OLD WOOD ENERGY PARK
APP REF: 24/00161/FUL
SOLAR FARM - ELECTRICITY GENERATING CAPACITY STATEMENT

Solar Farm Generating Capacity

Under the Planning Act 2008, the current statutory threshold for solar projects to be classified as nationally significant infrastructure projects (NSIPs) is 50 megawatts (MW). The draft Infrastructure Planning (Onshore Wind and Solar Generation) Order 2025[1] proposes to amend this by raising the threshold to 100 MW, meaning that only solar projects exceeding this capacity would require development consent under the NSIP regime. As a result, solar projects below this threshold would no longer be determined at the national level and would instead be considered through the local planning authority process. If enacted, this change would take effect from 31st December 2025.

Individual solar panels generate electricity in direct current (DC) form. The panels are electrically grouped in strings, and the electricity generated from each string is transferred in cables to an inverter, which is used to convert the DC electricity to alternating current (AC). A percentage of the electricity is lost in this conversion, meaning that the total peak DC wattage (or Watt-peak (Wp)) is greater than the AC output. The AC electricity is then able to be passed through a transformer which is used to step up the voltage for export to the grid.

Under the latest National Policy Statement for Renewable Energy Infrastructure (EN-3)[2], clarification is provided under paragraph 2.10.53 that the maximum combined capacity of the installed inverters (measured in alternating current (AC)) should be used for the purposes of determining the capacity of a solar farm.

Footnote 91 of EN-3 then provides some further clarification in respect to reactive power, stating that combined maximum AC capacity of the installed inverters may only exceed the 49.9MW threshold for Nationally Significant Infrastructure Projects for the sole purpose of overcoming reactive power consumption within the solar farm between the inverters and the connection point.

Apparent power is measured in MVA and is the amount of power supplied to an electrical system. It comprises both active power (MW), which is the useful power, and reactive power (MWAr), which is the non-useful power. To meet electricity network requirements and standards, the solar farm has a statutory requirement to be able to release or absorb some reactive power to the grid, on top of their active power export, this is to support network stability. Additionally the private electrical infrastructure within the solar farm introduces significant reactive power losses. To balance the losses within the private electrical infrastructure and satisfy statutory electricity network requirements, while simultaneously ensuring the efficient use of the grid connection, there is a need to increase the apparent power to achieve the grid connection capacity in active/ useful power.

The Planning Statement details the infrastructure proposed and the maximum parameters assessed in the application. At present the exact solar panel or inverter model has not been selected for the Development, given the historic and future potential for rapid advances in technology and component efficiency. Therefore, the precise DC watt-peak and exact number of panels or inverters has not been fixed.

Typical elevations of the solar panels are shown on drawing WLL02A-EXG-05-ZZ-D-K010-P02 Solar Panel. These indicate a range of parameters but any final panel would fit within the maximum, and therefore worst-case parameters shown. The layout presented with the planning application includes 110,256 panels. On the basis that the panels could each be 650 Wp, this would give a total capacity of circa 71.67 MWp DC. Solar panel models will be chosen prior to construction and the final solar panels will not be materially different from the solar panels which form the basis of this planning application

[1] UK Government, 'The Infrastructure Planning (Onshore Wind and Solar Generation) Order 2025 (Draft)'(2025) [Online]. Available at: https://www.legislation.gov.uk/ukdsi/2025/9780348269765 [Accessed 02 June 2025].
[2] https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3.pdf [Accessed 02 June 2025]

and used in the application stage assessments, therefore any potential effects have already been considered and assessed in full.

The number of inverters would depend on the capacity of the inverter selected. On the basis that each inverter has a rated output of between 1.75 and 2.5 MW then 25 would be required; this is considered to be the maximum and therefore worst-case and what is shown on the layout plan. As with the solar panels the final inverter technology will be chosen prior to construction and the final inverters will not be materially different from the inverters which form the basis of this planning application and used in the application stage assessments, therefore any potential effects have already been considered and assessed in full. If the capacity of each inverter increased then the number of inverters required could decrease. As with the panels, the size of the inverters would fit within the maximum worst-case sizes as detailed in the Planning Statement and shown on drawing WLL02A-EXG-05-ZZ-D-K002-P01 MV Inverter.

The number and size of the solar panels has been designed to optimise the performance of the inverters and the output of the site. Section 2.10.61 of EN-3 supports this, stating that an objective of efficient design should be to maximise the potential power output of the site. The aggregated inverter capacity would only exceed the 49.9MW AC NSIP threshold for the sole purpose of overcoming reactive power consumption, as permitted under Footnote 91 of NPS EN-3.

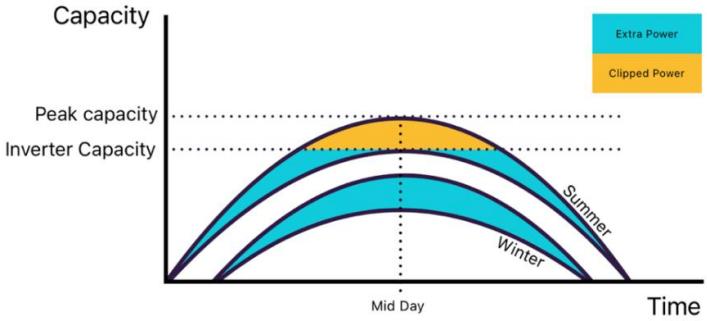
Overplanting

"Overplanting" is a term used in the solar industry to describe the situation in which the maximum installed generating capacity (measured in direct current 'DC') of the solar panels is larger than the solar farm's grid connection (measured in alternating current 'AC'). This allows the solar farm to maximise the renewable energy generating efficiency over its lifetime and make best use of the available grid connection's export capacity with the land that is available for the development. The design of a solar farm, including the degree of overplanting, is always influenced by characteristics of a particular site and the potential impacts of a development on the surrounding area, and so the approach to overplanting cannot be applied in the same way on every project.

The main reasons for overplanting are to seek to maximise the renewable energy-generating efficiency of the Development and to, therefore, make best use of the export capacity that has been secured. Solar farms have variable output over time and overplanting allows the project to deliver a more consistent level of energy to the grid, both over the course of the day and the year. A very short period of 'clipped' power in mid-summer is more than compensated by additional generation over the rest of the year when the solar farm is operating below peak capacity. Most often, the extent of necessary overplanting cannot be accurately calculated at the time of the planning application as the efficiency and generating potential of panels is constantly changing (improving) with technological advances. However, in determining the extent of overplanting there have been the following considerations:

- Power losses with converting DC to AC;
- Degradation in panel efficiency over time;
- Times of low irradiation (i.e. when it is cloudy, or at dawn and dusk); and
- Shading such as from trees, particularly in the winter months at dawn and dusk, as well as shading between rows of panels.

A higher ratio of DC:AC results in greater 'clipping' in the summer, which occurs when the panels could produce more output, but the actual generation is restricted by the inverters; on the contrary, this allows for more efficient utilisation of the inverters throughout most of the rest of the year, which generally correlates to when the need for the energy is greater. This approach then assists with smoothing the 'peak' of the typical solar generation curve profile by extending the time when maximum generation occurs in the day. This is illustrated on the following graphic.



Footnote 92 of EN-3 explains 'overplanting' (i.e., allowing for a higher DC watt-peak than the AC output capacity) in solar farm developments and confirms that the approach is an acceptable one provided that:

- the electricity exported to the grid does not exceed the statutory threshold such that the scheme would be categorised as a "nationally significant infrastructure project"[3] and nor would it exceed the threshold proposed under the draft Infrastructure Planning (Onshore Wind and Solar Generation) Order 2025;
- the overplanting can be justified; and
- the decision-maker assesses the proposed development and its impacts on the basis of its full extent including any overplanting.

The interpretation of national policy concerning the practice of 'overplanting' in solar energy projects was considered in a judgement handed down on the 19th May 2025, Ross v SSHCLG [2025] EWHC 1183[4], which confirmed that NPS EN-3 does not restrict the practice of overplanting to account for degradation in panel array efficiency, but that overplanting may be justified for other reasons too. The judgement also considered the correct interpretation of footnote 92 in EN-3, which governs when "reasonable overplanting should be considered acceptable". It confirmed that footnote 92 did not require a separate determination of whether the proposed degree of overplanting was reasonable. Instead, it should be addressed as part of the planning balance, which is to be carried out on the basis of the project's full extent, including any overplanting.

The overall area within the red line planning boundary, including the battery energy storage system (BESS), substation, landscaping and cable route is 100.96 hectares (ha) and this indicates the maximum extent of the Development. However, within this red line the solar farm infrastructure (i.e., the fenced area containing panels) occupies an area of approximately 67.09 ha (or circa 66.45% of the Site). Paragraph 2.10.17 of EN-3 states that a solar farm typically requires between two and four acres (between 0.8 and 1.6 hectares) for each MW of output. For a circa 50MW AC solar farm this would be 40 to 80 ha so 67.09 ha fits within this bracket. EN-3 further states that a circa 49.9MW AC solar farm would have between 100,000 and 150,000 solar panels, noting this would vary between sites. The Development has 110,256 panels and so is at the lower end of the expected range.

In summary the installed solar panel capacity of the Old Wood Energy Park is 71.67MWp DC (subject to panel type), with a maximum combined rated capacity of the installed inverters of no more than 49.9MW AC (except for the sole purpose of overcoming reactive power consumption within the solar farm between the inverters and the connection point). It is this latter value which is the value used to define the capacity of the solar farm in accordance with paragraph 2.10.53 of EN-3. The planning application has demonstrated that the resulting scale of the Development, as proposed and incorporating a reasonable level of overplanting, is acceptable in terms of its effects and impacts on the environment, with mitigation as proposed. The electricity exported to the grid would clearly not exceed the current statutory threshold of 50MW AC and as such the solar farm is not categorised as a Nationally Significant Infrastructure Project.

[3] The statutory threshold is currently a generating capacity of 50MW as per the Planning Act 2008 ("2008 Act") though this will rise to 100 MW after 31/12/2025 as set out in the draft Infrastructure Planning (Onshore Wind and Solar Generation) Order 2025.

[4] High Court (Administrative Court) (2025) *Ross v Secretary of State for Housing, Communities and Local Government and Renewable Energy Systems Ltd* [2025] EWHC 1183 (Admin). Available at: https://www.bailii.org/ew/cases/EWHC/Admin/2025/1183.html [Accessed 21 May 2025].