STOP EAST PARK ENERGY
SOIL OVER SOLAR

10 July 2026

East Park Energy: review of the Applicant's carbon assessment – reliability, transparency and alternative lifecycle analysis

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Submission: Post-hearing submission relating to Compulsory Acquisition Hearing 1

Stop East Park Energy (SEPE) is an independent, community-led group established in response to concerns over the proposed East Park Energy development. The group operates on an unfunded, voluntary basis and has over 1,000 registered supporters. SEPE includes individuals with professional expertise in agriculture, analysis, civil engineering, construction, ecology and environmental science, energy, finance, law and planning, as well as professional experience with the NSIP process.

• *The analysis of a selected set of Scheme carbon dioxide emissions and full Scheme carbon dioxide emissions avoidance set out in this submission has been prepared by a technical analyst with experience in NSIP solar and battery complex lifecycle analysis*

This submission:

1. Submits that the Applicant has materially understated the Scheme's lifecycle carbon emissions and materially overstated its claimed carbon savings.
2. Presents transparent alternative lifecycle calculations indicating that the Scheme would generate substantially more greenhouse gas emissions than it would avoid over its lifetime.
3. Shows that acknowledged calculation errors, methodological limitations and internal inconsistencies materially reduce confidence in the Applicant's greenhouse gas assessment and its claimed climate benefits.
4. Demonstrates, by reference to NSIP precedent, that community group scrutiny of applicants' carbon assessments has led to detailed critique and significant corrections during examination.
5. Submits that the weight attributed to the Scheme's claimed climate benefits in the planning balance should be materially reduced unless and until those claims are more robustly demonstrated.

1. Introduction

This submission builds on representations in SEPE's Deadline 3 submission (REP3-108, section 4.1, Appendix A), which set out calculations for the carbon dioxide emissions from a defined set of Scheme components, and responds to representations made at Compulsory Acquisition Hearing 1 on 10 June 2026.

SEPE submits that the Applicant's calculations for carbon dioxide emissions are understated and its calculations for carbon dioxide emissions avoidance are overstated. SEPE sets out alternative calculations in this submission. Along with re-presenting the projections for carbon emissions for three principal components of the Scheme (REP3-108), this submission projects the potential carbon emissions avoidance from the operation of the East Park Energy solar power plant and Battery Energy Storage System (BESS) on a year-by-year basis.

2. Precedent for challenge of carbon dioxide calculations during NSIP examination

As SEPE indicated in its Deadline 3 submission (REP3-108, section 4.1), there are clear precedents for challenge and alternative analysis of carbon dioxide emissions and avoidance in the solar NSIP regime. In this section, SEPE sets out two notable examples: one involving analysis by a community group; and one involving academic analysis commissioned by a community group. The former resulted in the Applicant making extensive and significant corrections to its analysis during the examination.

2.1 Great North Road Solar and Biodiversity Park (EN010162)

During the Great North Road Solar and Biodiversity Park NSIP examination, the applicant was challenged by a local community group on its carbon dioxide calculations. The community group identified mathematical errors, omissions and inappropriate assumptions. As a result, the applicant accepted the majority of assertions made and corrected its carbon dioxide analysis for the Scheme. Examples are set out below.

In the applicant's 'Environmental Statement Volume 2 Chapter 15 – Climate Change' the community group submission is that:

> "The combined effects of the revision of CO2 avoidance through aggregate power generation, and this review of the CO2 emissions that are a consequence of deploying the materials required for the development, is that the recalculated projected carbon avoidance over 40 years is 905,762 tonnes, not 1,594,744. This represents a 76% over-inflation of the benefits. Appendix

> C shows that all the recalculations correct wrong conversion factors, omitted infrastructure or incorrect data, or mathematical errors - not exclusions following the 1% IEMA guidelines.”

The applicant responds:

> “This is noted. Amendments to the analysis have been made in response to consultation comments as well as to changes to the design parameters, as set out this chapter.”

Within the same document, there are repeated references to errors and miscalculations, for example:

> “Transformer production emissions are based by the Applicant on 510 tonnes of steel. When it comes to transporting them, 1020 tonnes of transformers travel by sea but then only 500 leave the port for the site. It is not intended to correct this error as it is not known which of the 3 figures is right.”
>
> “There is a further miscalculation with regard to the transportation emissions for the substation”
>
> “This is the largest miscalculation” (referring to decommissioning of batteries and decommissioning transportation)

The applicant’s response to all assertions relating to miscalculations and errors is:

> “These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.”

The community group’s analysis indicated that the project could produce between 1.8 million and 2.6 million tonnes more carbon dioxide than it would avoid over its lifetime. At the close of the examination (the application is at Recommendation stage), the principal outstanding area of contention related specifically to how much electricity the solar complex would generate in practice, with the community group contending that the applicant’s capacity factor of 15.8% was materially over-stated.

2.2 Sunnica Energy Farm (EN010106)

The community group registered as an Interested Party in the Sunnica Energy Farm Examination commissioned the Centre for Renewable and Low Carbon Energy, School of Water Energy and the Environment, Cranfield University to conduct a review of the project’s carbon dioxide calculations. It was submitted as ‘Annex F – Carbon’ in its Written Representation.

The chief findings are set out as follows:

> “1) Sunnica may have overestimated their energy output at 23.5 TWh, unless they are intending an installed capacity of at least 625 MWp.
>
> 2) Sunnica’s methodology for calculating GHG (greenhouse gas) emissions throughout the lifecycle stages of the Scheme is not transparent and has led to an underestimation of the lifetime emissions of the scheme.”

Applying reasonable estimates based on the Sunnica Environmental Statement and assumptions favourable to the project where information was unavailable, Cranfield University concluded that realistic lifetime generation would be 17.7TWh rather than the applicant’s 23.2TWh, that lifecycle GHG emissions had been underestimated, and that, in most scenarios, the scheme would emit more carbon than it saved over its lifetime.

The applicant rejected Cranfield University’s criticisms, while Cranfield maintained that the underlying calculations remained undisclosed and could not be independently verified.

This exchange remained unresolved at the close of the examination, and at Recommendation, the Examining Authority recommended that consent should be withheld. It demonstrates that independent scrutiny of lifecycle carbon calculations has been accepted as a legitimate matter for examination within the NSIP process.

3. Accepted errors in the East Park Energy Application’s carbon dioxide calculations and “limitations” with its Greenhouse Gas Emissions Assessment

In an Interested Party Written Representation (REP1-087) it states:

> “**Greenhouse Gas Assessment reliability**
>
> The Applicant’s Greenhouse Gas (GHG) Assessment is a central component of the claimed public benefit. However, [this] submission identifies concerns regarding its reliability, transparency and internal consistency.
>
> In particular:
> - potential inaccuracy in calculation of operational worker travel over the scheme’s lifetime;
> - the relationship between inputs and outputs is not transparently explained;
> - key assumptions are not supported by sensitivity testing; and
> - there is limited use of supplier-specific or project-specific data.

> These issues indicate that the assessment is highly sensitive to assumption choice but does not transparently explore that sensitivity. As a result, the claimed carbon benefit cannot be treated as a robust or verifiable figure and should be afforded reduced weight unless corrected."

The submission considers a specific example:

> "Within the Applicant's GHG Assessment (APP-116), specifically Table 16 – GHG emissions over the lifetime of the Scheme, emissions during the operational phase for "travel of workers to site" are reported as only 0.4 tCO_2e over the lifetime of the Scheme.
>
> Given that the Applicant identifies approximately 20 operational staff, and indicates that these may travel up to a 100 km round trip to site, this figure appears unrealistically low when considered against the scale of activity implied. On an order-of-magnitude basis, such assumptions would be expected to generate a substantial volume of vehicle kilometres over a 40-year operational period. The reported emissions figure is not explained in a way that allows it to be reconciled with those inputs.
>
> … By way of illustration, if 20 operational staff were to undertake a 100 km round trip on a regular working basis, this would equate to approximately 440,000 km of travel per year and around 17.6 million km over a 40-year operational life. Applying standard UK Government greenhouse gas conversion factors to that scale of activity would be expected to result in emissions several orders of magnitude greater than the 0.4 tCO_2e reported. The purpose of this comparison is not to assert a substitute calculation, but to demonstrate the scale of the apparent discrepancy. This scale of activity should be understood in the context of the Applicant's wider Transport Assessment (APP- 101), which provides the baseline assumptions for vehicle movements associated with the Scheme."

The Applicant responds (REP2-044):

> "Table 16 within ES Vol 1 Chapter 15 Climate Change [APP-051] has been reviewed, and an error in the calculation of GHG emissions associated with the travel of workers has been identified.

The Applicant recalculated worker travel emissions, resulting in corrected emissions of 6,061tCO_2e during construction and 3,921tCO_2e during operation.

SEPE notes that Interested Party submission REP1-087 sets out the case of travel for workers as an example of potential inaccuracies and a lack of internal consistency or transparent reconciliation. However, the Applicant chooses to respond to this specific example alone, without undertaking wider sense-checks of its assumptions and calculations as appropriate.

SEPE also notes that issues emerging from this particular example are relevant to the Applicant's construction transport plans and potential reconciliation issues across the Application, which are the subject of a further SEPE submission at Deadline 4.

It is notable that in its response (REP2-044), the Applicant appears to acknowledge shortcomings in its greenhouse gas assessment. On page 77 it states:

> "It is important to emphasise that GHG emission calculations are continually evolving. The Applicant is committed to ensuring assessments are suitable for establishing the likely significant effects of the Scheme."

On page 78 it states:

> "The Applicant understands that there are limitations with ES Vol 2 Appendix 15-1 [APP-116] but would like to emphasise that the assessment has been produced to fulfil the requirements of the EIA Regulations and identify likely significant effects, and is not expected to be a full lifecycle carbon assessment."

SEPE addresses this further in section 5.

3.1 Apparent inconsistency in the Applicant's operational GHG intensity calculation

In 'Environmental Statement Volume 1 – Main Report Chapter 15: Climate Change' (REP2-012), the Applicant states at paragraph 15.8.23:

> "As the Scheme is expected to produce 15,980,748 MWh electricity for export to the national grid, the GHG intensity of the electricity generated over the lifetime of the Scheme has been calculated as 42.6 gCO_2e/kWh."

At paragraph 15.8.25, using what appears to be the same calculation method at 15.8.23, it states:

> "…the average operational GHG intensity of the Scheme has been calculated by dividing the total operational GHG emissions by the total energy generation

> of the Scheme. The operational GHG intensity of the Scheme is 0.246 gCO_2e/kWh…"

The Applicant's reported operational GHG intensity appears sufficiently low to warrant further examination. Following the calculation method set out for the Scheme's lifetime GHG intensity, SEPE reaches the same figure as the Applicant. However, applying the same calculation method to the operational GHG intensity of the Scheme produces a materially different result, as set out below:

- Total operational GHG emissions: 297,990tCO_2e
- Total energy generation of the Scheme: 15,980,748MWh
- 297,990/15,980,748: 0.0186 tCO_2e/MWh
- Converting from tCO_2e/MWh to gCO_2e/kWh multiply by 1,000: 18.6 gCO_2/kWh

There is a significant difference between the Applicant's operational GHG intensity claim of 0.246gCO_2e/kWh and SEPE's calculation of 18.6gCO_2/kWh.

Adopting SEPE's Scheme lifetime generation number of 14,932,319MWh (Appendix A.1) would result in an operational GHG intensity calculation of 20gCO_2e/kWh.

4. The Applicant's claimed carbon emissions and savings: inconsistencies, unrealistic assumptions and methodological concerns

In its 'Statement of Reasons' (REP3-013), paragraph 4.3.8, the Applicant claims:

> "The Scheme, with 400MW of solar and 100MW of battery storage, would … save 1.8 million tonnes of CO2 across its lifetime."

In its 'Planning Statement' (APP-031), page 17, footnote 1, the Applicant suggests that this saving of 1.8 million tonnes is:

> "Calculated based on the total GHG emissions offset by the project's electricity generation of circa 2,461,035 tonnes of CO_2 equivalent (based on the 'Grid Average' scenario as set out in Table 15.16 of ES Vol 1 Chapter 15: Climate Change [EN010141/DR/6.1]), less the lifetime GHG emissions of the Scheme at circa 648,178 tonnes of CO2 equivalent (set out in Table 15.13 of ES Vol 1 Chapter 15: Climate Change [EN010141/DR/6.1])"

SEPE notes that the footnote in the Planning Statement has not yet been updated to reflect required corrections to the lifetime GHG emissions, which is currently stated in 'Environmental Statement Volume 2 – Technical Appendices Appendix 15-1: Greenhouse Gas Emissions Assessment' (REP2-021), paragraph 3.1.2, as follows:

> "As shown, using the conservative assumptions the total emissions over the lifetime of the Scheme are ~681,000 tCO_2e."

In 'Climate Change' (REP2-012), paragraph 15.8.18 the Applicant states:

> "As the Scheme is expected to produce 15,980,748 MWh electricity for export to the national grid over its lifetime, the GHG emissions offset over the lifetime of the Scheme has been calculated using each comparator as outlined in Table 15.16."

SEPE contends that the Applicant's projected lifetime electricity generation total of 15,980,748MWh is overstated (see Appendix A.1).

Table 15.16 sets out four scenarios:

Table 15.16 – Offset emissions

Comparator	Emission factors (gCO_2e/kWh)	Offset over lifetime (tCO_2e)
Gas-fired power station (current long-run marginal generator)	382	6,104,646
Grid average 2024-2025	154	2,461,035
DESNZ Green Book long-run marginal generation-based electricity emission factors	Varies over the lifetime of the Scheme	172,820
Adjusted DESNZ Green Book long-run marginal generation-based electricity emission factors	Varies over the lifetime of the Scheme	359,321

The Applicant presents a very broad range of offset lifetime tCO_2e scenarios which produce materially different claimed carbon avoidance totals, as stated in paragraph 15.8.19:

> "As shown, the Scheme will offset between ~173,000 and ~6,105,000 tCO_2e over its lifetime, depending upon the displacement factor applied."

The Applicant effectively appears to switch between the Department for Energy Security and Net Zero's Fuel Mix Disclosure, the HM Treasury Green Book and an adjusted Green Book pathway. It does not provide a clear justification for doing so, which is particularly important since the choice of method influences the scale of the claimed benefit. SEPE contends that the Applicant relies on unrealistic emissions assumptions. SEPE also submits that the Applicant's use of long run marginal generation is not appropriate for calculating lifetime offsets under the operating model of a hybrid Scheme, specifically in relation to solar generation-to-grid and BESS supply-to-grid operations and evening gas peaker emissions. SEPE's calculations, set out in Appendix A, reflect a more realistic and appropriate scenario.

SEPE addresses each scenario set out in Table 15.16 below.

Scenario 1: 'Gas-fired power station (current long-run marginal generator)'

The Applicant does not explicitly cite the source of its GHG intensity of 382gCO_2e/kWh figure. Without this information, SEPE has worked on the assumption that the figure used in Scenario 1 is sourced from the Green Book, as is the case for Scenarios 3 and 4. However, the only figure matching that used by the Applicant in the Green Book is the 2010 *consumption-based* figure of 382gCO_2e/kWh (see Figure 1). If this 2010 number has been adopted, SEPE questions its use as what the Applicant describes as the "current" long run marginal generator emission number.

Since paragraph 15.8.14 refers to "electricity generation", and not consumption-based, SEPE believes that the 'current' number used should either be the generation-based figure for 2025 (the original date of the Applicant's Climate Change document) or, more logically, the 2028 figure (the year the Scheme is due to start operating). These figures are 193gCO_2e/kWh and 133gCO_2e/kWh, respectively. Using these figures would give 3,084,284tCO_2e and 2,125,439tCO_2e, respectively.

However, basing the entire 40-year lifetime on a 'current' figure is inappropriate because as the Green Book demonstrates, year on year, the long run marginal generation figure is forecast to drop significantly across the Scheme lifetime.

Scenario 2: 'Grid average 2024-2025'

SEPE notes that the Applicant has selected this scenario as its stated full lifetime offset calculation. Its justification as such is not clearly established. SEPE contends that it is unrealistic for the Applicant to use the single grid average 2024–25 emissions factor of 154gCO_2e/kWh "to calculate the offset emissions over the lifetime of the Scheme" (paragraph 15.8.15), as this also does not reflect Green Book projections for the 40-year operational lifetime, or indeed any year-on-year lifetime projections.

Further, it is unclear why the Applicant elected to use the DESNZ Fuel Mix Disclosure Data Table figure for this scenario, rather than applying the Green Book methodology used in the other scenarios.

Applying the Green Book long-run marginal generation-based emissions factors from 2028 (133gCO_2e/kWh, reflecting the year the Scheme is expected to become operational) to 2067 (2.3gCO_2e/kWh), together with capacity factor and evening gas peaker assumptions set out in sections 6.1.1 and 6.1.2 and Appendix A, results in lifetime carbon avoidance of 295,418tCO_2e over the Scheme's 40-year operational life.

Section 4.1 addresses the apparent internal inconsistency in the Applicant's Climate Change document.

Scenario 3: 'DESNZ Green Book long-run marginal generation-based electricity emission factors'

SEPE suggests that the outcome of Scenario 3 is the most realistic of the four, as it relates directly to the Green Book data. However, SEPE questions the use of the 2010 357gCO_2e/kWh figure and the finish date of 2070, set out in paragraph 15.8.16.

Scenario 4: 'Adjusted DESNZ Green Book long-run marginal generation-based electricity emission factors'

SEPE questions the transparency behind the Applicant's "adjusted GHG emissions trajectory… starting at this value in 2023 and gradually reducing to achieve the target for 2035 and then following the same trajectory as the Green Book after this date" (paragraph 15.8.17), but apparently using a figure of 382gCO_2e/kWh which appears to date from 2010, for consumption-based, not generation-based. The Applicant does not present detailed calculations.

It is not clear what the Applicant is referring to by "the target for 2035". SEPE assumes this refers to the former government's 2035 electricity decarbonisation target (see section 4.2), but the Applicant neither makes this explicit nor explains how it has informed its adjusted emissions trajectory.

At Appendix A, SEPE presents calculations setting out how emissions avoidance could vary across the lifetime of the Scheme, year-by-year from 2028 to 2067.

Table 1: Electricity emissions factors to 2100, $kgCO_2e/kWh$

Consumption and generation-based emissions factors.

Analysts should use **consumption-based emissions factors** for measuring GHG emissions per unit of final energy demand. These emissions factors include transmission and distribution losses, i**ncluding significant losses due to power station inefficiency**. **Generation-based emissions factors** measure GHG emissions per unit of electricity generated.

Long-run marginal emissions factors should be used for measuring *small changes* in consumption or generation. **Grid average** emissions factors are used for footprinting.

	Long-run marginal				Grid average			
	Consumption-based			Generation-based	Consumption-based			Generation-based
	Domestic	Commercial/ Public sector	Industrial		Domestic	Commercial/ Public sector	Industrial	
2010	0.389	0.382	0.375	0.357	0.499	0.490	0.480	0.457
2011	0.384	0.377	0.370	0.351	0.479	0.471	0.462	0.438
2012	0.377	0.370	0.364	0.344	0.530	0.520	0.510	0.483
2013	0.368	0.362	0.355	0.337	0.493	0.484	0.475	0.450
2014	0.362	0.355	0.348	0.329	0.443	0.434	0.426	0.403
2015	0.351	0.345	0.338	0.320	0.370	0.364	0.357	0.338
2016	0.340	0.334	0.328	0.311	0.296	0.291	0.285	0.271
2017	0.330	0.324	0.318	0.302	0.265	0.260	0.255	0.242
2018	0.319	0.313	0.307	0.291	0.246	0.241	0.237	0.224
2019	0.307	0.301	0.295	0.280	0.222	0.218	0.214	0.203
2020	0.293	0.288	0.283	0.268	0.197	0.194	0.190	0.180
2021	0.279	0.274	0.269	0.255	0.217	0.213	0.209	0.198
2022	0.264	0.259	0.254	0.241	0.158	0.155	0.152	0.144
2023	0.248	0.243	0.239	0.226	0.146	0.143	0.140	0.133
2024	0.230	0.226	0.222	0.210	0.151	0.149	0.146	0.138
2025	0.211	0.207	0.203	0.193	0.131	0.129	0.127	0.120
2026	0.191	0.187	0.184	0.174	0.098	0.096	0.095	0.090
2027	0.169	0.166	0.163	0.154	0.073	0.072	0.070	0.067
2028	0.145	0.143	0.140	0.133	0.063	0.062	0.061	0.058
2029	0.120	0.118	0.116	0.110	0.054	0.053	0.052	0.049
2030	0.093	0.091	0.090	0.085	0.049	0.049	0.048	0.045
2031	0.071	0.070	0.069	0.065	0.042	0.041	0.040	0.038
2032	0.055	0.054	0.053	0.050	0.033	0.032	0.032	0.030
2033	0.042	0.041	0.041	0.038	0.026	0.025	0.025	0.024
2034	0.032	0.032	0.031	0.029	0.021	0.020	0.020	0.019
2035	0.025	0.024	0.024	0.023	0.020	0.020	0.019	0.018
2036	0.019	0.019	0.018	0.017	0.020	0.019	0.019	0.018
2037	0.015	0.014	0.014	0.013	0.018	0.018	0.018	0.017
2038	0.011	0.011	0.011	0.010	0.018	0.018	0.017	0.016
2039	0.009	0.008	0.008	0.008	0.017	0.017	0.016	0.015
2040	0.007	0.006	0.006	0.006	0.016	0.016	0.015	0.015
2041	0.006	0.006	0.006	0.006	0.015	0.015	0.015	0.014
2042	0.004	0.004	0.004	0.004	0.015	0.014	0.014	0.013
2043	0.003	0.003	0.003	0.003	0.009	0.009	0.009	0.008
2044	0.002	0.002	0.002	0.002	0.008	0.008	0.008	0.008
2045	0.001	0.001	0.001	0.001	0.008	0.008	0.008	0.007
2046	0.001	0.001	0.001	0.001	0.008	0.008	0.007	0.007
2047	0.001	0.001	0.001	0.001	0.005	0.005	0.005	0.005
2048	0.002	0.001	0.001	0.001	0.005	0.005	0.005	0.005
2049	0.002	0.002	0.001	0.001	0.003	0.003	0.003	0.003
2050	0.001	0.001	0.001	0.001	0.003	0.002	0.002	0.002
2051	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2052	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2053	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2054	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2055	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2056	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2057	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2058	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2059	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2060	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2061	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2062	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2063	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2064	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2065	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2066	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2067	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2068	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2069	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
2070	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002

Figure 1: Extract from Green Book Table 1: Electricity emissions factors to 2100, $kgCO_2e/kWh$. Highlighted cells show the key figures discussed in this section

4.1 Inconsistent presentation of the Applicant's carbon offset assessment

At paragraph 15.8.30, the Applicant states:

> "The DESNZ Green Book long-run marginal generation-based electricity GHG emission factors reduce significantly throughout the operational phase of the Scheme due to the projected implementation of renewables. This means that there becomes a point at which the GHG emissions offset by the electricity generated by the Scheme are lower than those associated with building and operating the Scheme. However, developments similar to the Scheme are required to achieve the projected reductions in generation-based GHG emissions factors. This results in a 'Catch-22' situation for the purposes of assessing GHG emissions from the Scheme."

SEPE firstly suggests that this reveals an internal inconsistency. The Applicant's acknowledgement that, under the HM Treasury Green Book approach, there comes a point at which the Scheme emits more greenhouse gases than it offsets is difficult to reconcile with the unqualified carbon offset claim made in its Statement of Reasons, Planning Statement and earlier sections of the Climate Change document, ie that the Scheme would "save 1.8 million tonnes of CO2 across its lifetime". Secondly, the Applicant's 'Catch-22' observation carries limited weight when considered alongside SEPE's own analysis. SEPE's partial projection of Scheme emissions in Appendix B indicates a minimum net increase of approximately 1.23 million tonnes of CO_2e over the Scheme's lifetime. On SEPE's analysis, the Scheme would already generate substantially more emissions than it avoids, even before accounting for a range of additional project components, such that the Applicant's suggested future tipping point is no longer the central issue.

4.2 A note on currency

SEPE notes that paragraphs 15.8.17 and 15.8.34 of the current version of the Climate Change document (April 2026) refer to the 2035 electricity decarbonisation target and the "incoming government's" plan to achieve this by 2030. Given the publication date of the document, and that the government referred to has been in office since July 2024, these references appear to reflect an earlier policy context, raising questions as to whether the document has been fully reviewed and updated prior to publication:

> "Achiev[ing] the target for 2035"

> "Once operational the Scheme provides low carbon electricity to the national grid and supports the UK government's goal for all electricity to come from low

carbon sources by 2035, and indeed the incoming government's plan that this is achieved by 2030."

5. The Applicant's stated position, EIA requirements and NSIP Advice Note Seven

The Applicant's core position appears to be that its GHG assessment was prepared to meet the requirements of the EIA Regulations (REP2-044), rather than to function as a full Lifecycle Carbon Assessment, and that, at the current stage of design, the use of conservative assumptions is sufficient to identify likely significant effects.

Notwithstanding that 'Environmental Statement Volume 1 – Main Report Chapter 15: Climate Change' (REP2-012) establishes that during consultation the host authorities called for a more comprehensive, transparent and robust assessment, the Applicant states that the scope of the assessment was "agreed as part of the consultation process" following the EIA scoping exercise. However, a scoping opinion is not necessarily determinative of the adequacy of the final Environmental Statement, nor does consultation agreement necessarily remove the requirement under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 for the Environmental Statement to include:

> "the information reasonably required for reaching a reasoned conclusion on the significant effects of the development on the environment, taking into account current knowledge and methods of assessment"

While EIA is recognised as an iterative process, unresolved design detail does not appear to remove the requirement for the Environmental Statement to contain sufficient information to support a "reasoned conclusion" on likely significant environmental effects.

Where uncertainty relates to assumptions capable of materially altering the magnitude or significance of lifecycle GHG emissions, the adequacy of the Environmental Statement's assessment methodology becomes directly relevant to whether the Secretary of State can reach a legally compliant reasoned conclusion on the Scheme's likely significant climate effects under Regulations 14 and 21.

The Planning Inspectorate's 'Nationally Significant Infrastructure Projects – Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements' expressly emphasises that the requirement under Regulation 14 is directly linked to the Secretary of State's ability to reach the "reasoned conclusion" required under Regulation 21.

The Regulations additionally require information on:

> "…the likely significant effects of the development on the environment…the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions)…"

6. SEPE's alternative calculations

6.1 Carbon avoidance

Before setting out its alternative calculations, SEPE notes the following.

6.1.1 Capacity factor: monofacial versus bifacial panels on fixed-tilt structures

The panel generation calculations set out in this submission at Appendix A are based on bifacial panels, thereby adopting an assumption favourable to the Applicant (see notes accompanying calculations).

SEPE has therefore calculated its projections on a capacity factor of 12%. This is above the national, regional and local capacity factors set out by SEPE across a number of its submissions.

Panel specification is not consistently or definitively stated within the Application.

As SEPE set out in its Deadline 3 submission (REP3-108), in its 'Design Parameters and Principles Statement' (REP1-030), the Applicant states:

> "The solar PV panels will be either monofacial or bifacial and have an anti-reflective coating."

However, in its 'Environmental Statement Volume 2 – Technical Appendices, Appendix 15-1: Greenhouse Gas Emissions Assessment' (REP2-021), Table 3, under Equipment weight assumptions, 'Solar PV module', the Applicant states:

> "bifacial module"

Notwithstanding that SEPE has adopted a generation assumption favourable to the Applicant, SEPE notes that caution is required in relation to projected bifacial panel performance assumptions within UK solar NSIP-scale schemes. Modelled bifacial gain assumptions may rely on optimistic assumptions regarding albedo, panel spacing, layout efficiency and long term operating conditions. Typical albedo values for grassed agricultural land are lower than more reflective bare earth or artificial surfaces. SEPE notes that the UK field study[1] examining bifacial panel performance at a small solar site (installed capacity: 34.7MW) and featuring a “ground surface, covered with thick soil” which “played a vital role in determining the albedo”, limits the extent to which such evidence can confidently be extrapolated to the East Park Scheme’s proposed design and operational assumptions. The York study also found that bifacial panels had a marginally higher degradation rate per annum.

6.1.2 BESS operation

SEPE considers that the Applicant is likely to make maximum practical use of the BESS. The commercial incentive is to charge the battery system when solar generation is available and discharge during periods of peak electricity demand, when wholesale prices are highest. Unlike electricity sold under the Contract for Difference (CfD) mechanism, electricity exported from the BESS is expected to fall outside the CfD strike price restrictions and therefore receive the full prevailing wholesale price per MWh. This provides a clear commercial incentive to maximise BESS utilisation and supports SEPE’s assumption that a significant proportion of available generation will be routed through the BESS rather than exported directly to the grid.

6.1.3 Further assumptions are set out in the notes that accompany the calculations in Appendix A.

6.1.4 Carbon avoidance calculations

SEPE’s breakdown of the Scheme’s potential carbon dioxide emission avoidance, expressed in tonnes of carbon dioxide equivalent, is set out in Appendix A.

The calculations are based on SEPE’s projected lifetime solar panel generation of 14,932,319MWh for the Scheme. This assumes a 12% capacity factor for bifacial panels, an assumption favourable to the Applicant, as detailed in Appendix A, alongside associated notes on panel installation phasing and degradation assumptions.

SEPE’s calculations for ‘Panel production direct to grid’ and ‘BESS to grid’ are based on HM Treasury Green Book emissions data, the standard UK Government appraisal framework, using assumptions set out in the corresponding notes.

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[1] ‘A comparative study of bifacial versus monofacial PV systems at the UK’s largest solar plant’, Badran & Dhimish (2024), *Clean Energy*, Volume 8, Issue 4. Oxford University Press

SEPE's calculations are summarised in Table 1.

Export to grid	Carbon emissions avoided (tCO_2e)
Panel production direct to grid	166,531
BESS to grid	128,887
Total	**295,418**

Table 1: Alternative calculations for the Scheme's lifetime carbon emissions avoidance through solar generation direct to grid and via BESS to grid (see section 6.1.2 and Appendix A.2, setting out principal operating mode for commercial grid-scale BESS)

6.2 Carbon emissions

As previously set out in its Deadline 3 submission (REP3-108), SEPE's calculations suggest that the lifetime carbon dioxide emissions associated with the project would significantly outweigh any carbon emission avoidance. The calculations are re-presented in Appendix B. SEPE reiterates that these calculations are not for the full Scheme, but for a selected range of principal products/activities, namely BESS cells, PV panels and PV framework. Emissions are expressed in tonnes of carbon dioxide equivalent.

The summary is reproduced in Table 2.

Activity	Emissions (tCO_2e)
Production (China)	623,104
Production – transport	14,871
Replacement	862,395
Decommissioning – waste	17,961
Decommissioning – waste transport	1,658
Decommissioning – other	4,217
Total	**1,524,206**

Table 2: Alternative calculations for selected sample of GHG emissions associated with the Scheme

7. Carbon balance for the Scheme

As set out above and in the appendices, SEPE's calculations suggest that, even based on an analysis of only a selection of the Scheme's activities and products, the project would cause a substantial net increase in carbon emissions rather than a reduction.

Over its lifetime, SEPE calculates that the Scheme would generate at least 1,524,206 tonnes of CO_2e while avoiding only 295,418 tonnes of CO_2e. This represents a minimum net carbon increase of 1,228,788 tonnes of CO_2e over the lifetime of the Scheme. Expressed differently, based on the emissions assessed to date, the Scheme would generate more than five tonnes of CO_2e for every tonne of CO_2e avoided. As the 1,524,206-tonne figure is only a partial estimate and excludes emissions from a number of project components, SEPE contends that the Scheme's actual net carbon balance is likely to be less favourable still than this minimum estimate indicates.

7.1 East Park Energy and Net Zero

The concept of 'Net Zero' requires that greenhouse gas emissions are reduced to the greatest extent possible and that any residual emissions are balanced by equivalent removals, so that there is no net addition of greenhouse gases to the atmosphere. On SEPE's analysis, however, the Scheme would result in a substantial net increase in greenhouse gas emissions. Even on a partial assessment of the Scheme's activities, it would generate more than five times as much CO_2e as it would avoid, representing a minimum net increase of approximately 1.23 million tonnes of CO_2e over the lifetime of the Scheme. As this assessment excludes emissions from a number of project components, the Scheme's actual net carbon balance is likely to be even more carbon-intensive than this minimum estimate suggests. On this basis, the Scheme cannot properly be characterised as contributing to Net Zero and instead appears likely to make a substantial net addition to global greenhouse gas emissions.

7.2 Policy context and planning balance

The findings set out in this submission should be considered within the policy framework established by National Policy Statements EN-1 and EN-3. EN-3 makes clear that the principle of nationally significant renewable energy development is established, stating that:

> "the Secretary of State should act on the basis that the need for infrastructure covered by this NPS has been demonstrated."

However, that policy support does not remove the requirement for a project-specific assessment of the evidence relied on in determining whether consent should be granted. EN-1 provides that the Secretary of State must determine an application in accordance with the National Policy Statements except where:

> "adverse impacts from the development outweigh[] the benefits."

Accordingly, this submission considers whether this Scheme's claimed carbon benefits, which form an important component of those planning benefits, are supported by robust and transparent evidence. If lifecycle greenhouse gas emissions have been materially understated and carbon savings materially overstated, as this submission concludes is reasonably arguable, then the weight that can properly be attributed to the Scheme's climate change benefits in the planning balance should be reduced until those claims have been satisfactorily demonstrated.

Appendix A – Projected carbon dioxide emission avoidance (tCO_2e) for the Scheme

A.1 Panel generation

Year Number	Year	Replaced after 24 years	25yrs	26yrs	27yrs	28yrs	Total MWh AC
1	2028	84153	84153	0	0	0	168,306
2	2029	83311	83311	84153	84153	0	334,929
3	2030	82478	82478	83311	83311	84153	415,733
4	2031	81654	81654	82478	82478	83311	411,575
5	2032	80837	80837	81654	81654	82478	407,460
6	2033	80029	80029	80837	80837	81654	403,385
7	2034	79228	79228	80029	80029	80837	399,351
8	2035	78436	78436	79228	79228	80029	395,358
9	2036	77652	77652	78436	78436	79228	391,404
10	2037	76875	76875	77652	77652	78436	387,490
11	2038	76106	76106	76875	76875	77652	383,615
12	2039	75345	75345	76106	76106	76875	379,779
13	2040	74592	74592	75345	75345	76106	375,981
14	2041	73846	73846	74592	74592	75345	372,221
15	2042	73108	73108	73846	73846	74592	368,499
16	2043	72376	72376	73108	73108	73846	364,814
17	2044	71653	71653	72376	72376	73108	361,166
18	2045	70936	70936	71653	71653	72376	357,554
19	2046	70227	70227	70936	70936	71653	353,979
20	2047	69525	69525	70227	70227	70936	350,439
21	2048	68829	68829	69525	69525	70227	346,935
22	2049	68141	68141	68829	68829	69525	343,465
23	2050	67460	67460	68141	68141	68829	340,031
24	2051	66785	66785	67460	67460	68141	336,630
25	2052	84153	66117	66785	66785	67460	351,300
26	2053	83311	84153	66117	66117	66785	366,484
27	2054	82478	83311	84153	65456	66117	381,516
28	2055	81654	82478	83311	84153	65456	397,052
29	2056	80837	81654	82478	83311	84153	412,433
30	2057	80029	80837	81654	82478	83311	408,309
31	2058	79228	80029	80837	81654	82478	404,226
32	2059	78436	79228	80029	80837	81654	400,184
33	2060	77652	78436	79228	80029	80837	396,182
34	2061	76875	77652	78436	79228	80029	392,220
35	2062	76106	76875	77652	78436	79228	388,298
36	2063	75345	76106	76875	77652	78436	384,415
37	2064	74592	75345	76106	76875	77652	380,571
38	2065	73846	74592	75345	76106	76875	376,765
39	2066	73108	73846	74592	75345	76106	372,997
40	2067	72376	73108	73846	74592	75345	369,267
Total							**14,932,319**

Panel generation notes

1. The ‘Panel generation’ table presents SEPE’s forecast annual electricity generation (MWh AC) and cumulative lifetime generation for the Scheme.

   The assessment assumes a phased installation of the solar panels over a three-year construction period, with 40% installed in year 1, 40% in year 2 and the remaining 20% installed in year 3. It conservatively assumes (although unlikely) that completed phases will be capable of exporting electricity to the grid as construction progresses, resulting in electricity generation during the construction period. Each installed phase is assumed to have an operational life of 24 years before replacement.

2. On a deliberately cautious basis, a capacity factor of 12% has been adopted for these calculations. The capacity factor is based on the DUKES[2] data published by the Department for Energy Security and Net Zero which shows an average factor of 10.36% for the period 2020–2024. This has been uplifted by 15% and rounded up to account for the use of bifacial panels, in accordance with Badran & Dhimish’s findings in ‘A comparative study of bifacial versus monofacial PV systems’[3]. See section 6.1.1 of this submission, addressing uncertainty over the Scheme’s basic panel specification.

3. Badran & Dhimish found that panel degradation for bifacial panels was 1.17% per annum. Given the potential for minor design improvements, this has been rounded down to 1% per annum for these calculations.

4. **Note on generation projections and ‘homes powered’ claims**

   Based on the conservative assumptions SEPE has set out, particularly relating to the Scheme’s undetermined panel specification, SEPE projects lifetime panel generation of 14,932GWh, giving an annual average of 373,308MWh.

   The Applicant’s projected lifetime panel generation of 15,980GWh gives an annual average of 399,518MWh.

   The Applicant claims that the Scheme “would power approximately 117,000 homes”[4]. Employing SEPE’s projections, and using what SEPE assumes is

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[2] Digest of UK Energy Statistics (DUKES): renewable sources of energy https://www.gov.uk/government/statistics/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes
[3] Badran & Dhimish (2024), *Clean Energy*, OUP.
[4] Statement of Reasons (REP3-013), paragraph 4.3.8

the same calculation method and data as the Applicant, would result in 109,796 homes.

SEPE recognises that expressing generation in terms of the equivalent annual electricity consumption of households is a common industry and government communications convention. However, the metric can be misunderstood if presented simply as the number of homes the Scheme “would power”.

These ‘homes’ calculations are based on one component of the following government data for average household *energy* consumption[5]:

> “Assumed average consumption levels of 11,200 kWh for gas, 3,400 kWh for standard electricity and 4,800 kWh for Economy 7 per annum”

SEPE notes that the 3,400kWh figure represents average annual household *electricity* consumption only. It does not represent the total energy required to “power” an average home.

Further, the ‘homes powered’ calculation is an annual energy-equivalent metric. It should not be interpreted as meaning that the East Park Energy solar and battery storage complex could continuously supply electricity to approximately 117,000 (or 109,796) homes at any given time. Solar generation varies significantly with season, time of day and weather conditions, and battery storage does not alter the annual amount of electricity generated.

[5] Methodology Note, Domestic Energy Prices Statistics https://assets.publishing.service.gov.uk/media/69ca899fb111d64c49bb3d7c/domestic-energy-prices-methodology.pdf

A.2 Carbon avoidance: panel direct to grid

Year Number	Year	Marginal carbon Intensity kgCO2e/kWh	Annual Energy Production (Mwh) AC	Charged to BESS (MwhAC)	Solar Energy to Grid (Mwh) AC	Carbon Avoidance (tonnes CO2e)
1	2028	0.133	168,306	0	168,306	22,385
2	2029	0.11	334,929	115,598	219,331	24,126
3	2030	0.085	415,733	112,130	303,603	25,806
4	2031	0.0652	411,575	108,766	302,809	19,743
5	2032	0.0501	407,460	105,503	301,956	15,128
6	2033	0.0384	403,385	102,338	301,047	11,560
7	2034	0.0296	399,351	99,268	300,083	8,882
8	2035	0.0226	395,358	96,290	299,068	6,759
9	2036	0.0174	391,404	93,401	298,003	5,185
10	2037	0.0133	387,490	119,173	268,317	3,569
11	2038	0.0102	383,615	115,598	268,017	2,734
12	2039	0.0079	379,779	112,130	267,649	2,114
13	2040	0.006	375,981	108,766	267,215	1,603
14	2041	0.0057	372,221	105,503	266,718	1,520
15	2042	0.0036	368,499	102,338	266,161	958
16	2043	0.0028	364,814	99,268	265,546	744
17	2044	0.002	361,166	96,290	264,876	530
18	2045	0.0013	357,554	93,401	264,153	343
19	2046	0.0013	353,979	90,599	263,379	342
20	2047	0.0013	350,439	119,173	231,266	301
21	2048	0.0014	346,935	115,598	231,336	324
22	2049	0.0013	343,465	112,130	231,335	301
23	2050	0.0023	340,031	108,766	231,264	532
24	2051	0.0023	336,630	105,503	231,127	532
25	2052	0.0023	351,300	102,338	248,962	573
26	2053	0.0023	366,484	99,268	267,216	615
27	2054	0.0023	381,516	96,290	285,226	656
28	2055	0.0023	397,052	93,401	303,651	698
29	2056	0.0023	412,433	90,599	321,834	740
30	2057	0.0023	408,309	119,173	289,136	665
31	2058	0.0023	404,226	115,598	288,628	664
32	2059	0.0023	400,184	112,130	288,054	663
33	2060	0.0023	396,182	108,766	287,416	661
34	2061	0.0023	392,220	105,503	286,717	659
35	2062	0.0023	388,298	102,338	285,960	658
36	2063	0.0023	384,415	99,268	285,147	656
37	2064	0.0023	380,571	96,290	284,281	654
38	2065	0.0023	376,765	93,401	283,364	652
39	2066	0.0023	372,997	90,599	282,398	650
40	2067	0.0023	369,267	87,881	281,386	647
					Total	**166,531**

Panel direct to grid notes

1. The values in column 3 have been taken from HM Treasury Green Book published data[6].

2. The amount of generation diverted to the BESS has been calculated following analysis of predictions in similar NSIP projects. This significantly reduces the panel direct to grid emission savings due to the power diversion to the BESS. It has been assumed that:

    - The BESS is fully operational by 2029.
    - The panels can still export electricity to the grid prior to full commissioning. If additional information becomes available, these figures can be recalculated.
    - The Applicant is likely to make maximum use of BESS charging. This is because stored electricity can then be discharged during periods of peak demand, when wholesale electricity prices are typically highest. Electricity supplied from the BESS would remain outside the scope of the CfD strike price limitations and would therefore receive the full prevailing market price per MWh.

[6] 'Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal' and associated files https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

A.3 Carbon avoidance: BESS to grid

Year Number	Year	Evening Gas Peaker Carbon emissions (kg CO_2e/kWh)	Charged to BESS (MwhAC)	Bess Discharge to the Grid Grid (Mwh) Ac before cell degradation	Carbon Avoidance (tonnes CO2e)
1	2028	0.3192	0	0	0
2	2029	0.264	115,598	110,974	29,297
3	2030	0.204	112,130	107,645	21,960
4	2031	0.15648	108,766	104,416	16,339
5	2032	0.12024	105,503	101,283	12,178
6	2033	0.09216	102,338	98,245	9,054
7	2034	0.07104	99,268	95,297	6,770
8	2035	0.05424	96,290	92,438	5,014
9	2036	0.04176	93,401	89,665	3,744
10	2037	0.03192	119,173	114,406	3,652
11	2038	0.02448	115,598	110,974	2,717
12	2039	0.01896	112,130	107,645	2,041
13	2040	0.0144	108,766	104,416	1,504
14	2041	0.01368	105,503	101,283	1,386
15	2042	0.00864	102,338	98,245	849
16	2043	0.00672	99,268	95,297	640
17	2044	0.0048	96,290	92,438	444
18	2045	0.00312	93,401	89,665	280
19	2046	0.00312	90,599	86,975	271
20	2047	0.00312	119,173	114,406	357
21	2048	0.00336	115,598	110,974	373
22	2049	0.00312	112,130	107,645	336
23	2050	0.00552	108,766	104,416	576
24	2051	0.00552	105,503	101,283	559
25	2052	0.00552	102,338	98,245	542
26	2053	0.00552	99,268	95,297	526
27	2054	0.00552	96,290	92,438	510
28	2055	0.00552	93,401	89,665	495
29	2056	0.00552	90,599	86,975	480
30	2057	0.00552	119,173	114,406	632
31	2058	0.00552	115,598	110,974	613
32	2059	0.00552	112,130	107,645	594
33	2060	0.00552	108,766	104,416	576
34	2061	0.00552	105,503	101,283	559
35	2062	0.00552	102,338	98,245	542
36	2063	0.00552	99,268	95,297	526
37	2064	0.00552	96,290	92,438	510
38	2065	0.00552	93,401	89,665	495
39	2066	0.00552	90,599	86,975	480
40	2067	0.00552	87,881	84,366	466
				Total	**128,887**

BESS to grid notes

1. The ‘Charged to BESS’ figures are taken from A.2 column 5. As it is likely that BESS discharges will take place at peak period, the Green Book predictions for long run marginal carbon intensity used in the panel calculations would not be appropriate for these calculations. The Green Book shows that gas peaker emissions are circa 140% higher than the long run marginal emissions. Therefore, column 3 shows the Green Book long run marginal emissions with an uplift of 140%.

2. Column 5 refers to degradation. For now, no additional calculation has been made to represent the battery efficiency reduction year on year. If Lithium Iron Phosphate (LFP) cells are to be used, this is likely to be around 2% per annum. There is, however, a 4% reduction between columns 4 and 5[7].

3. SEPE’s analysis of BESS operation is based on an export-from-solar only model.

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[7] ‘Estimating the carbon footprint of utility-scale battery storage’, Rapier, 2020 https://www.forbes.com/sites/rrapier/2020/02/16/estimating-the-carbon-footprint-of-utility-scale-battery-storage/ Note: there are several sources which provide the same loss of power between charge and discharge.

Appendix B – Provisional carbon dioxide emissions (tCO_2e) for a sample selection of Scheme components/activities: BESS cells, PV panels and PV frames[8,9,10]

Embodied Carbon - Component/Material	Activity Data	Units	Emission factor, kg CO2e per unit	Emissions factor data source	Emissions (tCO2e)	Assumptions
Battery storage (BESS) Cells	400,000	kWh (Storage capacity)	89	Forbes (2020). Estimating the carbon footprint of utilityscale battery storage. https://www.forbes.com/sites/rrapier/2020/02/16/estimating-the-carbon-footprint-of-utility-scale-battery-storage/	142,400	
PV Panels	560,000	kWp	750	https://globalelectronicscouncil.org/wp-cont	420,000	Average carbon production, taking onto account Chinese energy manufacture. Global weighted average 2024 but adopting efficiency gains. Overplanting rate of 40% to achieve 400MWAC supply
PV Framework (steel)	22,400	Tonnes of galvanised steel	2710	Inventory of Carbon and Energy (ICE) Version 4	60,704	Approx 40 tonnes steel per MWp-dc PV capacity, various data sources. Assumes 100% galvanised steel.
Total					**623104**	

[8] Emissions calculations originally set out in SEPE Deadline 3 submission (REP3-108, Appendix A)

[9] Tables exported from Excel file; file available on request

[10] An additional range of smaller ancillary emissions related to decommissioning items set out in these tables, including entries such as site worker journeys and associated fuel costs, amounts to 4,217 and is not represented here for brevity

Transport - Component or material and mode of transport	Mass in tonnes	Distance in km. (sea and train, one way)	Emissions factor, kg CO2e per tonne.km	Emissions factor data source	Emissions (tCO2e)	Assumptions
Battery storage (BESS) Cells; HGV (within China)	3474.00	1000	0.05789	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Factors, 2024	201	
Battery storage (BESS) Cells; sea	3474.00	19365	0.013	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Factors, 2024	875	Approximately 8.686 tonnes per MWh based on spec sheet provided by BYD, including the container for shipping Shanghai to Felixtowe 10,456 nautical miles. -19,365km
Battery storage (BESS) Cells; HGV UK	3474.00	320	0.09294	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024.	103	Felixstowe to Little Straughton, return unladen
PV Panels; HGV (within China)	26439.00	500	0.05789	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024	765	Approximately 500 km from Xinjiang province to Freight depot. Fully laden one way. 695,760 bifacial panels each weighing 38kg
PV Panels; train (within China)	26439.00	4000	0.02779	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024. To Shanghai	2,939	Approximately 4,000 km from Xinjiang province to Shanghai by train
PV Panels; sea	26439.00	19365	0.014	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion. Factors, 2024. Shanghai to UK container port	7,168	
PV Panels; HGV UK	26439.00	320	0.09294	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024. Port to site	786	Port to site. Return unladen
PV framework; HGV central Poland to Rotte	22400	1000	0.05789	Department for Business, Energy & Industria Factors, 2024	1,297	
PV framework (steel); sea	22400	224	0.014	Department for Business, Energy & Industria Factors, 2024	70	Rotterdam to Felixstowe 121 nautical miles -224km
PV framework (steel); HGV UK	22400	320	0.09294	Department for Business, Energy & Industria Factors, 2024	666	Port to site. Return unladen
Total					**14,871**	

Component Replacement				
Item	replacement rate %	Original embodied emissions (tCO2e)	Original transport emissions (tCO2e)	Replacement embodied and transport emissions (tCO2e)
Transformers		0	0	0
PV Panels	100	420,000	11,658	431,658
Panel Supports		60,704	2,033	
PV Inverter		0	0	0
BESS Inverter		0	0	0
BESS cells	300	142,400	1,179	430,737
Transformer mineral oil		0	0	0
Fence posts		0	0	0
Total				**862,395**

Decommissioning - Waste	**Activity Data**	**Waste type**	**Emission factor, kg CO2e per unit**	**Emissions factor data source**	**Emissions (tCO2e)**	**Assumptions**
Steel, recycled	22400	Tonnes	0.98485	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024	22	Just panel supports so far
Batteries (cells only), recycled. Do not enter weight but number of kWh	1,600,000	Electrical items – batteries	11	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024	17,600	This factor is not weight related but based on the EU Product Environmental Footprint Category Rules the the Rapier report on Forbes.com
PV Modules	52878	Tonnes	6.41061	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024	339	Figure as in production emissions + 100% to account for module replacements over lifetime in line with replacement rate expectations. Assumes all panels will be recycled.
Total					**17,961**	

Decommissioning - Waste Transport						
Category	Mass in tonnes	Distance (km)	Emissions factor	Emissions factor data source	Emissions	Assumptions
Steel	22400	200	0.09294	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024	416	Artic HGV tipper. Assume 100km distance - likely much less than this.Arrival trip unladen
Batteries	13896	200	0.09294	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024	258	Enclosed Artic Hazchem assume 100km. Arrival trip unladen
PV Modules	52878	200	0.09294	Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2025	983	Figure as in production emissions + replacements
Total					**1,658**	

Total of all categories (TCO2e)	**1,524,206**