Battery arrays to reduce peak UK electricity demand by 17.5%

U.K. Peak electricity demand can be reduced by 17.5% by investing £21 billion on a 6:1 10GW battery array. It will save 14.6 million tonnes of CO2 emissions annually.

An £8.4 billion investment in a smaller battery array would reduce peak demand by 7%.

Hinkley C will generate 7% of the UK's electricity at a cost of £26 billion.

UK-wide restrictions on green energy and battery array connections to the Grid are bad for the environment.

Restriction on Green Energy Connection to the Grid

I want to be clear that my engagement is entirely public service. Neither I nor my business have any commercial interest in generating electricity, the Network or battery arrays. Dr. Alex is one of the leaders in the field, but I am the one driving this, fundamentally for my grandchildren.

The purpose is to inform and the ask is to present information to the right people so that the UK gets the green energy that it is the policy of the Government to deliver.

Ofgem have put in writing that battery arrays are generation, but yet they have also asked DNOs to provide battery arrays **(Appendix B)**.

Completely contrary to Government policy there are restrictions, UK wide, on the distribution of green energy. This is not about whose fault anything is, but an understanding of the facts.

Fact: The DNO in Derby will not allow our business in Derby to connect solar energy to the Grid.

Dr. Alex has advised me that in large parts of the UK there is a restriction on connecting green energy to the Grid, in many cases the restrictions apply until 2030.

Dr. Alex provided me with proof in confidence about 2 separate denials to connect from the "National Grid" and which he may or may not wish to share. One from Coventry denied connection until 31st October 2028. Another from Northern Powergrid denied connection above 1MW until 2031.

Greg Jackson the CEO of Octopus has been recorded to claim that a windfarm can be built in a year but can take 6 to 7 years to connect to the grid **(Appendix A)**

It is only important if it is both true and contrary to government policy and if it is diminishing the ability to lessen the worst impacts of climate change.

Why Battery Arrays Matter

U.K. peak energy demand is approximately 40 GW during the day and 28 GW at night. A 6:1 10GW battery array would provide 60 GWh and change day time peak consumption to 30GW and increase night time peak consumption to 33GW. The battery array would be quick release at peak demand during the day and slow re charge at other times.

The peak would then be 33GW and not 40GW, which is a reduction of 17.5% (100% less 33/40) and in theory would not require any increased investment in the grid, if in fact we had a national grid. The cost of the battery array would be circa £21billion, against the projected £26 billion cost of Hinkley C to generate 7% of the total electricity demand for the U.K.

Electricity cannot be stored in any other way apart from battery arrays. Less peak demand means less generation capacity or more likely the same generation capacity to deliver more electricity as we move from fossil fuels to green electricity.

Wind and solar are unpredictable generation and charging electric vehicles cannot come directly from the grid at peak demand times, so battery arrays are essential for a green electricity future. Even if only 40% of the peak demand could be stored and used to provide the same 7% as Hinkley C, the cost would be £8.4 billion for a smaller battery array instead of £26 billion for Hinkley C.

The point is that batteries are currently an essential part of delivering more green electricity, but not anywhere nearly as useful if they cannot be connected to the grid to manage peak demand. A failure to allow connection of battery arrays is both wasteful and leads to the unnecessary generation of more electricity to meet peak demand.

Why is refusal to connect to the grid important?

The government has no money and according to one leading venture capitalist.

“We share your belief that dealing with the peaks is key. Indeed, the investment (and climate) opportunity from dealing with the peaks in power supply has been a core strand of our Infrastructure strategy for several years. We are not alone, and there appears to be plenty of capital to support that thesis. I would also expect to see more operating companies follow AES’s lead by investing in their own battery capacity. Better to do this than wait for governments to work out what is necessary.”

If true there is plenty of capital available, but it has not been deployed if the peak demand to lowest demand gap for electricity has not changed in the last decade.

Small businesses can and would deploy their capital more readily if they could connect a battery array to the grid and benefit financially from the ability to buy and store energy at a sufficiently less cost than the price it could be sold for at peak times.

The government cannot afford the capital outlay for the minimum 7% reduction in peak demand or increase of the 7% peak supply that a circa £8.4 billion battery array would provide. Venture Capital could provide the capital but have not invested, Private Businesses (wind and solar) or house-holds would probably invest more in solar energy if they could have small battery arrays that they could connect to the grid.

Improving the business case for battery arrays requires connection to the grid and a fairer price for energy supplied.

The author does not know how generators and distribution networks are remunerated and that is the key to ensuring that energy storage becomes a significant part of the provision of more green energy.

Are Batteries CO2e Beneficial

It may or may not be true that there is widespread scepticism at “Westminster” that battery arrays are CO2e beneficial after considering the CO2e cost of production, use and disposal.

Under separate cover **(Appendix C)** I have provided the evidence that the 1.25 MW battery array that AESSEAL installed recently is good for the planet. The CO2e cost, including disposal over the 15 year life cycle, is circa 112 tonnes and a CO2e net benefit of 2415 tonnes over the same 15 year period.

On a macro level for £26 billion Hinkley C is reported to save 9 million tonnes of co2e annually and an £8.4 billion investment in a battery array to reduce peak demand by 7% would save approximately 5.84 million tonnes of co2e.

Conclusion

Our electricity supply chain is not actually broken but battery arrays would make it greener, provide more green electricity capacity and connection to the grid is an essential component to accelerate the supply of battery arrays. Battery arrays will be essential to store unpredictable solar and wind power and to re charge E.V.s. It is also a fact that £8.4 billion spent on battery arrays will not scratch the surface of the longer term requirement to generate, store and distribute more green electricity.

Yours sincerely,
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APPENDIX A

Octopus CEO says Grid is "not fit for purpose" - British Utilities (british-utilities.co.uk)

Octopus CEO says Grid is “not fit for purpose”

2 weeks ago
Andy Robinson
energy bills, energy company, energy customers, energy independence, energy price cap, energy prices, Energy security, energy supplier, energy supply, energy transition, Finance & Markets, gas prices, Greg Jackson, grid, National Grid, Octopus, Top Stories

Octopus CEO says Grid is “not fit for purpose”: At the Times Earth Business Summit CEO of Octopus, Greg Jackson, made comments on how building windfarms may only take 1-year worth of engineering but could lead to 6-7 years to get authorisation to connect to the grid.

In a quote, a National Grid representative said: “National Grid is one of the largest green investors in the FTSE & is investing £15 billion over the next 5 years to deliver the energy transition, which is the surest long-term route to energy affordability, resilience & independence.

“National Grid has to operate within a planning & regulatory framework which prevents investment in anticipation of generators requesting a connection to the grid. This needs urgent reform to allow faster connections to the grid.

“We’re working with the government & regulator to push this forward at pace.”

Octopus CEO says Grid is “not fit for purpose”

APPENDIX B

https://www.ofgem.gov.uk/publications/ofgem-confirms-approach-boosting-green-and-smart-investment-local-grids

Ofgem has confirmed that its proposed 2023 price control for electricity distribution networks will:

- Require DNOs to grow their capacity using 'flexible' solutions where they can, such as battery storage or smoothing peaks in demand, before building expensive new network capacity.

See also 26 April 2022

https://www.ofgem.gov.uk/publications/ofgem-launches-review-local-energy-system-operation

Ofgem has launched a review into how the energy system is planned and operated locally to ensure Great Britain is ready for a huge increase in green, more affordable home grown power.

This could result in the creation of new independent bodies separate from network companies to oversee local energy systems across the country.

APPENDIX C

The Swedish IVL (Environmental Research Institute) released a report stating that CO_2 emissions from battery manufacture have been halved in recent years, and range from 59 to 119 kg CO_2 per kWh of battery capacity. The higher value is where batteries are manufactured solely with the use of fossil fuels and is a worst case scenario. Many organisations consider the mean of 89 kg CO_2 per kWh as a realistic value for calculating the CO_2 emissions.

Considering 1.25 MWh (1,250 kWh) of battery multiplied by 89 = 111,250 kg CO2 or 112 tonnes.

The annual savings are calculated from a combination of a reduction in grid usage and the mix between day and night time generation and are typical as the usage and generation may vary with weather conditions.

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL
CO2e Footprint (tonnes)	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	112
CO2e Savings (tonnes)	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	2527
																2415