Proposed Examination Foreclosure

The Applicant is strongly of the view that the Examination of the Application can and should be concluded prior to the end of the six-month Examination period. The Scheme is critical national priority infrastructure, and there is an urgent need for the deployment of renewable energy infrastructure, as supported in Government policy.

Given that the examination process unearthed the fact that the Applicant does not intend to start construction until 2027, this is a curious opening argument in support of early termination. But the Applicant justifiably draws the ExA's attention to the pattern of *submissions which are made simply repeating points already made*.

The Applicant's Response to D4 Submissions [REP5-021] is no exception.

Figure 1 [actually, 'Figure 2'] *provides a sample illustration of the MWh per day that may be produced by a 480MW dc scheme (based on 1990 irradiance levels - the generation will vary year on year depending on weather conditions)* etc … [page 20; also Tech Note page 7].

The authenticity of this graph in the Technical Note had been shown to be questionable, with implications for the Applicant's claimed familiarity with PVsyst [REP4-036, 2.1.4]. Repeating the original text verbatim is not an insightful response.

On the next page, the Applicant restates that *other solar farms at the same latitude in EYRC (at 49.9MW) have a comparable ratio to the East Yorkshire Solar Farm scheme*. This was already declared in Responses to ExA Q2 [REP4-030], with East Yorkshire shown to be around average for the ERYC region. This surprising conclusion, which escaped scrutiny previously, is tested here (Appendix 1).

On page 23, there is a bizarre attempt to justify the "droop below 1" error in Fig 6-6 of the Statement of Need. This graph can be easily understood by any GCSE Science graduate (Appendix 2).

Thankfully, new information (page 23) is provided concerning the FSF/SAT graphs in the Statement of Need. Whereas previously *the figures have been derived from inputs which are appropriate for all solar schemes generally* [6.6.24], they are now derived from *location-specific PVGIS irradiation data* – possibly location-specific to East Yorkshire.[1] This is no mean achievement. The team at the University of Geneva spent years developing the thousands of lines of code in PVsyst for simulating annual solar energy generation. BOOM has apparently performed the same simulation feat with an Excel spreadsheet.[2]

The final paragraph in REP5-021 announces another repeat: the unwelcome return of the "straight lines of best fit" into Fig 6-5 of the Statement of Need. It is a technical distraction – as flawed as it was first time around – but now also a digital curiosity (Appendix 3).

[1] Identical graphs can be found in the Tillbridge (Lincoln) NSIP Statement of Need.
[2] You have to wonder why they didn't just use their PVsyst software to work out the numbers.

If BOOM finds that it has time on its hands, it might take the opportunity to revisit some of its earlier responses.

Applicant's Responses to Written Representations Submitted at Deadline 1 [REP2-019] was little more than wholesale rebuttal of the residents' concerns by deploying its catalogued armoury of Statements, Plans, Assessments, Consultations, etc. It is little wonder that the 'sensitive receptors' ceased contributing to this examination. The Applicant might consider receptors to be NIMBYs who need to move with the times, but the examination process was also a potential forum to engage, explore compromises, enhance mitigation and so on. It is not too late to investigate and propose creative solutions to ameliorate the multitude of local disruptions that this Scheme promises.

And, substantive technical issues have been ignored, such as the postulated advantage of having a battery facility hosted onsite rather than at a remote location [REP1-111, page 3]. As previously explained, this yields substantial savings for the transformer/switchgear installation and, most importantly, a greater than 50% reduction in the burden on the National Grid. As the Applicant has just observed, *grid connection capacity is currently constrained and is projected to remain constrained over the coming decade*, so this will be a top priority for the Secretary of State. The Applicant's observation that there is nothing *prohibiting other developers coming forward with their own storage projects in the vicinity of the Scheme* [REP3-033, page 20] either ignores or is unaware of the profoundly negative consequences of locating a battery in the vicinity of, rather than integrated into, the solar electrical circuitry. Does the Applicant hold a different position on this issue?

The Applicant is urged to make the best possible use of the remaining weeks.

Appendix 1 - ERYC Solar Farm Comparisons

The recent submission [REP5-021, page 21] repeats the Applicant's surprising claim that the land take for East Yorkshire is comparable to that of *other solar farms at the same latitude in EYRC* [sic]. This initially appeared at the previous Deadline [REP4-030, page 5], and it deserves examination.

For the eight 50MW solar farms in the ERYC region, land take was defined as acres of total site area per MW of installed capacity (MWp). LPA applications do not specify installed capacity, so the Applicant has assumed overplanting at a modest 1.25 to estimate MWp values. Total site area (equivalent to NSIP Order Limit) is always specified on the LPA Application Form. The Applicant calculated the eight values correctly [REP4-030, pages 5–6].

ERYC Solar Farms (50MW) in the Renewable Energy Planning Database									
Planning Application	Operator (or Applicant)	Site Name	Post Code	MW	MWp	BESS	Hetares	Acres / MWp	Planning Permission
22/02775/STPLF	Anesco	Turf Carr Solar Farm	HU11 5EF	49.90	62.38		64.26	2.5	29/05/2024
22/02460/STPLF	Elgin Energy EsCo	Sunderlandwick Solar Farm	YO25 9AB	49.90	62.38		76.38	3.0	21/04/2023
21/02335/STPLF	Albanwise Synergy	Creyke Beck	HU16 4AZ	49.90	62.38	BESS	89.21	3.5	06/01/2022
22/01208/STPLF	BOOM Power	Kenley Solar Farm	HU17 5XZ	49.90	62.38		94.00	3.7	18/11/2022
19/04321/STPLF	BayWa r.e. UK	Scurf Dyke	YO25 9RB	49.90	62.38	BESS	95.24	3.8	Construction
23/00760/STPLFE	GAM Capital	Froghall Farm, Wyton Road	HU12 8TY	49.90	62.38	BESS	98.27	3.9	
22/03648/STPLF	Albanwise Synergy	Carr Lane, Tickton	HU17 9SD	49.90	62.38		101.50	4.0	
21/04505/STPLF	Statkraft Uk	Soay Solar Farm	YO42 4RL	49.99	62.49	BESS	108.75	4.3	26/01/2022

Using the same criteria, East Yorkshire (480 MWp, 1277 ha) would weigh in at 6.6 acres/MWp. However, East Yorkshire includes ecology mitigation areas[3] within the Order Limit, so it is appropriate to exclude these regions (108 ha) from the calculation and thus obtain the comparative value of 6.0 acres/MWp (5.1 if the grid corridor also excluded).

Yet, the Applicant uses a value of just 3.9 acres/MWp, as calculated in the Technical Note [REP3-038, pages 12–14]. The disparity can be attributed to two Technical Note artifacts:

1) The land-take area was limited to the regions dedicated to solar PV, substations and access routes. This totals 976 ha, according to the values specified in the ES [The Scheme, page 2-1], Statement of Reasons (page 2) and elsewhere, and hence would yield 5.0 acres/MWp.

2) Without explanation, the Technical Note substitutes alternative land area values [for comparisons see REP4-036, page 4], most notably 751 ha for solar PV+substations in place of the ES's 966 ha. This brought the selected land area down to 765 ha, and hence afforded a final value of 3.9 acres/MWp.

The Applicant's creative approach with numbers has been noted elsewhere [AS-025].

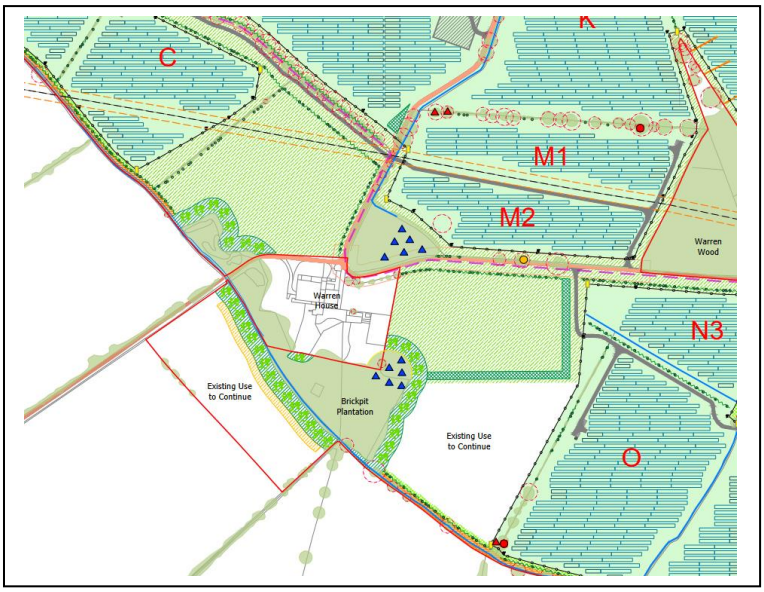
Nevertheless, we are grateful to the Applicant for drawing our attention to the Soay Solar Farm (last entry in the table).

[3] The Soay Solar Farm also includes ecology mitigation. In its Site Layout, about 25% of the site area is reserved for mitigation and unused fields. The 108.75 ha shown in the table is 75% of the declared total land area (145 ha).

Soay Solar Farm – a model for solar farm design

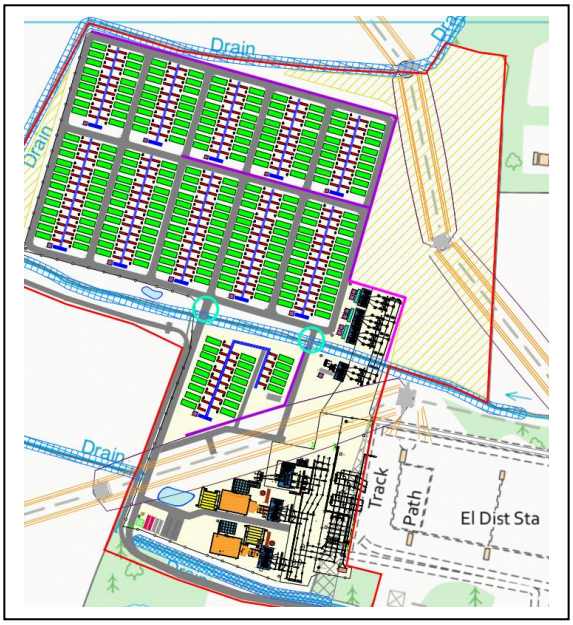
Unusually for a 50MW LPA application, Soay includes an ecology mitigation area, and the submitted documentation package resembles more that of an NSIP application. The ultimate owner is the Norwegian government, so it is likely that the applicant's intention is to build and operate the farm rather than sell the planning permission on the energy futures market. A superficial review of the plans reveals a couple of features that commend this as a model for solar farm design – one environmental, one technical.

On the south-west perimeter there is a residence. Rather than plant PV panels up to the front door, the applicant has elected to set aside fields as a buffer zone around the house, along with hedging. (The blue triangles are sites planned as nesting boxes for sparrows.)



Hopefully this sympathetic approach to the integration of ground-based solar serves as inspiration for future solar farm designs.

Soay includes a substantial battery (BESS) compound adjacent to the existing 400kV substation (bottom right). The energy capacity is not specified, but the housing within 200 shipping containers promises a significant facility. The Soay website explains that the batteries are also intended to provide grid balancing when not required for extending solar-derived electricity across the day. Thus, there is a two-way interface to the grid.



Although batteries are almost universal in NSIP applications, their uptake in the 50MW arena has been disappointingly slow (see table). It is encouraging to see a 50MW scheme that fully addresses the energy needs of the net-zero grid, despite not being required to adhere to the requirements of NPS EN-3 and EN-5.

Appendix 2 – Interpreting graphs.

Interpreting graphs is a GCSE Maths/Science skill, so there is really no reason not to understand this. Here is Fig 6-6 from the Statement of Need.

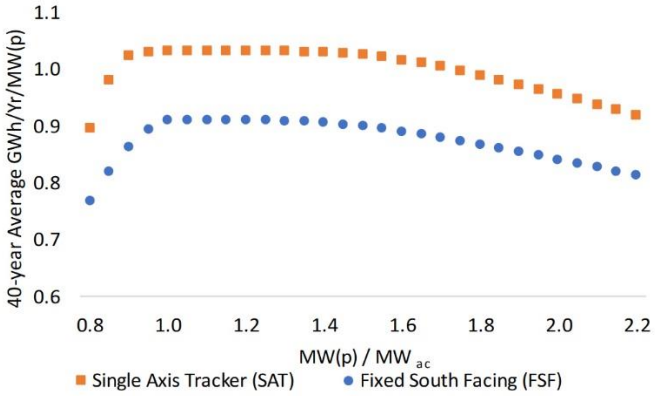


Figure 6-6. GWh/Yr/MW decreases as overplanting increases, and losses are incrementally larger above a ratio of c.1.3.

[Author Analysis] **(c) BOOM Power**

The horizontal axis is overplanting ratio, MW(p)/MW_{ac}.

The vertical axis is GWh/Yr/MW(p). GWh/Yr is annual energy yield (energy produced in a year); GWh/Yr/MW(p) is the annual energy yield per megawatt of installed capacity.

The values look reasonable. We would expect 1 MW(p) FSF to generate around 0.92 GWh over a 12-month period (based on a Load Factor of 10.5%).

As the graph shows (and the legend states), overplanting reduces the yield of annual energy per MW(p) (because some of the available energy is curtailed). Looking at the graph, I would have said that losses are "incrementally larger" above 1.4 or 1.5 rather than 1.3 (as per the legend), but the determination is subjective. I also have no idea why these are dual-slope curves with a transition at around 1.4, but that too is another issue.

What does an overplanting ratio *below* 1.0 mean? It means that the inverter output rating *exceeds* installed capacity, and hence no curtailment will occur. Decreasing the overplanting ratio still further has no effect: the annual energy yield for each installed MW(p) will remain at its full value (green line below).

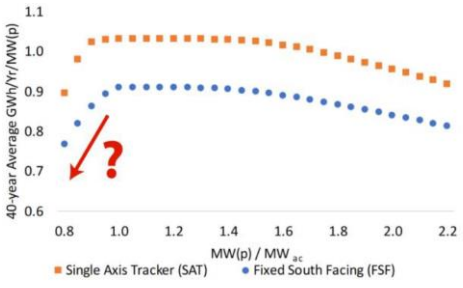
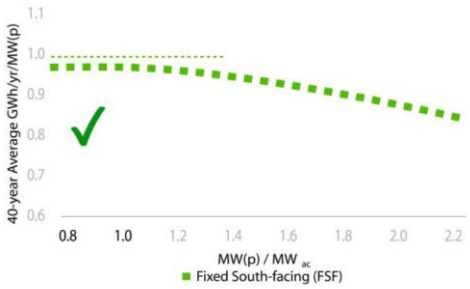


Fig 6-6 in Statement of Need © BOOM Power Ltd



Energy-per-panels without droop below 1.0

Image from Deadline 4 Submission [REP4-036] page 7.

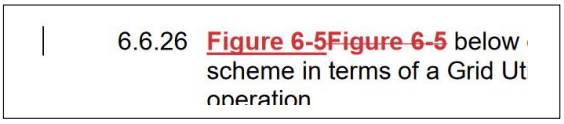
Appendix 3 – Now you see them; now you don't; now you do.

Following criticism of the "straight lines of best fit" in Fig 6-5 of the original version of Statement of Need and publication of its updated version omitting the lines (Rev 01), the Applicant's attention was drawn to the paragraphs in Rev 01 that still referred to the now-absent lines. It was suggested that these paragraphs should be deleted [REP4-036].

The Applicant is grateful for the respondent bringing to its attention the omission of the straight lines of best fi[t] *in Fig 6-5 [REP2-010]. For clarity, these lines failed, in error, to transfer in the document pdfing process and an updated Statement of Need is submitted along with Deadline 5 submission* [REP5-021, final paragraph].

This looks a bit suspicious.

The Applicant is probably unaware that the Inspectorate website retains submission file metadata. (In my browser, you click on *Document Properties* to see the metadata.) The original Nov 2023 submissions were indeed created with a document PDFing process (using PDF-XChange Standard). Subsequent submissions, including Statement of Need Rev 01, were saved directly from Microsoft Word as PDF files. There was no PDFing.


6.6.26 Figure 6-5~~Figure 6-5~~ below
scheme in terms of a Grid Ut
operation

And, anyway, the Applicant has told us that the Figure 6-5 correction was intentional. Rev 01 (Tracked) includes the tracking annotation associated with the updated figure. (The only change in Figure 6-5 of Rev 01 (tracked) and Rev 01 (clean) was elimination of the misnamed "straight lines of best fit.")

Either way, the return of the lines is, in the opinion of this respondent, a confident step backwards.

For the avoidance of doubt, the deadline 5 Statement of Need retains paras 6.6.29-6.6.30 and the Applicant stands by the conclusions drawn from them.

For the avoidance of doubt, the respondent stands by the conclusions drawn in REP4-036 concerning the Applicant's Note on Scheme Efficiency [REP3-038] and Fig 6-5 of REP5-015.