to be arguable, but added *obiter*:

“25. Now let us assume that I am wrong on both points above, so that the issue of law is at least arguable as a matter of contributory negligence. Even if that were the case, I would still refuse to allow the amendments to Response 14. There are two reasons for that.

26. The first is because the amendments were made late, only a few weeks before trial (and with a holiday period intervening). The lateness is neither explained nor the subject of any explanation.

27. The second is because of all the uncertainties that the amendments introduce, and the inevitable adjournment of the trial if they were allowed. On the basis of the case as it presently exists, the claimant has devoted little time, and little of its expert's report, to a consideration of the allegations of contributory negligence arising out of the underpinning works. That is because the claim has hitherto been put on the narrow basis indicated in *D&F Estates* (i.e. actual knowledge and condoning of the wrong) and the claimant has decided – whether rightly or wrongly – that it has a good case in defence of that very specific allegation.

28. I accept Mr Sullivan's proposition that, if these amendments were allowed, they would require the claimant to reconsider this whole aspect of the case and, more than likely, to focus upon matters which it had previously thought were unnecessary. It would give the case on workmanship and inspection a completely different emphasis. Out of caution, the claimant would have to put itself into the shoes of *Toureen* and look at all the factual and expert issues (not just the narrow *D&F Estates* point), to gather evidence in response and weigh its potential liability for contributory negligence on this new basis.

29. It would not stop there. No matter what my views are as to the inherent dangerousness exception as a matter of law, and the difficulty of arguing the point in this case (paragraph 14 above), the claimant would need carefully to consider that aspect of the amendments, for the first time, and in very short order. It may be

a matter on which expert, as well as factual, evidence is thought to be required. I acknowledge at once that Ms McCafferty properly indicated that this would not be how the case would be presented at trial, but the discussion of the law set out above demonstrates that considerations of inherent danger may easily become part of the defendant's case, even by default.

30. Thus, if I allowed these amendments, they would not only comprise an unwelcome and unnecessary distraction to the claimant as it prepares for a trial that is a month away, but it would probably also give rise to the need for further evidence, perhaps including expert evidence. That would fatally jeopardise the trial date. On an application of the relevant principles summarised by Carr J in *Su-Ling*, I am bound to conclude that it would not be appropriate to allow the amendments in those circumstances.”

11. In relation to amendments constituting withdrawal of admissions, particular considerations apply when seeking permission under CPR 14.1(5). These are set out at CPR 14 PD 7.2:

“In deciding whether to give permission for an admission to be withdrawn, the court will have regard to all the circumstances of the case, including –

- a) the grounds upon which the applicant seeks to withdraw the admission including whether or not new evidence has come to light which was not available at the time the admission was made;
- b) the conduct of the parties, including any conduct which led the party making the admission to do so;
- c) the prejudice caused to any person if the admission is withdrawn;
- d) the prejudice that may be caused to any person if the application is refused;
- e) the stage in the proceedings at which the application to withdraw is made, in particular in relation to the date or period fixed for trial;
- f) the prospects of success (if the admission is withdrawn) of the claim or part of the claim in relation to which the admission was made; and
- g) the interests of the administration of justice.”

12. ADVA §§ 16-18 summarises the law on applications to withdraw admissions, and includes reference to the judgment of Sumner J in *Braybrook v Basildon and Thurrock University NHS Trust* [2004] EWHC 3436 QB stating *inter alia* that the “*nearer any application is to a final hearing the less chance of success it will have even if the party making the application can establish clear prejudice. This may be decisive if the application is shortly before the hearing.*”

(3) Background

13. The Claimants issued the present claim and served their original Particulars of Claim in October 2018. The Defence was served in November 2018, and a Reply and Defence to Counterclaim on a date which cannot be ascertained from the current iteration of that document provided to the court.
14. A Scott Schedule was initiated in March 2019, setting out the Claimants’ position on the alleged defects in the solar parks, to which the Defendants’ responses and the Claimants’ replies were added later.
15. These statements of case were amended on various later occasions. As at the date of the amendment application, the latest iterations were the Re-Re-Amended Particulars of Claim dated 1 September 2020 (but, given the date of the next document, presumably served on some date prior to then), the Re-Re-Amended Defence dated 25 August 2020, the Re-Re-Amended Reply and Defence to Counterclaim dated 1 September 2020 and the Amended Scott Schedule dated 2 September 2020. (For brevity, however, I refer in this Annex simply to the “*Particulars of Claim*” and the “*Defence*”.)
16. The defects experts’ Joint Memorandum preceded the experts’ reports and was dated 3 June 2020. The experts subsequently served their main reports on 24 June 2020 and supplemental reports on 31 July 2020.
17. On 20 July 2020, the Defendants’ solicitors, Enyo Law LLP (“*Enyo*”), wrote to the Claimants’ solicitors, Stewarts Law LLP (“*Stewarts*”), raising a concern as to “*a disconnect between the parties’ statements of case and expert evidence*”. By way of example, Enyo identified (among others) an unpleaded allegation relating to the painting of transformers emerging from the expert report of Mr Ryder served on behalf of the Claimants:

“... we note that Mr Ryder has sought to expand the Claimants’ case in his expert report by relying upon the state of the paint applied to the transformers in support of the alleged failure to design solar parks with an operating life of 25 years... This is not a pleaded allegation, nor has disclosure or witness evidence been provided. As such, it is not a matter before the court...”

18. On 21 July 2020, Stewarts replied, asserting that “*[t]he cases being advanced are the pleaded cases*”, and responded thus to Enyo’s specific concern in relation to the paint allegation:

“... this issue is referred to in the defects’ experts joint memorandum... and it is addressed (in part) by Dr Lockwood in his report... it is an expert-led point which has long been on the

defects experts' agenda and, as such, it is hard to see what witness evidence or disclosure would be necessary."

19. The Defendants say they understood the Claimants thus to be taking the position that it was not necessary to amend pleadings to reflect points that were canvassed and debated in the expert evidence, and thus let the matter lie. The Defendants say that is the reason why, following the further events outlined below, the present application was made only on in late September 2020, shortly before trial.
20. A Pre-Trial Review took place on 24 July 2020, at which neither side raised anything connected with amendments to statements of case.
21. Shortly thereafter, the parties' supplemental experts' reports served on 31 July 2020 included material addressing several of the topics which are the subject of the present application for permission to amend, without indicating any reservation of position (for example, to the effect that matters were being dealt with only briefly as they were unpleaded). Indeed, as I note under heading (4) below, the Claimants' case on transformer and busbar capacity (in particular) has in reality been elaborated only in experts' reports and the Joint Memorandum rather than in statements of case or the Scott Schedule. Nor was any suggestion made at this stage that the matters set out in the Defendants' experts reports would, if they were to be advanced, require further disclosure or factual witness evidence.
22. The Defendants' skeleton argument indicates that in the course of trial preparations, the Defendants' legal team took the view that it would assist the court to be provided with pleadings reflecting the case actually advanced by each side. On 25 September 2020, Enyo wrote to Stewarts enclosing draft amendments reflecting (insofar as they are now contested) the evidence of the defects experts, and inviting the Claimants to do likewise. On 29 September 2020, Stewarts responded, objecting to the bulk of the proposed amendments.
23. On 30 September 2020, the parties served their opening submissions. On the same date, the Defendants issued the present application for permission to amend, supported by the eighth witness statement of their solicitor, Mr Allen. On 5 October 2020 the Claimants served the second witness statement of their solicitor, Mr Jones, in opposition to the application. Mr Jones exhibited, among other things, Notes for the court provided by the Claimants' two defects experts, Mr Ryder and Mr Halliday. These set out their understanding of the points that the Defendants wished to advance, based on the proposed amendments, and the further work which the experts considered would be necessary in order fully and properly to respond to them.

(4) Transformer and busbar capacity

24. The Particulars of Claim set out no details of what is meant by the "*maximum load curve provided by the PV system*", the "*appropriate settings*" or "*any ratio*".
25. The response to this allegation in § 17 of the original Defence was based on the solar parks' stated maximum power outputs, which it is said are virtually never achieved due to efficiency losses and to constantly changing irradiance conditions.

26. By an amendment in 2019, the Defendants added a case based on the argument that the maximum load curve provided by the PV system meant the rated current of the inverters forming part of that system (Amended Defence § 17(A)(2)). The first two sentences of that paragraph read:
- “The maximum currents set out in the Amended Scott Schedule are accurately stated in the second sentence of item 1. However, the relevant current for the purposes of assessing “*the rated output for the maximum load curve*” is the rated current from the connected inverters set in accordance with the manufacturer’s specification.”
27. Item 1 in the Amended Scott Schedule begins by listing “*The maximum current from the connected inverters ...*”, stating in each case the maximum current each inverter (taken in isolation) was capable of providing.
28. The Claimants appear to suggest that the first sentence of Amended Defence § 17(A)(1) constitutes an admission that that was the current which the inverters were in fact producing. I do not agree. That interpretation would ignore the word “*maximum*” and would in any event be inconsistent with, for example, the pre-existing defence in Defence § 17 referred to in § 25 above, which is maintained.
29. The parties’ positions are set out in more detail in the Scott Schedule, which has gone through various iterations. The Amended Reduced Scott Schedule is dated 2 September 2020. Item 1 deals with capacity of transformers and busbars. It sets out the inverter maximum currents, and (currently) the Defendants’ case based on rated inverter current. The Claimants in the reply column say that the current they have specified for each site “*is produced by the inverter*”; that what matters is not the rated current but “*the actual current running through the busbars*” (into which the current from the inverters is fed); and that “[*t*]he levels of current set out by the Claimants is frequently provided by the inverters ...”
30. The defects experts’ Joint Memorandum considerably elaborates both parties’ cases on capacity, based on views expressed by experts. For the Claimants, this includes:
- i) Mr Ryder’s interpretation of ‘*on any ratio*’ as meaning any voltage ratio which may arise from variation of network voltage as provided for by the Connection Agreement between solar park operator and the DNO (distribution network operator);
 - ii) Mr Ryder’s point that the relevant current is the maximum inverter current, which he says will likely be reached when operating at 0.95 leading power factor (absorbing reactive power from the network) and 94% rated voltage, as potentially required by the Connection Agreement, and which he says operational experience indicates can be experienced in practice; and
 - iii) Mr Ryder’s further point that as the contract provides for operation at a maximum ambient temperature of 45%, compared to the 40% referred to in the national standard, a particular 2.6% adjustment has to be applied to the transformer rating.

31. Equally, the Joint Memorandum (item 1) records the disagreement of the Defendants' expert (Dr Lockwood) with each of those points of elaboration, including Dr Lockwood's points that:
- i) the highest inverter current in practice is likely to occur when operating at 94% of nominal voltage and 0.95 lagging (exporting reactive power to the network), rather than leading, power factor;
 - ii) if the DNO requires low voltage, e.g. 94 or 95% of notional, then the relevant settings would include adjusting the transformer taps, one of whose purposes is to compensate for variations in network voltage requirements;
 - iii) transformers and busbars have an overload capacity; and
 - iv) the alleged defect should be viewed in the context of the Guaranteed and Minimum Performance requirements for the solar parks set out in the contract.
32. Points (i) and (ii) above are developed and discussed in both parties' experts' reports. Regarding point (i) above, Dr Lockwood makes *inter alia* the point that 94% voltage and 0.95 leading power factor could never happen in practice because (in simple terms) a leading power factor is used when network voltage is above nominal; and supplying a leading power factor where the network voltage was below nominal would simply make the problem worse. On this particular matter, Mr Ryder appears in his report to take his stand on the fact that the Connection Agreement could in theory require that combination of voltage and power factor. However, in his supplementary report he nonetheless includes (in Part 7 §§ 20 and 23) ageing calculations based on four permutations involving low voltage and either 0.95 leading or 0.95 lagging power factor.
33. The disputed proposed amendments to the relevant parts of Defence § 17 would allow the Defendants to plead the responses already given, and discussed in the experts' reports, (a) that the higher inverter current in practice arises in conditions of 0.95 lagging power factor and 94% voltage; and (b) that periods of sustained low network voltage can be adjusted for using the transformer taps. (The Defendants clarified in oral argument that, on this latter point, they wish to be able to argue that the taps can be used to adjust for periods of sustained low voltage, but no more.) Those points arise directly from the case that the Claimants seek to advance, as set out not in their pleadings but in the Joint Memorandum; and they have been canvassed in detail already between the experts.
34. Mr Ryder suggests that more information would be needed on these matters (in particular, further calculations on lagging/leading power factors, and efforts to demonstrate their validity by way of examples or other means; and further study of documentation and literature regarding the use of taps). However, these matters are in my view squarely in issue between the parties already, and it would be unfair to shut the Defendants out from putting forward their response to the Claimants' case as the latter has been elucidated through the means I have identified above. If further work is needed, then it will have to be accommodated in the trial process. It does not require an adjournment of the trial.

35. The Claimants say there would be a need for disclosure on the issue regarding the use of transformer taps. However, that point has been clearly live since the Joint Memorandum on 3 June 2020, and no such suggestion has previously been made. The Defendants' reference to the taps responds to the unpleaded suggestion from the Claimants' expert that the maximum inverter current should be based on assuming both a leading power factor and low (94%) voltage being demanded by the DNO. Dr Lockwood responds that such a scenario, if it ever occurred (which he says it could not), could be catered for by use of the taps as per their intended purpose. The use of transformer taps is dealt with in some detail in the experts' reports (see, e.g., Mr Ryder's first report, 'Item 1', §§ 46-47 and 127-136; Dr Lockwood's first report §§ 80, 104, 229 and 255; Mr Ryder's supplemental report, Part 3, §§ 3-16; Dr Lockwood's supplemental report §§ 69-81).
36. Moreover, it is not alleged that Wirsol ever in fact sought to use the transformer taps. That makes it fairly unlikely that the Defendants would have any relevant disclosure. Moreover, it appears that the keyword searches done by the Defendants were broad and would be likely to have captured any relevant documents. For example, they included the name of each solar park and the word 'transformer' or 'TX', 'busbar' and 'inverter'. Even taking account of the fact that the issue has not hitherto been expressly pleaded, in practice it seems unlikely that there would be probative documents retained by the Defendants. It is fundamentally an expert issue, and in my view does not require an adjournment.
37. I shall therefore permit the amendments which (in summary) would involve pleading the arguments that the highest inverter current in practice will occur during times of low network voltage and lagging power factor; that the transformer taps can be used to adjust for periods of sustained low voltage; and that the contractual requirements for transformer and busbar capacity are to be construed and applied on that basis.
38. I take a different view of the proposed amendments about balancing the supply or absorption of reactive power between substations (i.e. between two sets of inverters each supplying one substation) at two-substation sites. This methodology would involve using different power factor settings for one set of inverters from those used for the other. That might allow one transformer to be operated at a power factor of 1 (unity, neither lagging nor leading) and all the reactive power to be supplied by the other.
39. In the contract, Employer's Requirements § 4.4.5 requires "[e]ach transformer" to be suitable in all respects to operate without injurious heating at its rated output for the maximum load curve provided by the PV System. Each transformer is supplied by a fixed number of inverters. The Claimants say that § 4.4.5 requires each transformer individually to pass that test, so the solution would not comply. The Defendants respond that there would be no breach of § 4.4.5, because the question for each transformer would concern the current being provided to *that* transformer, which would still be within its capabilities.
40. This topic was touched on only relatively briefly in the Joint Memorandum and experts' reports. Mr Ryder's first report includes the points that the proposed solution (a) would not work at single transformer sites (of which there are two), or sites where the number of inverters connected to each transformer is equal or nearly equal (three more sites); (b) would not allow independent operation of the two substations without breaching the Connection Agreement; and (c) would be difficult to implement and create a serious

risk of errors in implementing the different inverters settings. In these circumstances Mr Ryder considered that the balancing solution would to be incompatible with the contractual requirements for “*good and prudent practice*” and “*continuous, efficient and reliance operation with minimum maintenance*”.

41. In his Note for the court, Mr Ryder states that if this were a key Defence argument, then in order to investigate and respond fully to it he would need to:
 - i) make more detailed calculations to see how feasible it would be to split the reactive power unevenly between the transformers at each site with two transformers; perform the calculations for each transformer; and make further and more detailed voltage regulation calculations, as lower power factor means more voltage regulation; and
 - ii) seek more information on how easy it would be to implement the changes in inverter settings in practice: this would involve a review of the manuals and relevant documentation, discussion with the asset managers and contractors who would have to implement the changes, and undertake a trial of 1-2 days to see how easy it would be to make the changes in practice (which would obviously take time to set up).
42. In my view, the case which this amendment seeks to advance is weak for the reasons given by the Claimants, and to introduce it as a key plank of the Defence would involve new expert work that could not be accommodated in the trial timetable. In all the circumstances I do not consider it just to grant permission for it.
43. The proposed amendments relating to transformer and busbar overload capacity go even further, in the sense that they do more than merely meet the Claimants’ case as to the requisite capacity: in effect, the Defendants seek to argue that even if there is a lack of capacity, up to a certain level it does not matter.
44. This matter is the subject of some fairly brief discussion in the Joint Memorandum and the experts’ reports (including ‘Item 1’ §§ 37 and 105-108 of Mr Ryder’s first report and Part 8, § 26 of his supplemental report). However, to resolve the overload capacity fairly would require a considerable amount of further information about operational experience, as indicated in §§ 16 and 18d-e of Mr Ryder’s Note for the court:

“16. If [transformer overload capacity] were now part of the Defendants’ Defence, to provide a full and complete opinion on this topic I would need to undertake the following additional work:

 - a. Study the various transformer manuals and other transformer documentation in more detail to see what they say about whether the dry-type transformers can be overloaded as part of normal operation. As a minimum I would wish to consider an example from each manufacturer. I note (as above) that it has been difficult to obtain information and documentation from some of the manufacturers and, therefore, time-consuming.

- b. Compare the requirements of IEC standard 60076-7 for oil-immersed transformers with those of IEC standard 60076-12 for dry-type transformers.
- c. I would need to consider operational data about the thermal performance of the transformers in service, both from Wirsol (as the prior owners) and Toucan. I would need to consider what monitoring data is available, for what periods, and assess the records of what operational constraints (such as inverter “clipping”) have been applied over those periods. This would be a lot of data from the different monitoring systems and careful consideration would be required”

“18. If [busbar capacity] were now a key argument in the Defence to address the matter properly, I would need to undertake the following additional work:

...

- d. Seek from Toucan (and Wirsol) more operational data about the performance of the 3200A busbars in service. There is a real risk their performance in service might be different from their performance on test. In particular, I have heard reports that the busbars are overheating in service, and I am concerned that their capacity may have been overstated. I had understood that the busbar ratings had previously been agreed by all parties and had carried out my previous work and analysis on that agreed basis. Whilst this would be of tangential relevance to the Defence as currently advanced, I believe the actual rating of the busbar and its response to overloading would be significant were the Defendants now to be advancing a case that the busbars can be overloaded by 50%. That said it is a bit unclear to me from the amendments whether the Defendants are arguing that the busbars have an overload capacity of 50% or only that busbars have an overload rating that can be used in normal operation (paragraph 17 g).
- e. I would therefore propose to monitor/assess the thermal performance of the busbars currently in service. The complexity of this exercise depends on whether the instrumentation is in place to measure the thermal performance. If the instrumentation is already there, the task would involve collecting the data and then interpreting it for a number of sites. Following making arrangements, that would take up to 2 days depending on the number of sites surveyed. However, if the instrumentation is not already in place, then this is much more difficult. It would involve the time and cost of fitting the necessary instrumentation and connecting it to the remote monitoring system. It would then be necessary to wait for a period of hot, sunny days in order

to test. Given the current time of year and weather, that is likely to involve waiting until Spring for results.”

45. In addition, there might need to be further disclosure about overloading in practice at the solar park sites.
46. The Defendants’ proposed new argument also appears weak, at least as regards transformers, because (a) clause 4.4.5 itself requires the transformer to be used at its “*rated output*”, not above it, and (b) the standards relied upon identify that whilst dry-type transformers may be permitted to bear a maximum overcurrent of 50%, that appears to be for short-term emergency loading and it carries with it risks of, among other matters, overheating (see, e.g., IEC 60076-12 at sections 4.2 and 4.3).
47. In all the circumstances, I do not consider that it would be just to grant permission to amend on this point.
48. Finally under this heading, proposed new Defence § 17(a) would include an argument to the effect that the contracts did not require the transformers or busbars to have any particular rating, but did require them to be capable of operating at the required Guaranteed Performance Ratios and in accordance with the other contract terms and conditions.
49. Insofar as that proposed argument seeks to link the required capacity to the Guaranteed and Minimum Performance Requirements, it appears weak because the latter requirements are merely liquidated damages provisions operating for the first two years of the contracts, and do not detract from (and are not referred to in) the contractual equipment specifications set out in the Employer’s Requirements or the Contractor’s Proposals.
50. The argument would also appear to raise a new question of fact as to whether the transformers and busbars were in fact capable of operating at the levels required to meet the Guaranteed and Minimum Performance Requirements.
51. In any event, the argument has low prospects of success and in all the circumstances it is not appropriate to give permission to amend.
52. Conversely, I allow the contested proposed deletion of the first sentence of Defence § 17(i), which relates to a case that the Defendants no longer seek to advance, to the effect that with two exceptions the transformers’ “*Adjusted Power Output*” was less than the relevant solar park’s “*Maximum Power Output*”. Paragraph 17(i) states that “*The exceptions were Cranham and Newton where the Transformer’s Adjusted Power Output was 0.08% and 0.39% lower than the Solar Park’s Maximum Power Output.*” That might be viewed as the deletion of an admission, but, if so, it is an admission of no relevance since neither side now advances a case that ‘Adjusted Power Output’ and ‘Maximum Power Output’ are contractually relevant concepts.

(5) ‘Capping’ or ‘clipping’ of inverters

53. The Defendants wish to add a sentence to Defence § 18(a) denying that the capping (limiting) of inverter output was a symptom of a capacity defect. The capacity defects are in any event denied in § 17 the Defence. The amendments to § 18(a) to (d) as a whole would change the Defendants’ position from being that the effect of inverters

clipping was negligible at two sites where it occurred and non-existent at the other two, to being that it was negligible at all four sites. To that extent the Defendants are rowing back from a firmer position. The capping issue has already been fully canvassed in the expert evidence. It is appropriate to grant permission to make this amendment.

(6) Adjustments to protection settings

54. Proposed amendments to Defence § 18(e) would aver that:
- i) adjustments which Wirsol made to the protection equipment (said by the Claimants to have been to levels above those approved by the manufacturer) were done after consultation with the manufacturer and would not cause any short or long-term damage to the equipment;
 - ii) the protection settings could and should properly be set so that (a) the overcurrent settings are materially higher than the rating of the transformers and/or busbars, and used to open the circuit breakers in fault conditions, and (b) the Woodward relay's 'thermal replica' feature is used to detect sustained overloads on the transformers and/or busbars, and to shut down the substation should the overload be excessive.
55. Amendment (i) above reflects the Defendants' existing pleaded case, in substance already appearing in Defence § 18(e) and Scott Schedule item 3, as well as having been dealt with in the expert evidence (§ 5 of Mr Halliday's first report and § 3.4 of his supplementary report). I shall grant permission for it.
56. Amendment (ii) is dealt with to a degree in the expert evidence, but is not reflected in the Joint Memorandum. In substance it involves setting up the protection equipment so that the transformers and busbars can exceed their rated current levels, and rely on it to detect excessive overloads.
57. This argument is in my view weak. The course of action contemplated would likely be inconsistent with the relevant standards, including Good and Prudent Practice and IEC 60076-12 (Loading guide for dry-type power transformers) section 4, which sets out the serious risks which can arise from loading a transformer above the rating assigned to it by the manufacturer.
58. In addition, although the issue has been dealt with to some extent in the existing expert evidence, Mr Halliday explains in his Note for the court that:
- “3. I accept that [the two points comprising amendment (ii)] were raised in Dr Lockwood's first report, however they did not form any part of the Defendants' pleaded case that I had been asked to address in my reports and I did not understand that these arguments were the points in issue between the parties. I do not agree with them, however, I did not address them in the level of detail I would have had they been relied on by the Defendants as their main defence.

...

5. The first of the two new pleaded arguments advanced is to increase the overcurrent setting so it is effectively only used to protect against fault currents and to implement the thermal replica function to provide protection against overloads. These points were raised briefly in Dr Lockwood's first report at paragraphs 266 and 275 along with a number of other new points such as that the LV busbars were rated at 3250A (paragraph 264). In the time available between the first and second reports I responded briefly in paragraphs 4.2.2.3 to 4.2.2.6 of my supplemental report.

6. In summary, I disagree that this alleged "workaround" is a proper or verified use of the equipment. The 3900A is based on 120% of a busbar rating of 3250A, not the 3200A stated by Burnell and does not take any cognisance of the transformer rating. In my view, the ratings of both cannot be considered in isolation of each other. My view is that the manufacturer's approved overcurrent setting should be used as the primary protection as it is based on an actual measured value, this is industry practice, and not a theoretical calculated value (as may arise with the use of thermal replica).

...

9. If these arguments are now advanced as a central part of the Defendants' case, I would need to undertake the following further work:

- a. I would wish to conduct a thorough review of the manuals, Distribution and Network Operator (DNO) and vendor information, which may involve sourcing documents and information not already available.
- b. The manuals and vendor information would be used to determine the electrical protection requirements to ensure no damage to the transformers and/or busbars occurred for electrical overloads or electrical faults. This would require to be compiled for each type/ manufacturer of transformer and busbar.
- c. Once the electrical protection requirements have been determined this would require a detailed protection study to be carried out for each site to determine the electrical protection settings for each site. These would require to be agreed with the transformer and busbar manufacturer.
- d. I would anticipate a full protection survey in relation to protection settings and thermal replica function to take time to set up. There would then be time for the survey to be carried out, to carry out any evaluative work and to provide a report

to the Court. I cannot see that this is possible to be concluded in the next few weeks”

59. Moreover, there is a possibility that the issue would require disclosure of the Defendants’ practices at these and other sites and/or additional factual witness evidence. Mr Allen, for the Defendants, explains that (a) it is common ground what settings were applied to the Woodward relays, and that the thermal replica function was not enabled; and (b) whether similar fact evidence would be required from other Wirsol solar parks was specifically discussed with the Claimants’ (then) solicitors in discussions relating to disclosure (and specifically the question of keywords), and it was agreed that disclosure should be focused upon the solar parks where defects have specifically been alleged, rather than seeking similar fact evidence. However, that was on the basis of a different case from the one now proposed to be advanced, and I agree with the Claimants that the latter might make it necessary to obtain a wider range of evidence.

60. In all the circumstances, I do not consider it just to grant permission for this amendment.

(7) HV circuit breakers

61. The Defendants wish to plead an allegation that the existing HV circuit breaker installed at each site, including at sites with two substations but only one HV circuit breaker, can be used to provide protection against HV and LV faults at both substations. This would be by means of (a) the HV circuit breaker being instructed (by the ‘Woodward relay’ current-measuring device) to open in the case of a fault, momentarily de-energising the solar park, (b) the HV switch for the affected substation being instructed to open and (c) the HV circuit breaker then being instructed to close, re-energising the unaffected substation.

62. This argument appears to have limited prospects of success, given the requirements of Employer’s Requirements §§ 4.4.9 and 4.4.10 for the protection of HV switchgear (referred to in my main judgment), which on their face require HV circuit breakers.

63. Mr Halliday in his Note for the court accepted that this point had been raised in the Joint Memorandum, but makes the same general point as set out in quoted paragraph 3 in § 58 above. He also makes the following specific points:

“7. As to the third argument concerning the LV and HV Circuit Breakers defects, the new argument advanced is that the HV Circuit Breaker at Substation 1 could be used to clear an LV fault at Substation 2. It is suggested that once Substation 2 had been isolated there would be some form of automatic system to restore power to substation 1 thus ensuring minimal loss of production. I addressed this briefly at 7.4.1.2 in my first report and 6.2.3.4 in my supplementary report.

8. In my view, this is a wholesale change in operational philosophy and procedures which, on the face of it is completely unsatisfactory, but would require to be reviewed on the basis of any proposed control changes.

9. If [this argument is] now advanced as a central part of the Defendants' case, I would need to undertake the following further work:

...

e. As to the circuit breakers, to investigate the feasibility of implementing this type of system detailed schematic drawings would be required for all switchgear at all sites. The schematic drawings would require to be checked to confirm if the switchgear had the required functionality and facilities installed to allow the required control to be implemented. To date I have not seen any relevant detailed schematic drawings for any of the installed switchgear.

f. I would anticipate this will require discussions with the manufacturer on switchgear clarifications and/or modifications.

g. Detailed control cabling block diagrams, schedules and termination details would be required to determine what existing cabling is in place and what additional cabling would be required for such a scheme.

h. Once the schematic diagrams, cabling details had been reviewed a detailed site survey at each site would be required to confirm the site installation is as per the switchgear and cable details provided. This would determine if the proposal was a practical solution. This would be a minimum of one day per site following the above and set-up. Based on the survey notes the feasibility of the proposal would then be assessed and written up. If this was to be implemented this would require a detailed design for each site to be carried out and an installation and commissioning plan to be prepared.”

64. Given the somewhat complex nature of the proposal the Defendants put forward, Mr Halliday's explanation above appears to me to provide a plausible account of the work that would be necessary fairly to address this issue, were it introduced as a pleaded case now. It would not be feasible to accommodate it now without adjourning the trial.

65. In all the circumstances, it is not just to grant permission for this amendment.

(8) HV and LV bus section circuit breakers

66. The experts agree that the contract required these types of circuit breakers to be installed, but also agree that they would provide no benefit in view of the sites' design, viz a single connection to the DNO with two radial feeds to the two transformers in the solar farm. The Claimants' experts' reports do not address this matter further.

67. The proposed amendment assumes that the Claimants do not pursue this claim. However, the Claimants do apparently pursue the claim, though to what effect remains to be seen. For that reason, the amendment in its current form should not be permitted.

(9) Miniature Circuit Breakers

68. The Claimants allege that the fault levels at the points of installation of the miniature circuit breakers (MCBs) exceed the rating of the currently installed units.
69. The Defendants currently deny any defect, but now wish to admit a defect in relation to some MCBs whilst putting the Claimants to proof as to the extent of the defect, i.e. which MCBs are affected.
70. The Claimants say the proposed amended case has no prospects of success because the Defendants' expert has not identified the affected sites (as he had apparently promised to do) and the Claimants' expert Mr Halliday has presented evidence that all sites are affected. That is disputed, the Defendants arguing that Mr Halliday presents merely a worst case calculation that does not discharge the Claimants' burden of proof.
71. I do not consider that the points the Claimants make oblige the court to accept Mr Halliday's evidence without further consideration or testing at trial, and therefore will allow the amendment. It may turn out that the Claimants have satisfied the burden, but that cannot be assumed merely from the existence of their current expert evidence.

(10) Landscaping

72. The Claimants allege that the landscaping, site finishing and cable installation works at the Carrowdore and Lisburn sites were defective in certain respects.
73. As to cable installation, Defence § 23A(2) currently denies that the cables were inadequately buried. The Defendants wish now to admit that the burying of the cables was such as to require further work. A proposal to add a sentence averring that the work was being implemented at the time the EPC Contracts were terminated, and has since been completed, was withdrawn at the hearing (though it is common ground that the work has in fact now been carried out). It is appropriate to grant permission for the amendment.

(11) Other matters

74. The Defendants also propose amendments to Defence §§ 17A(3), 18(c) and 18(e) (first two sentences) which are uncontroversial.

(12) Conclusions

75. Accordingly, I ruled on Day 2 as follows.
- i) I do not give permission for the amendment to Defence § 17(a), relating to Guaranteed and Minimum Performance ratios;
 - ii) I give permission for the amendments which I would loosely characterise as going to the identification of the network circumstances that would in practice give rise to the greatest inverter current, and to whether that current would *prima facie* overload the transformers;

- iii) I give permission for the amendments (as reformulated during the application hearing) which can be broadly characterised as relating to the use of the transformer taps in response to network voltage requirements varying from notional;
- iv) I do not give permission for the amendments relating to responding to network requirements by applying different settings to different sets of inverters within a single site;
- v) I do not give permission for the amendments relating to overloading of transformers or busbars;
- vi) As a result of those rulings taken together, I give permission for the proposed amendments to the following paragraphs of the Defence:
 - a) § 17(b);
 - b) § 17(c);
 - c) § 17(e) but disallowing the words from ‘and (b)’ onwards;
 - d) § 17A(2) first paragraph but disallowing the words “*and the balancing of reactive power between the substations*”;
 - e) § 17A(2) final paragraph up to and including the words “*i.e. the transformer taps were used*”, but disallowing the rest;
 - f) § 17A(4) but disallowing the words “*and the balancing of reactive power between the substations*”;
 - g) § 17A(5);and I refuse permission for the proposed amendments to §§ 17(e1), 17(f) and 17A(4A);
- vii) I give permission for the deletions in §§ 17(g), (h) and (i);
- viii) as regards capping or clipping, I give permission for the proposed amendment to § 18(a);
- ix) as to protection settings, I refuse permission for the proposed amendment to § 18(e) to add the sentence beginning with the words “*Further*”;
- x) as to bus section circuit breakers, I refuse permission for the proposed amendment to Defence § 21(1);
- xi) in relation to HV circuit breakers, I refuse permission for the proposed amendments to §§ 21(2)(a)(iv) (the words from “*and that the Woodward relay*” onwards), 21(2)(c)(i) and 21(2)(c)(iii);
- xii) I give permission for the proposed amendments relating to miniature circuit breakers in § 22;

- xiii) I give permission for the proposed amendment relating to landscaping in § 23A(1) and (2), apart from the last sentence of (2) which I understand has been withdrawn;
 - xiv) I give permission for the proposed amendments to § 17A(3) (which I consider to be non substantive), § 18(c) (which I do not consider materially alters the existing text) and § 18(e) (1st two sentences of the proposed amended text, i.e. from '*the manufacturers*' to '*damage to the equipment*'); and
 - xv) in each case I give or refuse permission, as the case may be, for the corresponding proposed amendments to the Scott Schedule.
76. I did not hear argument about the costs of the amendments and of the amendment application. These can be addressed as part of the consequential matters arising from this judgment as a whole.