

7000 Acres

7000 Acres Supplement to Cottam REP-117 [The role of Solar in Energy Provision and Decarbonisation], reviewing progress towards decarbonisation and the role of solar.

Deadline 2 Submission – 21st November 2023

Summary

Three major reports have been published this year that assess the decarbonization of the power sector in the UK and current progress towards delivering on that goal. In doing so, they describe the main challenges and the extent to which solar plays a role. These reports are:

- Delivering a reliable decarbonised power system, by the UK Climate Change Committee (CCC), March 2023
- Decarbonising the power sector, by the National Audit Office (NAO), March 2023
- Decarbonisation of the power sector, by the Business, Energy and Industrial Strategy Committee (BEIS), April 2023 – **Note:** *the energy portfolio of this department is now the responsibility of the Department for Energy and Net Zero (DESNZ)*

In all of the above, while there are clear concerns raised regarding the UK's current path to decarbonization, within the details, it is notable that *solar is not central to any key recommendations to address the situation in any of the reports.*

Conclusions:

It is clear that in order to decarbonise, the UK faces many challenges, among which those most pressing concerns are:

- The need for overall co-ordination and planning of the energy system
- The resolution of grid connectivity issues – especially to deliver offshore wind generation
- Inadequate pace of deployment of wind and nuclear power generation
- The need to manage energy flexibility and intermittency of renewable energy sources

While solar has its part to play, it features very little in the landscape of key challenges to be overcome for the UK to make a success of decarbonising the power sector, and existing rates of deployment do not appear to be a concern, thereby undermining the call by Applicants for extensive acceleration of solar deployment through large-scale ground mounted solar.

However, uncoordinated deployment of solar has the potential to interfere with efficient and effective decarbonisation by:

- Exacerbating issues of excess renewable supply and curtailment, thereby increasing the net cost of a decarbonised energy system.
- Competing for land that will be required for direct decarbonisation measures, through tree planting and restoration of peatlands.
- Providing additional “clutter” to an already overwhelmed queue of grid connection applications.
- Diverting skilled resources away from delivering on the key priority tasks for decarbonisation, e.g. offshore wind, new nuclear, carbon capture.

It is therefore essential that there is a clear plan for the deployment of solar to deliver the Government ambition for 70GW of solar, as has been recommended by Chris Skidmore's report, and as has been accepted by Government.

In the absence of such a plan, the Applicant seeks to gain from the uncoordinated situation in the UK with regard to decarbonization, and in so doing lock in long-term contracts that will back an infrastructure investment that may well be a source of future regret.

In submissions to the Examining Authority, the Applicant repeatedly conflates the urgent need for decarbonization with the urgent need for their large-scale ground mounted solar project. While there is an urgent need to decarbonize, it is clear that solar will play a limited role in resolving the key issues required to decarbonize the UK power sector – something that must be fully considered when weighing up the significant impacts of large-scale ground mounted solar schemes.

Review of Reports on UK Decarbonisation Progress and Role of Solar:

Three major reports have been published this year that assess the decarbonization of the power sector in the UK and current progress towards delivering on that goal. In doing so, they describe the main challenges and the extent to which solar plays a role. These reports are:

- Delivering a reliable decarbonised power system, by the UK Climate Change Committee (CCC), March 2023
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The CCC report states “the UK Government has committed to decarbonise electricity supply by 2035, in line with the Climate Change Committee’s advice. However, the Government has not yet provided a coherent strategy to achieve its goal”; this is a consistent message across all three reports, with the BEIS Committee report stating, “for too long, policies for the power sector have been designed in silos, without adequate consideration of how they all interrelate and fit together”.

All three reports call for greater Government involvement, with the NAO report recommending that “Decarbonising power requires government to increase its planning and coordination of the power system”. The BEIS Committee echo this by stating “the Government must become more involved in co-ordinating delivery, including the provision of an overarching delivery plan”, and the CCC similarly states “careful system-level and asset-level planning and design is needed from the outset to ensure that a decarbonised system, with a higher degree of weather-dependence, can be made reliable and resilient.”

All three reports conclude that delivery of the decarbonisation of the electricity system is under threat because of this uncoordinated approach, with the NAO stating, “the lack of a delivery plan means DESNZ cannot be confident its ambition to decarbonise power by 2035 is achievable”, and going on to assert that “without a delivery plan DESNZ cannot fully understand when costs could be highest and the potential effect on taxpayers and consumers.”

The BEIS Committee identifies notable omissions in the Government’s strategy to decarbonise the power sector, “these include, but are not limited to, policy to deploy onshore wind, measures to reduce energy demand, support for long-duration energy storage, a decision on the use of hydrogen across the economy and clarity on where private finance for nuclear energy projects will come from.”

The BEIS Committee report goes on to highlight points from the CCC, echoing concerns that the Government’s 2035 goal will not be met without “urgent reform”, their key issues being:

- a lack of an overarching delivery plan and focus on whole system costs;
- network constraints and delays in securing grid connections;
- an outdated planning regime;
- economic headwinds that have increased costs for developers of low-carbon projects, and a global race to secure investment in the energy transition;
- bottlenecks across supply chains;
- a wholesale electricity market that is in need of reform;
- a lack of focus on ensuring a route to market for flexible assets; and
- limited progress in reducing energy demand.

In all of the above, while there are clear concerns raised regarding the UK's current path to decarbonization, within the details, it is notable that *solar is not central to any key recommendations to address the situation in any of the reports.*

In the Government's response to the BEIS Committee Report on progress towards decarbonisation, the word "Solar" does even not feature once in 33 pages of discussion.

From these reports, the primary areas that require most urgent action to decarbonize are in the following areas:

Overall Co-ordination:

The BEIS committee state that "The level of coordination and pace of delivery needed requires the Government to operate in a different way than it has in the past" and call for an "overarching delivery plan for the decarbonisation of power, with clear milestones and contingencies". This aligns well with the CCC recommending the publication of "a comprehensive long-term strategy for the delivery of a decarbonised, resilient, power system by 2035"

According to the NAO report, the Government has committed to create a new organisation to co-ordinate the power system, called the Future System Operator, which would "advise government on policy decisions that balance decarbonisation with maintaining a secure supply of electricity and ensuring the system runs efficiently. This might include, for example, advice on the best location to build new wind farms".

This indicates the high level of intervention such a body would be required to play in the co-ordinated development of the future energy system, in order to effectively and efficiently decarbonise the power system.

Network infrastructure

Delays in availability of grid connections are widely reported in the press. The BEIS committee asserts that "The UK's 'first come first served' approach to grid connections is failing to deliver the volume of connections required. Projects which may be speculative or slow-moving risk being prioritised over those that are more viable".

The nature of the challenge lies in the observation made by the BEIS committee that "The expansion of renewables, especially offshore wind, will mean that more generation is located on the periphery of the network (for instance in Scotland or East Anglia or Cornwall), situated at greater distances from large centres of demand (such as South East England)".

The CCC quotes National Grid which stated that "in order to support the Government target of up to 50 GW of offshore wind by 2030, in the next seven years it will have to install more than five times the amount of transmission infrastructure in England and Wales than has been built in the last 30 years".

This highlights the scale of the challenge, and given offshore wind is expected to play such a dominant role in the future UK energy mix, failing to deliver grid connectivity to offshore wind would have a seriously impair decarbonisation.

The BEIS committee noted that “In May 2022, the Government appointed Tim Pick as the UK Offshore Wind Champion—an independent advisor to government on the development of the UK’s offshore wind sector”. Tim Pick was quoted as saying that if Ministers “take just one message... it should be the urgent need to upgrade our national grid”.

As an indication of the scale of change, the BEIS committee reported that “Between 2018 and 2022, the volume of new application offers provided per year by National Grid ESO to generators wanting to connect to the grid grew tenfold, and the volume of offers that will be sent out in the first quarter of 2023 alone will exceed the total volume in 2022”.

What is unhelpful are the high volume of speculative or unnecessary schemes that are in the queue for National Grid connections. The BEIS Committee report reports that “Future Energy Scenarios modelling by National Grid ESO shows that Great Britain needs between 123 and 147 GW of low-carbon transmission generation by 2030 to be on a net zero compliant pathway. In February 2023, Great Britain had 257 GW of low-carbon electricity generation with contracts for future connection to the transmission network. Combined with the 83 GW already connected to the grid, that is almost three times as much than is needed. However, National Grid ESO expects just 30–40% of projects in the queue to come to fruition, with many pipeline connections likely to be speculative”.

There are over 130GW of solar schemes in the National Grid connection register. Such schemes do not include the potential for rooftop solar schemes. This is a clear area where greater coordination is required as the current scramble for potential solar schemes and strategic holding of grid connections serve to exacerbate the existing circumstance of congestion.

BEIS recommend that “Ofgem allows National Grid ESO to require projects already in the queue to meet strengthened milestones. If projects are unable to meet these, network operators should be able to prioritise other more viable projects in the queue”.

It is worth noting that network infrastructure extends beyond the electricity network. The CCC report notes “The network and storage infrastructure needed to support a decarbonised system will also be very significant, with build required for the transport and storage of electricity, hydrogen and CO₂”. Such infrastructure for electricity storage (particularly medium to long-term), hydrogen and CO₂ is in its infancy, again underlining the scale of network infrastructure challenges that must be overcome to decarbonise the UK power sector.

Address the shortfall in low carbon generation:

To meet the decarbonisation target, the bulk of future energy volume will be produced by low carbon generation. In this space, there is real concern expressed by the CCC and NAO that installation of wind and nuclear generation are not being progressed sufficiently quickly.

With regard to wind, the NAO notes that “Achieving DESNZ’s ambition of up to 50GW of offshore wind by 2030 requires more than 37GW to be deployed in eight years. By comparison, as of January 2023, 12.6GW has been deployed since the first offshore wind farm started operating in 2000”.

The BEIS committee also notes that “No offshore wind project has been recommended for approval by the Planning Inspectorate since 2017”.

BEIS states that “The UK is a world leader in offshore wind, with the largest fleet of turbines outside China. Offshore wind is widely expected to provide the bulk of the UK’s electricity in future. The

Climate Change Committee (CCC) has suggested that by 2050 the UK may have between 65 and 125 GW of offshore wind capacity, up from 13 GW today.”

Crucially, with a yield (load-factor) of over 50% for offshore wind, that capacity will deliver 280-560TWh of power – and provide the foundation for the future energy system.

With regard to nuclear, NAO notes that “DESNZ has an ambition for up to 24GW of nuclear power by 2050 and to make progress on up to eight more reactors by 2030”, but highlights “a gap of nearly 18GW for the government to achieve its 2050 ambition of up to 24GW. Only one project (3.2GW at Hinkley Point C) has entered construction in the past 20 years”.

The NAO makes the explicit recommendation that the Government “within 12 months, review plans for achieving its ambitions for offshore wind and nuclear power expansion”.

For Solar, the CCC report notes that build rates for solar remain “close to historical peak”. It describes the estimated installation rates to meet the 70GW ambition by 2035 as requiring 4.3 GW per year of solar and “4.1 GW of solar having been achieved historically”.

Furthermore, in evidence given to the BEIS Committee it was noted that “there have been double the installations of rooftop solar this year compared to last year. That is entirely driven by the energy price crisis. Those in the warehousing sector have said that they think we could put 15 GW of solar on their sector alone. There is an awful lot we can do there, which has not really been looked at yet.” It was also noted that “local planning system is working quite well”, and reflecting that “Local democracy is working” in this regard.

The BEIS Committee reflected on the Review of Net Zero by Chris Skidmore MP which “recommended that the Government establish a taskforce and publish a roadmap to help achieve its 70 GW ambition” and that “in March 2023, the Government accepted this recommendation, with plans to establish a joint government industry taskforce and publish a solar roadmap in 2024”.

A final aspect that is raised by the CCC Report and the BEIS Committee is that of skills, where gaps and shortages have the potential to pose a delivery risk to offshore wind, new nuclear and carbon capture projects. It is therefore essential that these skills are not “diverted” into projects that are of limited value to the decarbonisation of the power sector.

All three reports call for urgent action to ensure sufficiency of wind and nuclear delivery programmes. By contrast, there are no such concerns about the rate of solar development – and, as a result, there is no case for the large-scale ground mounted solar schemes, or the associated increase in rate of solar deployment that is advocated by the Applicant.

As an aside, the CCC report explores the possibility of importing renewable energy from outside the UK, “especially from countries with abundant potential for low-cost generation (e.g. from solar in sunny regions)”. Implicit in this is the acknowledgement that the UK is not an abundant source of solar energy.

The increasing importance of generation flexibility to manage intermittency of renewable generation.

To be able to balance the electricity system in the future, it is acknowledged that there is the need to manage this energy flexibility through energy storage and carbon free dispatchable power

generation. Apart from the historical variability of demand, this is increasingly important as electricity supply is increasingly sourced from intermittent renewable sources.

The CCC notes that “Careful system-level and asset-level planning and design is needed from the outset to ensure that a decarbonised system, with a higher degree of weather-dependence, can be made reliable and resilient”. Similarly, the NAO recommends that the Government should “establish how it will ensure the system is resilient to prolonged periods of low generation from renewables”. The CCC states that “The Government must give equal focus to low-carbon flexible solutions as to the full delivery of its existing renewables and nuclear commitment”.

The CCC describes “a typical year” where “a balanced supply mix could comprise around 70% of annual generation from variable renewables (primarily offshore wind), complemented by around 20% from relatively inflexible generation such as nuclear and bioenergy with carbon capture and storage (BECCS). The remaining generation will need to come from low-carbon back-up generation (e.g. hydrogen-fired turbines and fossil gas plants with carbon capture and storage – CCS) alongside other forms of flexibility”. It is notable that solar does not feature as a material element of the CCC’s description of a future typical year.

The BEIS Committee reports that “Traditionally, meeting security of supply has been most challenging during times of peak demand, with gas-fired power stations providing the required flexibility. In the future energy system, stress will be driven as much by peaks and troughs of electricity supply”. However, the BEIS Committee also reports that “Oversupply will also be problematic as, at periods of high renewable generation and low demand, additional energy will need to be consumed (either by increasing demand or using storage) or generators will need to be paid to reduce output, which would add to customers’ bills. Modelling by the CCC suggests that the power available from renewables will exceed demand in around one-third of hours in 2035”.

The BEIS Committee reported that “The total cost of balancing the system for 2022/2023 was £4.2 billion. To manage constraints (when there is more electricity in a part of the network than the network can safely handle), National Grid ESO paid out £1.38 billion in 2022 to reduce the supply of cheap renewable energy on the periphery of the network and increase supply from gas plants closer to demand instead”.

The BEIS Committee report described “The average cost to turn down a wind farm generator is around £50 per MWh, while the average cost to turn up a combined cycle gas turbine (CCGT) plant is around £200 per MWh”. The report also quoted Will Mezzullo, Head of Hydrogen at Centrica, who said “some studies estimate that by 2035, around 30 terawatt hours of electricity, equivalent to powering 8 million homes for a whole year, may need to be curtailed”.

This highlights the adverse consequences of uncontrolled, uncoordinated development of infrastructure, such as excessive large-scale ground mounted solar would have on the efficient delivery of a decarbonised energy system, by exacerbating the situation of “curtailment”, where renewable power is required to be reduced during periods of excess generation.

In terms of storage, the BEIS Committee report uses the analogy of frozen food to describe the importance of storage. Before refrigeration we lost 60% of food. Without greater storage capacity, the same would go for excess renewable generation that could not be immediately used. It was commented that this “is the big strategic gap that we have in this decarbonisation system”.

The BEIS Committee report stated that “The deployment of long-duration energy storage is essential to ensuring that a zero-carbon power system can operate 24/7, 365 days a year”.

The Applicant's proposed development produces large-scale intermittent renewable generation with only very limited, short-term energy storage. The Applicant therefore provides only a partial offering to the decarbonisation of the power system, by failing to address the intermittency and flexibility issues necessary to balance the energy system.

Local involvement:

In common with the Review of Net Zero (Skidmore Review), the BEIS Committee report states that "Local communities who host critical clean energy infrastructure should benefit from doing so". As with the majority of other content in these reports, the focus is on resolving delivery of wind generation, rather than solar, suggesting "connections between offshore wind farms and transmission networks need to be better co-ordinated to minimise disruption for local communities".

There is no reference to the circumstance of multiple large-scale ground mounted solar schemes being proposed within the same area, but it is clear that no net community benefit that would arise from Cottam, West Burton, Gate Burton and Tillbridge solar being located in such close proximity, quite aside from the compound effect of disruption to local communities through multiple schemes being developed in parallel.

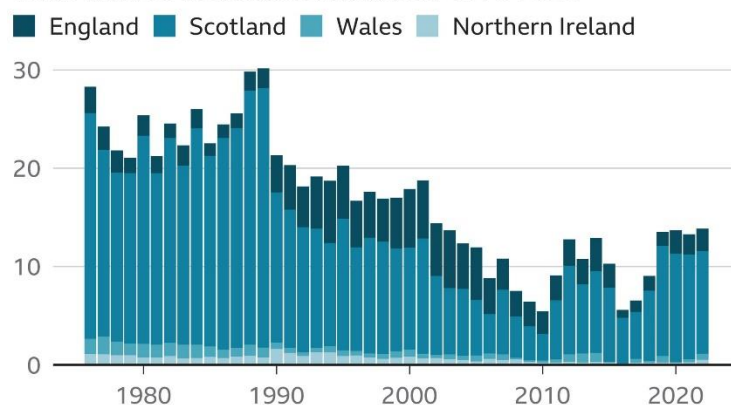
More broadly – with regard to Land Use:

The BBC article [Climate change: Is the UK on track to meet its net zero targets? - BBC News](#) considers many facets of the UK's progress towards decarbonization, and including progress towards the measures necessary for direct decarbonization through tree planting and the restoration of peatlands, as advocated by the UK Climate Change Committee in the 6th Carbon Budget.

This is an important factor, particularly when considering the use of land at scale for ground-mounted solar. Trees and peatlands play important roles in removing carbon dioxide from the atmosphere. The article states that "UK forest cover is 13%, among the lowest in Europe."

New tree planting across the UK

Total number in thousand hectares, 1976-2022



Source: Forestry Commission



It states that the "Government has a target to plant 30,000 hectares of trees a year by 2025. However, annual UK tree planting has not risen above 15,000 hectares since 2001". The article quotes the UK forestry body as warning that there is "zero chance" of the UK meeting its target."

The BBC article reports that “it is estimated that only around 20% of UK peatlands are in a near-natural state, including only 1.3% in England. These damaged peatlands are responsible for around 5% of the UK’s greenhouse gas emissions, whereas healthy peatlands would take up carbon dioxide.” And reports that the CCC says that peatland restoration is “significantly off track”.

Deployment of large-scale ground mounted solar puts additional pressure on land use – already considered to be stretched, at a time when it is clear that plans to deploy direct decarbonization measures through tree-planting and restoration of peatlands are already behind.

Conclusions:

It is clear that in order to decarbonise, the UK faces many challenges, among which those most pressing concerns are:

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While solar has its part to play, it features very little in the landscape of key challenges to be overcome for the UK to make a success of decarbonising the power sector, and existing rates of deployment do not appear to be a concern, thereby undermining the call by Applicants for extensive acceleration of solar deployment through large-scale ground mounted solar.

However, uncoordinated deployment of solar has the potential to interfere with efficient and effective decarbonisation by:

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- Competing for land that will be required for direct decarbonisation measures, through tree planting and restoration of peatlands.
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References:

Reference	Link
Delivering a reliable decarbonised power system, by the UK Climate Change Committee (CCC), March 2023	Delivering a reliable decarbonised power system - Climate Change Committee (theccc.org.uk)
Decarbonising the power sector, by the National Audit Office (NAO), March 2023	Decarbonising the power sector - National Audit Office (NAO) report
Decarbonisation of the power sector, by the Business, Energy and Industrial Strategy Committee (BEIS), April 2023 Including: Business, Energy and Industrial Strategy Committee Oral evidence: Decarbonisation of the power sector, HC 283 01 November 2022	Decarbonisation of the power sector (parliament.uk)
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The Sixth Carbon Budget, 2020, UK Climate Change Committee	https://www.theccc.org.uk/publication/sixth-carbon-budget/