Dean Moor
Solar Farm

Environmental Statement: Appendix 9.3 – Dean Moor Solar Carbon Calculations

on behalf of **FVS Dean Moor Limited**

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Prepared by: Stantec UK Ltd
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DEAN MOOR SOLAR FARM

ENVIRONMENTAL STATEMENT

APPENDIX 9.3 – CARBON CALCULATIONS

PREPARED ON BEHALF OF FVS DEAN MOOR LIMITED

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, Regulation 5(2)(a)

Project Ref:	**EN101155/ES/Appendix 9.3: Carbon Calculations**
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1 Dean Moor Solar PEIR Carbon Calculations

1.1 Summary

1.1.1 The Proposed Development will have the potential to export up to 150MW at any one time, based on the available export capacity identified by the DNO. Using the 150 MW, the annual generation for a solar farm of this size could generate approximately 134 gigawatt-hours (GWh) of renewable electricity per year.

1.1.2 Load factor is a term often used to consider the performance of solar farms, and other generation sources. The load factor is how much electricity a site generates a year compared to how much electricity could theoretically have been generated if it were producing at maximum output continuously.

1.1.3 In this case a load factor of 10.2% has been used in line with the latest figures released by the Department for Energy Security and Net Zero for UK solar photovoltaic projects. The estimated carbon dioxide (CO_2) savings are approximately 8,986.03 tonnes of CO_2 per year. The sources used for this calculation are shown in Table 1.1.

Table 1.1: Supporting Calculations

Site	Figure	Calculation	Source
Solar Farm Capacity (MW)	150	N/A	N/A
Site Specific (UK) Load Factor	10.2%	N/A	Assumes a capacity factor of 10.2% for average UK solar photovoltaic projects as per the 'Digest of UK Energy Statistics (DUKES) 2024: Chapter 6', published by the Department for Energy Security and Net Zero. See Table 6.3 "Load Factor". Updated 30 July 2024. https://www.gov.uk/government/statistics/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes
Carbon Factor (projected for 2027 – assessed opening year of the Proposed Development)	0.067 kg of CO_2e per kWh 0.067 t of CO_2e per MWh	N/A	The values are taken from the Department for Energy Security & Net Zero Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Data Table 1, Column J, Row 29. Updated 30 November 2023. https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal
Carbon Factor (fossil fuel sources only)	Natural Gas – 0.18290 kg of CO_2e per kWh Coal – 0.31699 kg of CO_2e per kWh Average - 0.249945 kg of CO_2e per kWh Average - 0.249945 t of CO_2e per MWh	Average = 0.18290 + 0.31699 = **0.249945** kg of CO_2e per kWh	The values are taken from the Department for Energy Security & Net Zero 'Greenhouse gas reporting: conversion factors 2024' spreadsheet. Updated 8 July 2024. https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024

Site	Figure	Calculation	Source
Annual "units" /kWh generated	134,119,800 kWh	150,000 kW (150MW x 1,000) x 8766 (Number of hours in a year – 365.25 days (to account for leap years x 24 hours) x 0.102 (carbon factor of 10.2% / 100) **=134,119,800 kWh**	Assumes a capacity factor of 10.2% for average UK solar photovoltaic projects as per the 'Digest of UK Energy Statistics (DUKES) 2024: Chapter 6', published by the Department for Energy Security and Net Zero. See Table 6.3 "Load Factor". Updated 30 July 2024. https://www.gov.uk/government/statistics/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes
Annual estimated CO_2 reduction	8,986.03 tCO_2e	150 MW x 8766 (Number of hours in a year – 365.25 days (to account for leap years) = **1,314,900 MWh** MWh x 0.102 (Carbon Factor of 10.2% / 100) = **139,119.8 MWh/Yr / Load Factor** MWh/Yr / Load Factor x 0.067 (Carbon Factor in tCO_2e) **=8,986.03**	Based on a saving of 0.067 kg of CO_2e per kWh. The values are taken from the Department for Energy Security & Net Zero Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Data Table 1, Column J, Row 29. Updated 30 November 2023. https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal The fossil fuel only calculation is based on a saving of 0.249945 kg of CO2e per kWh, which is the average carbon factor between natural gas and coal (for electricity generation). The values are taken from the 'Greenhouse gas reporting: conversion factors 2024' spreadsheet. Updated 8 July 2024. https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024
Annual estimated CO_2 reduction (displacing fossil fuel sources only)	33,522.57 tCO_2e	150 MW x 8766 (Number of hours in a year – 365.25 days (to account for leap years) = 1,314,900 MWh	

Site	Figure	Calculation	Source
		MWh x 0.102 (Carbon Factor of 10.2% / 100) = 134,119.8 MWh/Yr / Load Factor MWh/Yr / Load Factor x 0.249945 (Carbon Factor in tCO_2e) = **33,522.57**	
40-year estimated CO_2 reduction	359,441.2 tCO_2e	8,986.03 x 40 = 359,441.2 **tCO_2e**	
40-year estimated CO_2 reduction (displacing fossil fuel sources only)	1,340,902.8 tCO_2e	33,522.57x 40 = **1,340,902.8 tCO_2e**	