Modelling of GB grid-scale solar PV generation: impacts of the new category of solar power plant on the national energy system

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Key findings and strategy implications

New modelling set out in this paper shows that prioritising grid-scale solar power facilities in order to inflate GB solar power capacity is not likely to deliver correspondingly increased solar power contributions to national electricity demand. In fact, solar power contributions at grid scale in this country are effectively locked in to modest levels. This is because of a combination of poor performance of UK solar power assets across autumn and winter seasons when energy demand is at its highest (and is forecast to significantly rise as the UK moves to more electrification); the asymmetric relationship between higher outputs of spring/summer with the natural drop in energy demand during those periods, alongside the growing role of rooftop and other embedded applications in reducing energy-take from the grid; and the limited role even significant deployment of short term battery energy storage can play in the seasonal scenario of higher energy output/lower energy demand. Moreover, increasing solar power capacity – crucially, without the benefit of significant corresponding higher energy output when it is most needed – is likely to result in extensive curtailment and associated costs across the entire energy system during peak solar output periods, compounded by market disruption caused by arbitrage practice by multiple individual energy storage asset owners.

1. The gap between solar power capacity and average energy output in the British climate is significant. 'Capacity factors', a measure of performance, are as low as 9.5% to 11% across an average year, with particularly low capacity factors seen across the first and fourth quarters. Despite this, a new category of exceptionally large grid-scale solar facility designed to be built on agricultural land (average size: 2,000 acres) is currently planned to deliver a substantial majority of UK solar capacity. Capacity continues to be the primary reference measure for both developers and policy-makers.

2. New modelling indicates that if the UK reaches 45GW solar capacity (2030 target: 45–47GW), predominantly via a series of individually-owned, large-scale ground-mounted schemes on agricultural land, solar power would contribute only 14.6% to total annual electricity demand, against 2024 demand profiles. With battery storage, increasing land-take further, the contribution could reach 16%.

3. Because of forecast rises in demand, the modelling suggests that achieving the 2035 solar capacity target of 75GW would see a drop in the solar contribution to just 12.9%. With increased battery storage (and additional land-take), it could be 16.4%, only fractionally higher than the contribution achieved at 45GW capacity.

4. The dip or plateau in solar contribution at a significantly increased installed capacity not only reflects the forecast increase in demand for electricity, but also high solar peaks at low electricity demand periods, coupled with limitations in short term battery storage.

5. The detailed modelling findings set out in this paper for 2030 and 2035 are broadly in line with the National Energy System Operator's (NESO's) Future Energy Scenarios (FES) forecasts for 2050. FES 2024[1] estimates that solar technology would account for 10.7–13.9% of GB generated electricity in 2050. FES 2025[2] has a lower forecast, indicating that solar technology would account for 10–11% of GB generated electricity in 2050.

6. As demand rises with new heat pumps and electric vehicles, and with current strong policy support for new energy-intensive data centres, because of the seasonal mismatch in solar supply and demand, transmission-scale solar will inevitably fail to keep pace without very long term, costly, energy storage.

7. As rooftop and other embedded solar installations increase, grid demand will weaken, and grid-scale ground-mounted solar power supply requirements will soften accordingly, particularly as seasonal periods of higher solar output correspond to lower energy demand. This has serious implications for curtailment rates and associated costs.

8. Solar power curtailment can be partially offset with battery energy storage, but even higher capacity battery arrays do not offer longer than a few hours' storage, and cannot be relied on for significant day-to-day storage, let alone season-to-season. Battery storage modelling in this paper is on a best case scenario basis.

9. Battery storage will inevitably be used not only to limit curtailment by asset operators, but also by operators capitalising on energy arbitrage opportunities, imposing further costs on the network.

10. When solar meets or exceeds demand, it would push all other generation across the system, including more expensive offshore wind, into curtailment risk, leading to high levels of asset redundancy and significant curtailment costs.

11. Future growth of new nuclear would push more non-flexible generation into curtailment, again leading to non-flexible asset redundancy. In the case of solar this would leave large tracts of agricultural land under solar panels entirely unproductive, with needless subsequent land contamination and change of use to development.

12. For solar contributions to annual electricity demand to exceed 20% would require exceptionally large deployment of both installed solar and battery storage capacity. Modelling of 131GW, the solar sector's ground-mounted pipeline, shows a contribution to electricity demand of 18.8%, or 25.6% with 6-hour battery storage. This would be at the expense of more than 650,000 acres of land, or 5% of UK cropland, not including battery system arrays, also predominantly targeting agricultural land. This extreme level of solar over-supply would trigger curtailment of all other energy sources on the grid, with associated high costs.

Modelling of higher capacity levels dictated by the government's targets shows a counter-intuitive reduction in solar contribution to electricity demand, because as demand rises, the seasonal nature of UK solar will increasingly cause it to fall short; and over-supply of grid-scale solar at peak output periods would result in expensive curtailment costs. This would be exacerbated by higher levels of embedded solar and the planned nuclear installation programme.

Deploying multiple grid-connected solar schemes on a significant scale across the UK is not an effective use of agricultural land once the actual, modest, contribution of energy and emissions reductions have been considered, and when alternative applications via embedded scenarios are readily available.

The UK's solar strategy needs careful reconsideration to reflect the performance limitations of solar power technology in the UK climate; shift emphasis to actual energy outputs rather than focusing on capacity; and the consequent requirement to prioritise embedded distribution-level installation over transmission-level solar facilities. As this modelling demonstrates, the grid-scale solar sector is likely to introduce not only new costs arising from battery storage asset energy trading, but also trigger curtailment costs that go far beyond the solar segment of the UK energy market.

Overview

Modelling has been conducted to analyse the national contribution of large-scale ground-mounted solar energy facilities to GB electricity demand. This has been set in the context of national targets, expected demand growth and an example Statement of Need for one large-scale solar project with Nationally Significant Infrastructure Project (NSIP) status. The results present solar capacity factors (output compared to theoretical peak output), solar contribution (energy delivered as % of demand) and curtailment rates (unused generation potential) for a range of solar and battery energy storage system (BESS) deployments, and possible future changes in demand.

Introduction

Plans for a new category of very substantial grid-scale, ground-mounted solar facility are being accelerated, particularly across England, with certain regions seeing large areas of prime agricultural land set to be put under solar panels and BESS. The government sees these as an important part of its Net Zero policy, with increased targets for solar of 45–47GW by 2030* and 75GW by 2035**, and additional capacity sought from rooftop solar installations, according to the Solar Roadmap[3]. The means by which these targets are expected to be met are set out in the Clean Power Action Plan 2030[4] with supporting advice and analysis provided by the National Energy System Operator (NESO)[5,6]. In April 2025, the Department for Energy Security and Net Zero (DESNZ) updated its Clean Power 2030 connections reform annex[7], combining transmission and distribution targets into a single target for each region, effectively significantly increasing the previously smaller transmission targets.

Large-scale transmission-connected solar facilities (greater than 100MW capacity from 1 January 2026) are classed as NSIPs whereby development consent is determined by the DESNZ Secretary of State after scrutiny by the national Planning Inspectorate (PINS). The local planning process is bypassed for these projects. NSIPs currently pass through a number of stages including statutory community consultation, submission to PINS, PINS examination and recommendation, and finally decision by the Secretary of State.

The examination stage may require a Statement of Need (SoN) from the developer to justify how a specific scheme fits the NSIP criteria and why, in the developer's opinion, the Development Consent Order (DCO) should be granted. One such SoN was submitted to the Botley West Solar Farm examination by the developer Photovolt Development Partners GmbH[8]. This report has subsequently been referred to by other developers for their own PINS examinations. It is worth particular scrutiny on that basis, specifically because it is underpinned by a questionable methodology and interpretation of 'need'.

* The current 45–47GW target increased the previous target of 35GW and was set out in the Clean Power 2030 Action Plan, December 2024. This target is for total solar deployment (embedded plus transmission level). Solar deployment stood at 17.2GW in 2024, indicating a further 30GW of additional solar would be needed to meet the target in 2030.

** The original target for 2035 was 70GW based on a 5-fold increase from an embedded generation base of 14GW, set out in the British Energy Security Strategy 2021, and updated in 2022[9]. Since then, deployment has grown to just over 19.1GW[10]. Instead of counting this growth towards the original target, the government appears to have simply increased the target to 75GW.

Botley West Solar Farm Statement of Need

The SoN report draws heavily on the government's targets and assessments as set out in the Clean Power 2030 Action Plan and supporting analysis by NESO. NESO's Future Energy Scenarios (among other projections) are used to show the expected growth of annual UK energy demand from around 270TWh to a possible 700TWh by 2050, ie by a factor of around x2.6. These numbers do not include embedded* wind or solar generation, which have the effect of reducing the demand on the transmission network.

The energy requirement for the UK is an important metric, as operational costs and carbon emissions are directly linked to this. However, the SoN analysis proceeds in terms of generation *capacity* for its justification of large-scale solar need. Peak output capacities for solar are only reached at a specific solar irradiance level, typically 1000W/m^2. This level is rarely seen in the UK, and actual received irradiance depends on solar altitude and azimuth (time of day and year), cloud cover and air quality. The output of solar arrays is constantly varying and is highly location-dependent. Annual average solar capacity factors (percentage of time an energy generator works at its installed capacity) in the UK are typically in the range 9.5–11%[11].

Figure 1 reproduces the SoN Figure 6 that shows average generation output capacity of different renewable energy technologies for future installed capacity scenarios and expected average demand profile. The methodology by which this figure is generated is not provided, but from simple inspection it is clear that for an installed peak capacity of large-scale solar equal in magnitude to installed offshore wind (46–47GW) the solar contribution to energy (and therefore carbon emissions reduction) is very much smaller, especially in winter when energy security becomes far more fragile. Paragraph 2.3.3 of the SoN refers to NESO's Future Energy Scenarios 2024 estimates, stating: "NESO's FES(2024) analysis shows that if GB solar capacity follows the trajectory set out in each of the three net zero pathways, the technology will account for 8% - 10% of GB generated electricity in 2030, 9% - 14% in 2040 and 11% - 15% in 2050." Nonetheless, the SoN asserts: "The chart shows the important contribution solar generation would make to meeting demand in winter (yellow part of stacked columns)", despite this clearly being a very small fraction of the generation mix.

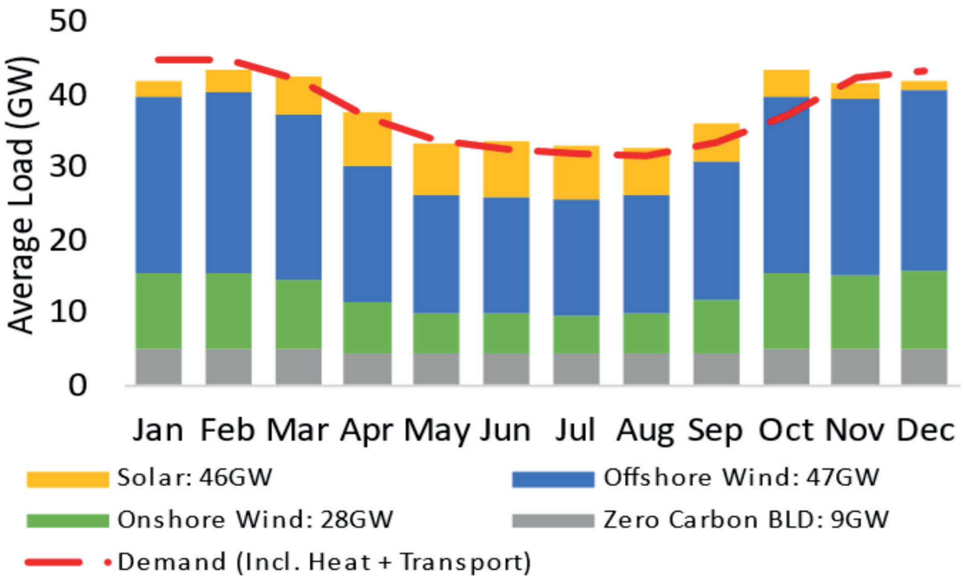


Figure 1 Botley West SoN Figure 6 average seasonal renewable energy generation capacities and demand, derived from FES 2024 and CP2030

* Embedded generation refers to electricity generated from source connected directly into the distributed energy network rather than the higher voltage level transmission system network. Embedded generation is not controlled or metered by the network system operator.

Extending this analysis, the SoN suggests that the Oxford region will need a 7-fold increase in installed renewable capacity (to 2.8GW) to meet the region's current electricity demand. It suggests that 2.3GW of this would be solar and 0.5GW from other sources (para 3.2.7). This is a different generation mix when compared to the NESO scenarios, and it is unclear why solar is being promoted to deliver the vast majority of the region's electricity needs when there is a national strategy to meet Net Zero needs using a more diverse mix. A regional solar-only strategy would require disproportionate local land-take in that area.

The Botley West SoN therefore uses an incomplete modelling method that focuses on capacity and fails to analyse the actual energy contributions, and mixes national and regional justifications which do not appear to be consistent with each other.

Modelling of transmission-level solar electricity contribution

Using average demand and supply metrics is an inadequate way to present the value and impact of electricity generation technologies to meet desired economic and carbon outcomes for a transformed low carbon grid. Seasonal variations in both demand and supply are critical to the operation of the system, the cost of electricity passed on to the consumer, and the overall contribution of carbon savings. For example, NESO summer demand forecasts[12] suggested a sub-13.4GW would be likely in 2025, in part due to high embedded generation including solar. In fact, a national demand of just 12.8GW was seen at 15:00 on 25 May 2025[13]. Summer is the time of peak solar output, leading to potential curtailment risks, while winter demand (when solar output is low) will greatly increase as heat is increasingly electrified. This gives rise to questions around curtailment, operation of BESS, and costs passed to the consumer. NESO's analysis of low summer demand indicates the potential excess of inflexible generation assets as shown in Figure 2. Note that this does not include solar generation which, at the time of analysis, mainly comprised embedded generation systems, with two or three small-scale transmission-connected solar schemes, each with a capacity of <50MW. The addition of significant grid-scale solar will increase the need for curtailment for inflexible generation assets. In addition, in the case of solar, there should be a consideration of the effective use of land when assessing the actual contribution of energy and emissions reductions.

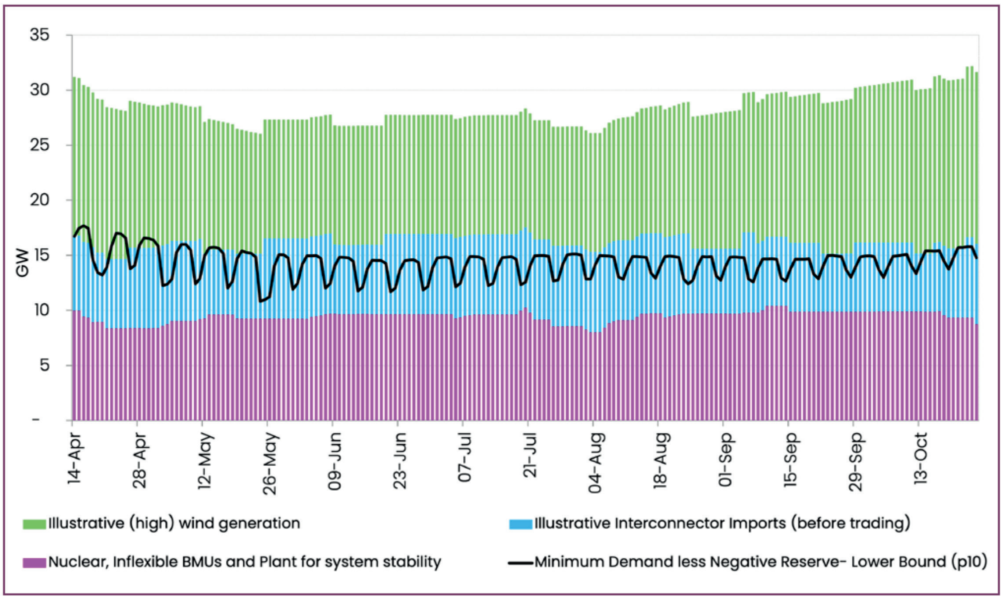


Figure 2 Minimum demand forecast compared with inflexible generation mix (not including solar), NESO Summer Outlook (Figure 6)

Analysis is presented here from a high level model of electricity output from grid-connected solar assuming government targets of 45GW by 2030 and 75GW by 2035 are met. The UK solar sector's full pipeline of 131GW (as at June 2025[14]), representing an extreme over-supply of solar power, is also modelled. The analysis uses NESO half-hourly transmission systems demand data for 2024[13], and applies some assumptions about how this demand may change in future. Solar generation output assumes a reference peak solar output irradiance of 1000W/m^2, and uses hourly average global solar irradiance to scale the national PV output. The aim is to show:

- The annual contribution that PV can make to the grid
- The amount of potential electricity generation that is curtailed

BESS is used to reduce curtailment and increase the utilisation of generated solar electricity. However, BESS assets can also be used for arbitrage to increase the income of a solar facility at times of high system marginal price; analysis of such operation is beyond the scope of this work, but must be an important consideration when assessing whether solar electricity is actually used to benefit the consumer, rather than the solar scheme owner, in terms of price.

An additional consideration for high transmission-level solar penetration rates is that where solar curtailment is avoided, and solar meets 100% of demand, all other forms of generation assets (including offshore wind and gas-fired plant) will have to be curtailed, which carries a further cost to the consumer. The model does not include the generation of nuclear baseload plant which cannot be switched off, and which will increase the need for curtailment when renewable generation exceeds demand. However, it should be borne in mind that future growth of new nuclear generation will push solar and wind further towards the curtailment margin. This study is an initial attempt to understand how some of the system variability affects the viability of large-scale solar and its potential contribution to UK electricity needs.

Method

NESO half-hourly demand data for 2024[13] has been condensed to hourly demand (average hourly MW). The model uses GB demand (England, Scotland and Wales). Data is available for embedded solar and wind generation and interconnector transfers. These are accounted for in the overall grid demand figures. However, future increases in embedded generation may strongly impact the variation in grid demand, and therefore the requirement for grid-connected generation assets. These future changes are not modelled explicitly, but accounted for by different summer and winter scaling factors. The results are indicative of the technical potential and do not model the economics of solar on the system.

The analysis calculates the following:

- Total solar generation potential in MWh for each hour of the year
- The amount of curtailment in MWh for each hour
- The annual % contribution of solar
- The annual % solar load factor against maximum generation potential
- The annual % curtailment against total potential

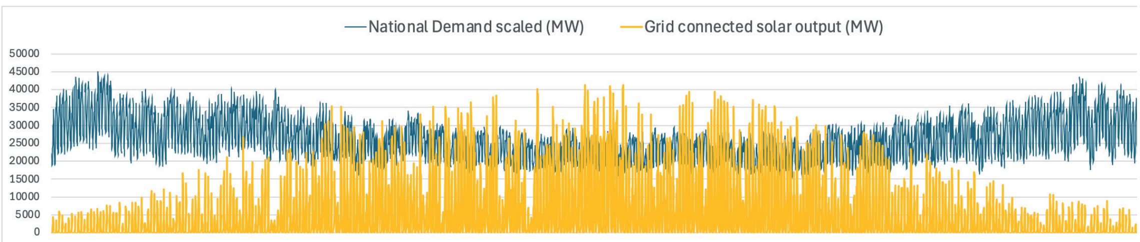
These are calculated for the following solar maximum outputs and grid demand profiles:

- 45GW: as 2024
- 45GW: 2024 winter x 1.2, summer x 1
- 45GW: 2024 winter x 2, summer x 1
- 75GW: 2024 winter x 2, summer x 1
- 75GW: 2024 x 2
- 131GW: 2024 winter x 2, summer x 1.5

Each of the above has been modelled with and without BESS, where the BESS capacity is set at 60% of the solar peak output with either 4 or 6 hours of storage. It is important to note that BESS operation is assumed to be optimised across the national grid, an oversimplification that would be a best case operational scenario. The increased winter demand represents heat pump and electric vehicle load additions (they may be higher than this post 2035), whereas the relatively lower summer demands represent the impact of additional embedded generation from wind and solar. These demand variations are not known in any detail and so are indicative only. No account is taken of the anticipated significant growth in energy-intensive data centres.

Results

Figure 3 shows two cases with different levels of installed solar capacity (45GW and 131GW) against either 2024 or scaled 2024 demand. When solar output (in yellow) exceeds demand the excess is assumed to be curtailed unless BESS can effectively store and utilise that energy within a 24-hour period. In other cases, the relationship of solar generation to demand will vary, giving rise to different curtailment or BESS storage rates. Figure 3a shows the case for unchanged 2024 demand profiles with the 2030 grid-connected solar target of 45GW. This shows low winter contributions, when the demand is higher, with peak solar contributions occurring when the load is lower in summer. This is when curtailment or BESS operation is most likely. Figure 3b shows the far more extreme case of solar over-supply (more than the 2030 and 2035 targets combined) with a doubling of winter demand and a x1.5 increase in summer. This would represent a case where solar greatly exceeds summertime demand; curtailment can be avoided using 6-hour battery storage, but this would require complex load management and curtailment of competing generation assets for extended periods of time, with high associated costs.



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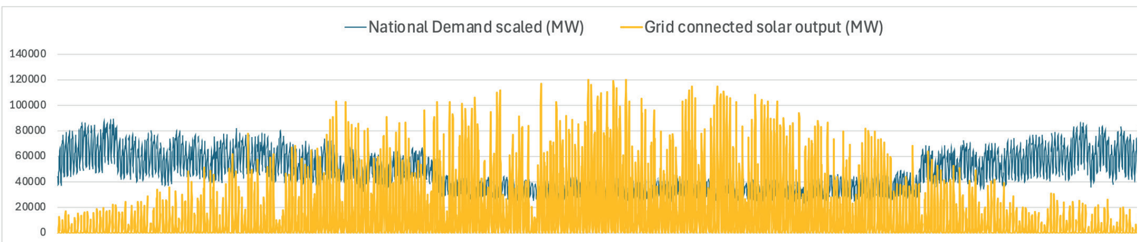

b

Figure 3 Hourly solar generation in MW for (a) 45GW capacity and 2024 grid demand and (b) 131GW for 2024 grid demand x2 in winter and x1.5 in summer

Figure 4 shows an example of peak solar generation at times of low demand with BESS used to avoid curtailment. This BESS operation is distinct from using the storage for arbitrage when solar is generated at times where the marginal system price is low, and may be stored and sold at peak times when the marginal system price is high, avoiding the Contracts for Difference price cap.

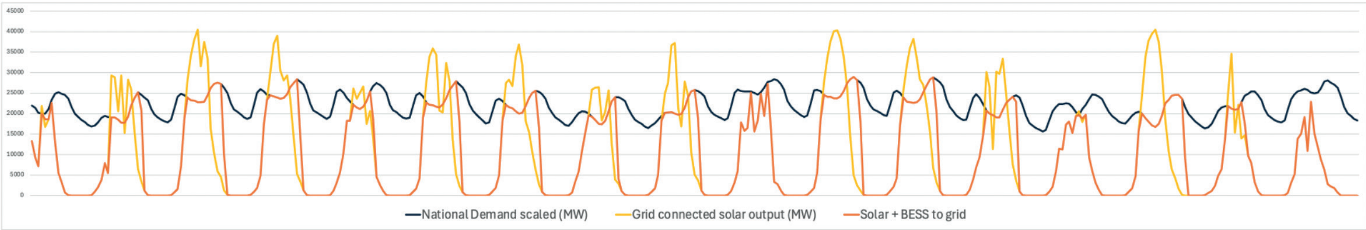

Figure 4 Example operation of BESS avoiding curtailment (in orange) at times when national solar generation exceeds demand

Tables 1, 2 and 3 show the results for the different scenarios discussed above for the different levels of solar build-out.

The solar capacity factor (the amount of solar generated against a constant maximum output) in the modelling is calculated to be 9.9%, which agrees with the 2024 figure published in DESNZ's Digest of United Kingdom Energy Statistics[11].

	45GW BESS at 0.6 x solar GWp capacity					
National demand profile	ND 2024		ND winter x1.2 summer x1		winter x2, summer x 1	
	Solar only	+BESS 4h	Solar only	+BESS 4h	Solar only	+BESS 4h
Solar contribution %	14.6%	16.0%	13.0%	14.2%	9.0%	9.8%
Capacity factor	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%
Curtailed capacity factor	9.0%	9.9%	9.1%	9.9%	9.1%	9.9%
Maximum generation potential GWh	39093.1		39093.1		39093.1	
Total used GWh	35727.3	39060.1	35845.3	39060.1	35928.4	39060.1
Total curtailment GWh	3365.8	33.0	3247.751	32.98866	3164.6	33.0
% curtailment	8.6%	0.1%	8.3%	0.0	8.1%	0.1%
hours of curtailment	442	5	417	5	398	5
% hours curtailment	5.0%	0.1%	4.7%	0.1%	4.5%	0.1%

Table 1 Solar contributions, load factors and levels of curtailment for 45GWp solar against 2024 GB national demand and stated variations

	75GW BESS at t 0.6 x solar GWp capacity				
National demand profile	ND x2		ND winter x 2, summer x 1		
	Solar only	+BESS 4h	Solar only	+BESS 4h	+BESS 6h
Solar contribution %	12.7%	13.3%	12.9%	16.1%	16.4%
Capacity factor	9.9%	9.9%	9.9%	9.9%	9.9%
Curtailed capacity factor	9.4%	9.9%	7.8%	9.7%	9.9%
Maximum generation potential GWh	65155.1		65155.1		
Total used GWh	62024.6	65155.1	51380.3	63895.9	65068.2
Total curtailment GWh	3130.5	0.0	13774.8	1259.2	86.9
% curtailment	4.8%	0.0%	21.1%	1.9%	0.1%
hours of curtailment	288	0	804	72	6
% hours curtailment	3.3%	0.0%	9.1%	0.8%	0.1%

Table 2 Solar contributions, load factors and levels of curtailment for 75GWp solar against 2024 GB national demand and stated variations

	131GW BESS at t 0.6 x solar GWp capacity	
National demand profile	Winter x2, summer x1.5	
	Solar only	+BESS 6h
Solar contribution %	18.8%	25.6%
Capacity factor	9.9%	9.9%
Curtailed capacity factor	7.2%	9.9%
Maximum generation potential GWh	113804.25	
Total used GWh	83266.6	113398.0
Total curtailment GWh	30537.7	406.3
% curtailment	27%	0.4%
hours of curtailment	998	22
% hours curtailment	11%	0.3%

Table 3 Solar contributions, load factors and levels of curtailment for 131GWp solar against 2024 GB national demand and stated variations

Discussion

From the profiles in Figure 3a it is clear (and expected) that maximum solar output is in the summer months when load (demand) is a minimum. NESO expects summer loads to fall below 13GW, which will occur at times of the day with maximum solar output. This is due to the growth of embedded solar and wind. As shown in Table 1, if grid-connected solar were to be connected at the 2030 target (45GW) with 2024 demand, the annual solar contribution would be 14.6%, with 8.6% of the solar contribution curtailed. If BESS were able to transfer all the load this would raise the solar contribution to 16%.

In future the winter demand is likely to increase due to the addition of heat pumps and electric vehicles. Summer loads will have the addition of EV charging, but may reduce or stabilise due to greater volumes of embedded solar. Solar contributions fall sharply as demand grows – 14.2% and 9.8% for winter demand growth of x1.2 and x2 respectively, even with BESS. BESS can avoid some curtailment, but there is an economic optimum for this (not calculated here), and it provides an uplift to the annual solar contribution of between 0.6% and 6% (ie solar contribution that would otherwise have been curtailed).

If the 2035 target of 75GW is met and demand doubles in the winter (Table 2) (it may exceed this), but summer demand growth is offset by embedded generation, we might expect a maximum solar contribution of 12.9%, with possible curtailment rates of 21%. This is due to the very high oversupply in summer, but severe shortfalls in winter. BESS can increase the solar contributions, by avoiding curtailment, up to 16.4%, although the difference between 4-hour and 6-hour storage is very small. This would suggest an economic optimum for BESS exists, but this would be difficult to assess as it depends on a number of unknown variables such as actual demand and installed solar capacities. Embedded solar generation already contributes around 6% of UK electricity and is also set to increase significantly, which would undermine the revenue generation of grid-connected solar into the future. A strategy of building out embedded solar, along with demand reduction and management, before any grid-connected systems are considered, would therefore seem the most appropriate route so as to avoid future system redundancy and needless land contamination and transfer.

In the most extreme case where the 2035 target is greatly exceeded (ie all the current solar sector ground-mounted project pipeline of c. 131GW is approved and built, Figure 3b and Table 3), solar contributions can reach 18.8%, or 25.6% with 6-hour BESS (which is oversized for much of the summer period). Without batteries, curtailment would be 27%. The 131GW installed capacity would require an exceptionally large land area – over 650,000 acres of land for ground-mounted solar alone. Cropland is the principal target for grid-scale developers and therefore it would be likely to remove around 5% of UK cropland from food production. BESS land-take, also typically on agricultural land alongside solar infrastructure, would be additional. Note that CPRE[15] estimates show almost 120GW capacity of rooftop and other land use solar (eg brownfield, car parks) is achievable. These embedded applications can be deployed rapidly given the right regulatory environment, as evidenced in other countries[16], and have the great advantage of much more efficient use of land area, without the additional harms to biodiversity and agricultural land development and loss, and the negative impacts on farming livelihoods and rural communities of large-scale solar deployment.

It is important to note that where solar contributes the entire demand requirement (during its peak output periods in the summer) this would lead to curtailment of all other sources on the grid (apart from embedded generation and nuclear). This analysis has not considered the impact of nuclear and other baseload plant, which would further increase this curtailment. Over-supply of solar could therefore deliver very expensive curtailment costs across the whole system, which further strengthens the argument that solar build-out needs to be delivered in a planned and highly controlled regulatory environment.

Concluding remarks

These results, where we see diminishing energy returns for very significantly increased installed solar capacity, and additional curtailment risks/costs across the whole energy system, raise the critical question of whether these contributions of grid-scale solar to national demand are worth the sacrifices of agricultural land, including Best and Most Versatile land, and biodiversity loss, especially if the land is to be transferred into non-farming ownership. At solar facility land intensities of nearly 5,000 acres/GW and modest electricity contribution rates presented here, solar requires over 1,200 times the land area per unit of electricity generated than a Combined Cycle Gas Turbine (CCGT), and around 550 times more land than nuclear, both of which are considered firm sources of power. Increasing embedded generation from rooftop and small-scale community solar schemes could deliver the same overall contributions while enabling generation to occur close to the points of demand, and reducing the need for much of the additional transmission infrastructure, as well as minimising significant curtailment costs across the system.

An additional important question remains on energy trading. It is likely that developers will seek to use arbitrage in times of lower demand (ie with no curtailment) to increase the profitability of a generation asset. Indeed, some developers have already indicated that energy arbitrage via BESS is a significant part of their business model. Instead of allowing the national system to benefit from the lower cost of solar during the day, which would help depress overall prices for the consumer, energy trading would effectively game the market mechanisms and increase the overall cost of electricity on the network.

Notes

1. This paper does not consider long duration energy storage. Nascent technologies such as hydrogen power to gas and salt cavern compressed air are still at a very low technology-readiness level, technically complex and very costly.

2. Ground-mounted solar schemes on agricultural land are consistently described by developers and policy-makers as 'temporary'. However:

   i. the National Planning Policy Framework[17] encourages 'life extension' or 'repowering' of renewable installations, setting the stage for more or less permanent loss of farmland to solar. Extensions to small-scale, older solar schemes are already under way
   ii. research suggests[18,19,20,21] that solar power infrastructure can result in long term damage to soil, undermining claims that decommissioning and remediation work will be either straightforward or cost-effective and making a return to productive agricultural use less likely
   iii. developers investing in solar NSIPs typically elect to exercise the compulsory acquisition powers available to them via the Planning Act 2008 during the DCO process.

'Modelling of GB grid-scale solar PV generation: impacts of the new category of solar power plant on the national energy system' is published by Stop Oversized Solar, a coalition of community groups from across the UK countryside. Contact: stop.oversized.solar.uk@gmail.com

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