

A Better Battery Strategy

Democratising the UK's energy system through optimised battery storage

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A Better Battery Strategy.



Introduction

The UK has set a target of delivering a clean energy system by 2030 - less than six years away. To meet this, we need to accelerate Britain's energy transition, bringing clean energy onto the grid faster, and more effectively.

As we switch to intermittent renewable energy sources, battery storage will play an essential role in stabilising the grid, matching electricity demand minute by minute. That's why National Grid has stated that 50GW of storage is needed in the UK by 2050¹, with this technology serving as the foundation of a clean, reliable and affordable energy system.

However, our current aging grid system is not built for these future needs. As a centralised system designed to get grid-scale projects built and online, we are currently limiting access to energy markets, reducing competition, and restricting the paybacks of the energy transition to investors and developers.

The Four Ds

The energy transition is often seen through the lens of four Ds;

Decarbonisation

Shifting to full reliance on the cleanest, cheapest and most abundant forms of energy – wind and solar.

Decentralisation

Deploying these renewable assets in every city, town, village and county.

Digitalisation

Having access to, and effective control, of data from each source of renewable generation to support rather than disrupt the future grid.

Democratisation

Giving all citizens and organisations access to, and fair treatment in, Britain's increasingly sophisticated energy markets.

If we are to deliver a clean energy system by 2030, we must achieve all of the four Ds, but we need to put a real focus on Democratisation. By allowing everyone to participate in our energy market, from households to small businesses, we can accelerate the UK's energy transition, encouraging wide participation in the journey, and ensuring everyone in the UK can benefit.

To make this happen, the Government needs a Better Battery Strategy. While the former government developed plans for a UK Battery Strategy², the role of smaller systems, deployed by British businesses (SMEs) and households, were not included or accounted for. With an increasing number of renewable assets coming online, alongside massive improvements in technology, households and businesses are ready, and well positioned, to get involved.

When it comes to the improvements in technology, AI-enabled optimisation is a key development, and will ensure every unit of energy is effectively utilised. Investing in renewable and storage assets that are not optimised is like having a laptop that is not connected to the internet; you can achieve some tasks efficiently but are missing out on a breadth of resources that will add much more value.

The potential benefits of a Better Battery Strategy are profound. With grid-scale batteries getting connection dates well beyond 2030, smaller existing and future installations will bring down emissions and bills now. So why wait?

Four steps for a Better Battery Strategy:

The Government can democratise our energy system and support in achieving clean energy goals with four simple steps:

- 1** Bring batteries into existing plans, from its Rooftop Revolution to the Warm Homes Plan.
- 2** Enable easier access for all batteries to take part in all energy markets via Virtual Power Plant (VPP) technology.
- 3** Incentivise battery investment and broader market participation, via tax incentives and increased returns through better use of data.
- 4** Ensure optimisation is at the heart of all deployment to ensure no unit of clean energy is wasted.

Chris Doherty
Managing Director

The Joulen logo is a circular emblem with a dark background and a light-colored border. Inside the circle, the word "JOULEN" is written in a bold, white, sans-serif font.

Statement from Managing Director

"Batteries are an essential technology in the decarbonisation toolkit and will anchor the clean energy transition.

"As we switch to clean energy, it is critical that these technologies are not restricted by an inefficient market that limits access, reduces competition, and directly benefits only a few large players. By not allowing every battery to participate in the market and not directing every unit of energy efficiently, clean energy and the investment behind it is being wasted.

"Democratising access to everyone can accelerate the shift to clean energy, reduce the cost of the transition, and spread the benefits to small businesses and households. Our data shows that, with small-scale battery and renewable systems on business premises and households in every corner of the UK, we can get closer, sooner, to our clean energy goals.

"By maximising the value of every one of these batteries, we can ensure everyone benefits, bringing down costs, achieving net zero, and optimising our grid in the process. This Better Battery Strategy will democratise and secure our clean energy future."

Reaping the benefits

With a Better Battery Strategy, any businesses with renewable and storage assets could be reducing their electricity costs by 60%, plus earning up to £75,000 of additional income every year right now. Looking ahead, investment from just five per cent of UK businesses in on-site renewable and battery systems, for example rooftop solar, could have the equivalent CO2 impact of taking 45,000 cars off the road between now and 2030.

Consumers can benefit, too. Households with solar and storage systems could be reducing their bills by up to 65%, with an additional income of £375 per year, per household³. Not only this, but by incorporating battery storage and solar systems into every one of the Government's 1.5 million new homes, we could remove 1,320,000 tonnes of CO2 from the atmosphere.

By enabling these new homes, households, and small businesses to collaborate and participate as Virtual Power Plants (VPP), a system that integrates multiple power sources to provide grid services, communities and consumers will see greater direct returns. However, they currently face barriers in taking part under present arrangements.

For the new Government, our ask is simple: fulfil the four small steps outlined above to democratise our energy transition – allowing residents and businesses across the UK to bring down bills, stabilise the grid, and facilitate a net-positive future for all.

JOULEN

Joulen specialises in flexibility optimisation services. Using our AI software platform PARIS (Predictive Analytical Renewables Integration System), we maximise renewable energy system ROI - providing both optimisation of our customers' assets and enabling our partners to offer optimisation services to their customers. We work with assets of all sizes, from residential and commercial through to grid-scale.

PARIS

Our platform uses forecasting and machine learning algorithms to determine how best to utilise an asset to maximise value, whether that is through dynamic smart charging to minimise grid costs or trading in available energy markets. It then controls the assets to deliver on that value.

Features

- Smart charging of battery storage to minimise grid costs using the flexibility of the battery storage and the predictability of the PARIS consumption and generation forecasts for the customer.
- Participation in local grid flexibility markets.
- Participation in Ancillary services markets.
- Trading energy in Wholesale and Balancing markets
- Demand Side Response for commercial and industrial premises.
- Aggregate assets into a virtual power plant (VPP) to further increase revenue potential in markets that require larger asset sizes.
- Ability to optimise multiple customer sites in conjunction with one another to maximise the value that can be achieved across a portfolio.



Bringing down bills through democratisation

Small businesses and households across the UK are facing a cost-of-living crisis. The average household electricity bill has risen exponentially, with bills expected to rise by nine per cent to £1,714 a year for the typical household⁴. On top of this, 96% of businesses are worried about rising energy costs.⁵ As we change our approach to energy generation, the democratisation of this system will allow SMEs and households to benefit more directly from the UK's energy transition, by giving them the tools to participate.

Transitioning to renewable energy will bring down the cost of electricity, as we become less reliant on imported gas, which is not only subject to energy shocks, but also the main cause of inflation. But moving away from centralised fossil fuel energy generation, which currently remains the single largest source of energy across the UK (1.7 terrawatt-hour imported in 2023), will require more sophisticated control of our grid, with storage playing an essential role in balancing generation.

So far, the UK's focus when it comes to tackling this – be that from investors and operators to regulators and government – has been on getting grid-scale batteries online.

These are extremely important. But as the system and technologies evolve, we must open up access to energy markets. This will democratise our energy system, giving businesses and households across the UK access to these revenues, rather than only allowing developers and investors to reap the rewards.

For example, with 29% of this imported gas currently being used for homes⁶, deploying solar and battery storage on only 20% of these domestic properties could reduce our spending on imported gas by £123m each year,⁷ putting this straight into the pockets of households.

Crucially, digitalisation, enabled by AI platforms such as PARIS, can enhance control as we shift to clean energy, by enabling grids to absorb more renewable energy, more of the time, without the destabilisation that un-optimised renewables and storage can bring.

Improving ROI for businesses

Businesses across the UK are looking for ways to bring down energy bills, with a landmark 1.5 million small-scale installations taking place just ahead of 2024's July election.⁸ However, these businesses could be missing out on thousands of pounds each year.

Currently, much of the commercial and industrial (C&I) and domestic battery capacity on the grid is not optimised, which means these batteries provide most of their services during the summer months. This is due to the excess of renewable generation being stored, particularly solar energy, during sunnier weather. Smart charging and optimisation allow for the utilisation of batteries all year round, which in turn minimises grid costs and prevents curtailment, saving taxpayers money in the process.

Better use of data means every asset owner can predict, prioritise and direct their energy throughout the winter too, maximising asset performance and ROI all year round.

Businesses with optimised solar and battery storage could save 60% on their electricity costs, with optimised battery storage accounting for 22% of this.² By allowing small businesses to participate in all energy markets via optimised systems, businesses could also generate additional earnings of £75,000 per battery every year.¹⁰

This could also lower the payback period by 80% – making investment in batteries significantly more attractive, and supporting accelerated uptake throughout the country.¹¹

£75,000

Potential additional earnings of £75,000 per battery every year

The picture for residential batteries

Around 1.3 million homes in the UK have solar panels¹², with a high volume of new installations also including a battery. But a large proportion of these batteries are not optimised, or participating in energy markets.

These consumers could be saving up to 65% on bills today¹³. Couple optimisation of these assets with participation in all energy markets, and households could be making an additional income of £375 per year, based on average household energy consumption.¹⁴ Making optimisation and participation the standard could also bring down the payback period by a third (33.3%) on average, bringing it in line with the payback period on solar systems and making it a more attractive investment for households.¹⁵

£375

Additional income of £375 per year, per household

By introducing these standards, 500 new homes could make up 2.5 megawatts (MW) of power, coming together to form a community Virtual Power Plant and allowing residents to participate in the Capacity Market, Balancing Mechanism and Frequency Response Markets. Scale that up to the 1.5 million homes the Government intends to build in the next five years¹⁶, and we could see 7,500 MW of clean power on the grid - equating to 10% of the UK's generation capacity in 2023¹⁷.

Democratise the UK's energy markets

The Government must enable access to all energy markets across the full distributed energy system, including residential homes and businesses. Utilising Virtual Power Plant technology (VPP), a system that integrates multiple power sources to provide grid services will allow everyone to participate – and benefit – from the energy transition, rather than focusing purely on the benefits for developers and investors.

As the Government aims to make the UK a clean energy superpower, allowing broader access to all energy markets will democratise our system, driving growth in the fastest growing global market, and ensure the energy transition benefits everyone.

Accelerating the energy transition

The new Government is aiming to make the UK a clean energy superpower, with policies including the creation of GB Energy – a publicly owned, clean power company for Britain – and plans to double onshore wind, triple solar, and quadruple offshore wind capacity¹⁸. While this signals a commitment to the energy transition, the conversation has been focused on this uplift in renewable energy generation, with little mention of battery storage, despite this technology's key role in integrating clean energy onto the grid¹⁹.

There are huge opportunities to accelerate the energy transition from a Better Battery Strategy. In the UK, battery storage capacity will need to increase to around 50 GW by 2050 to achieve Britain's net zero targets²⁰. However, with grid-scale batteries getting connection dates well beyond 2030, these timeframes do not add up. That is why installations by homes and commercial businesses are essential in bringing down our emissions now, and accelerating towards a clean energy system.

The role of businesses

Businesses across the UK are looking for ways to bring down their own emissions. More stringent emissions targets alongside consumer pressure have meant that by 2023, 94% of UK-based companies within the Forbes 2000 had set net zero targets²¹. But while targets have been set, achieving them is proving a much harder puzzle to solve²².

If just five per cent of UK businesses installed and optimised solar and battery systems, they could each save more than 207 kg of carbon dioxide equivalent (CO₂e) per day²³. This could make up almost 21,000,000 tonnes²⁴ a year – equivalent to more than a billion fully-grown trees, or taking 45,000 petrol or diesel cars off the road before 2030,²⁵ helping bring down both national, and businesses' own emissions.



Clean homes, clean grid

A key promise from the UK Government has been a Rooftop Revolution, aiming to deliver solar power to millions of UK homes²⁶, as well as building 1.5 million new homes to tackle the housing crisis²⁷. While this is a critical first step, optimised battery storage must form a part of this, allowing government and consumer investment to go further.

If every new home built had renewable and battery storage systems – with 200,000 being built every year on average – we could save over 176,000 tonnes of CO2 each year²⁸ – equivalent to more than 68,000 cars off the road²⁹. With the Government promising to build 1.5 million new homes in this Parliament, that could be 1,320,000 tonnes of CO2 before 2030³⁰, and each new home reducing their reliance on the grid – and bringing down bills – by up to 65%.



Incentivise investment in battery storage today

By incentivising businesses to invest in on-site clean energy systems, and making every new home solar and battery powered, the Government would see an immediate, enormous impact towards our net zero goals.

Tax incentives on renewable and storage systems will ensure a better return on investment for households and businesses. By offering financial benefits from the investment, such as relief on property rates for SMEs, or the implementation of a benefit in kind programme similar to the cycle to work scheme for homes,³¹ the Government could see an uplift in clean energy deployment immediately.

Additionally, including battery storage in the Future Homes Standard³², which aims to decarbonise UK homes, could see more efficient homes that are not only cheaper to run, but make the most of the Government's planned Rooftop Revolution.

Battery storage must become an intrinsic element of every part of the Government's energy strategy, or clean, home-grown energy will be wasted – be that through curtailment of excess renewable power, or outdated markets that exclude smaller players and reward the participation of dirty fuels, like diesel generators.



Better batteries, less bottlenecks

Our current, outdated electricity grid is a key bottleneck of the energy transition. According to Ofgem, at least 700 GW of renewable power projects are waiting in grid connection queues, with our grid systems unable to cope with more coming online³³.

Alongside this, we're also increasing our spend on curtailment of clean energy. In 2023, Britain wasted enough wind energy to power one million homes, with the cost of this potentially rising to £3.5 billion by 2030 – increasing household bills by £200³⁴ – without more storage on the grid to store this excess energy, and bring these costs down.

This problem will not be tackled overnight. While grid expansion must take place as quickly as possible, change does not have to only happen at a national level. Bringing smaller batteries, owned by households and businesses into the balancing picture will ease grid pressures locally, requiring fewer infrastructure upgrades and more renewables in tandem. Optimisation will also help to avoid overbuilding and overspending on the energy transition, through making the most of all clean energy, and energy storage coming online.

The impact of power-hungry players

Power-hungry sectors, like manufacturing or supermarkets, are a vital part of our economy and society – but are currently a huge drain on the grid. If only 0.1% of UK businesses (6,900 businesses)³⁵ invested in batteries and local on-site renewable generation, this could be the equivalent of more power than the largest power station currently being built in the UK (Hinkley Point C), as well as 130 grid-scale battery sites.³⁶ This infrastructure could also be deployed in 12 months, rather than the many years it takes to deliver large grid-scale generation and storage.

MORE POWER THAN THE LARGEST POWER STATION

If only 6,900 businesses invested in batteries and local on-site renewable generation, this could be the equivalent of more power than the largest power station



People Power

Consumers and homes across the UK could be providing resilience for our energy grid right now. Globally, the home battery market reached a capacity of 34 GWh³⁷ by the end of 2023, with this market already helping stabilise power grids everywhere.

From 2030 onwards, domestic demand flexibility could provide an additional 20-30 TWh of renewable generation annually – more than 20% of our current gas imports.³⁸

Putting optimisation at the heart of deployment

By ignoring the opportunities that wider deployment of small-scale batteries bring, the UK Government is missing the opportunity to encourage wider involvement in the energy transition, as well as faster delivery on our net zero goals. These systems support existing infrastructure, allowing more renewables to be deployed in faster timeframes.

The Government should incentivise small scale battery storage in homes and SMEs, ensuring recipients are mandated to optimise assets and participate in energy markets, giving them the opportunity to provide demand side flexibility services and earn income from their participation.

Optimisation will ensure assets are fully utilised to their potential for the benefit of all parties, including the electricity network operator, the government, and asset owners.

Germany's battery boom

There are nearly 1.2 million residential batteries in Germany, with 500,000 sold in 2023 alone.³⁹ This battery boom adds up to 9.5 GWh of residential battery storage, or 70% of the total storage capacity in the country.⁴⁰ With this huge increase in consumer-owned batteries, the German grid – as well as its consumers – have seen significant benefits. What can the UK learn from this boom in residential storage?

Allowing energy independence

The need for energy security is growing across Europe, especially in rural areas or areas with unstable power supplies. Home battery storage offers protection against power outages, while also helping to stabilise the power grid by absorbing peak loads.

Also, more and more households in Germany want to optimise their own consumption and be independent of electricity price fluctuations, driving demand for battery storage. Additionally, easy access to wholesale energy markets offers residents the opportunity to sell their energy when prices are high, and buy energy when prices are low.

70%

Domestic batteries make up 70% of Germany's total storage capacity

Capitalising on technological developments and integration

Advances in battery technology, such as improved service life, efficiency and integration into smart home systems have further increased the attractiveness of home battery storage. In Germany, there is also a growing number of providers offering innovative solutions for integrating battery storage into home energy management.

Incentivising households

There are many funding programmes at federal and state level that subsidise the purchase of home battery storage in Germany. A well-known example is the KfW (Kreditanstalt für Wiederaufbau) funding programme, which provides low-interest loans and repayment grants for battery storage. This has been instrumental to the residential solar and battery boom.

By coupling incentives to buy solar and battery systems, with the opportunity to participate in the energy market, Germany's recent policies have accelerated residential uptake, showing how these smaller systems can support the country's energy security, reduce overall CO2 emissions, and play an essential role in the balancing of the grid.

Implementing a Better Battery Strategy

With huge untapped economic and environmental savings to be made, the democratisation of our energy system is clearly an approach to be utilised by the UK Government.

By increasing the number of these battery and renewable systems on the grid – and expanding the role they can play – we can ensure a just transition for every home and every business, in every corner of the UK, accelerating towards our clean energy goals, and increasing participation and engagement in the journey

For a new government committed to clean, cheap energy for all, there are four quick changes that will allow the UK to implement a Better Battery Strategy:

1: Bring batteries into existing plans

Through including batteries in the Rooftop Revolution, Warm Homes plan, and existing Future Homes Standard, the UK will see a reduction in energy prices, and better utilisation of renewable systems.

2: Enable easier access for all batteries to participate in all markets

Easier access for residential and commercial batteries in all energy markets, through the utilisation of virtual power plant technology. This change will allow smaller systems to work harder and help overcome grid bottlenecks.

3: Incentivise battery investment

Incentivising businesses and households to invest in optimised battery storage and renewable energy systems could go a long way in increasing uptake. Tax incentives for storage and solar systems in areas where flexibility is most needed will increase engagement and clean energy deployment, at low cost to the Government.

4: Ensure optimisation is at the heart of deployment

Making optimisation a prerequisite of any incoming systems to allow better and smarter deployment of renewable energy.

A Better Battery Strategy could see people across the UK benefiting from the energy transition. By democratising our energy system, we'll see lower bills, higher investment, lower emissions, and increased public engagement on the journey – a win-win for everyone.

Working and footnotes

All proprietary data and calculations are based on Joulen's modelling, which analysed over 70 data sets and scenarios via its PARIS AI platform. These are all based on several factors and potential scenarios, taking into account:

- Various residential and commercial business consumption profiles.
- Historical energy market pricing data for GB.
- Numerous electricity tariffs from across a number of electricity suppliers.
- Renewable generation profiles for solar and wind of varying sizes and installation types.

Full calculations can be found in the footnotes below.

Footnotes and calculations

1. <https://www.energy-storage.news/uk-needs-at-least-50gw-of-energy-storage-for-net-zero-by-2050-national-grid-eso-says/>

2. <https://assets.publishing.service.gov.uk/media/656ef4871104cf000dfa74f3/uk-battery-strategy.pdf>

3. This may vary depending on customer installation and consumption profile and is based on the assumption that participation in all energy markets was enabled for residential systems, using historical energy market data to determine financial returns.

4. <https://www.theguardian.com/money/article/2024/aug/19/winter-energy-bills-rise-great-britain-price-cap#:~:text=The%20expected%20increase%20in%20energy,qualify%20for%20it%20this%20winter.>

5. <https://www.fsb.org.uk/resources-page/out-in-the-cold.html>

6. https://assets.publishing.service.gov.uk/media/66a7da1bce1fd0da7b592f0a/DUKES_2024_Chapter_5.pdf

7. Based on UK Government data, average price of gas in 2023, and PARIS AI workings:

- a) 101.7TWh of gas for electricity, with 29% used for domestic
https://assets.publishing.service.gov.uk/media/66a7da1bce1fd0da7b592f0a/DUKES_2024_Chapter_5.pdf
- b) 29% for domestic is 30TWh. If 20% of homes had optimised battery storage and solar PV.
- c) 6TWh * 60% reduction = 3.6TWh.
- d) 99.22p average price of gas 2023. <https://www.statista.com/statistics/1174560/average-monthly-gas-prices-uk/>
- e) 1 therm = 29 kWh, thus average price per kWh = 3.42p / £34.20 per MWh.
- f) $(3.6 * (1,000,000 * £34.20)) = £123m$

Footnotes and calculations

8. <https://solarenergyuk.org/wp-content/uploads/2024/06/SEUK-Solar-Energy-Storage-Manifesto-2024.pdf>

9. This may vary depending on customer installation, consumption profile and tariff structure. These values are based on the Joulen PARIS platform using data for a manufacturing plant with 1MW solar PV system coupled with 1MWh battery storage, using a wholesale market tariff tracker.

10. £75,000 may vary depending on customer installation, consumption profile and tariff structure. These values are based on a manufacturing plant with 1MW solar PV system coupled with 1MWh battery storage, using a wholesale market tariff tracker.

11. This is based on a standard unoptimised battery saving £30k per annum, but with optimisation and market access this increases to £150k per annum, assuming a deployed asset cost of £750k.

12. <https://www.theecoexperts.co.uk/solar-panels/popularity-of-solar-power>

13. 65% on bills with PV, Battery and optimisation based on output from the Joulen PARIS algorithm using standard residential consumption profile of 4300kWh per annum on a dynamic tariff with 5kWp Solar PV and 8kWh battery storage system.

14. Based on an estimated £75k earnings across all energy markets per 1MW annually. For a home with 5kW inverter this would equate to £375.

15. Optimisation of the battery using PARIS Joulen Smart Charging as per 13 will increase savings by 50%, reducing payback by one third.

16. <https://labour.org.uk/updates/stories/just-announced-labour-will-build-1-5-million-homes-to-save-the-dream-of-homeownership/>

17. 1.5 million homes with a 5kW inverter would enable peak power of 7,500MW – 10% of the UK's generation capacity:
https://assets.publishing.service.gov.uk/media/66a7da1bce1fd0da7b592f0a/DUKES_2024_Chapter_5.pdf).

18. <https://great-british-energy.org.uk/>

19. <https://labour.org.uk/change/make-britain-a-clean-energy-superpower/>

20. <https://www.energy-storage.news/uk-needs-at-least-50gw-of-energy-storage-for-net-zero-by-2050-national-grid-eso-says/>

21. <https://zerotracker.net/analysis/new-analysis-half-of-worlds-largest-companies-are-committed-to-net-zero>

22. <https://www.bbc.com/worklife/article/20231110-the-tough-truth-behind-corporate-net-zero-sustainability-targets>

23. Based on the assumption that there are 5.6m businesses in the UK today, and the addition of 0.5MW of solar PV and a 1MWh battery which will generate 1MWh electricity to these businesses daily. With a kWh of energy generated the equivalent of 0.207 KgCO₂e (Carbon Trust https://ctprodstorageaccountp.blob.core.windows.net/prod-drupal-files/documents/resource/public/Conversion_factor_introduutory_guide.pdf)

Footnotes and calculations

24. After a year this would be 21,000,000 KgCO₂e, based on the assumption of 0.5MW PV and 1MWh battery installation, both using 1 MWh less from the grid each day and a kWh of electricity saving 0.207 KgCO₂e.
25. Based on assumption that a car emits 2.6 metric tonnes of CO₂ in a year. Based on travelling 10k miles per year (16k kms) and a 164g of Carbon being generated per km (<https://www.greenmatch.co.uk/blog/uk-transport-co2>)
26. <https://www.theguardian.com/environment/article/2024/jul/13/labours-rooftop-revolution-to-deliver-solar-power-to-millions-of-uk-homes>
27. <https://labour.org.uk/updates/stories/just-announced-labour-will-build-1-5-million-homes-to-save-the-dream-of-homeownership/>
28. Based on a 5kWp solar PV generating 4,250kWh annually, with a kWh equal to 0.207kgCO₂: 880kgCO₂ x 200,000 = 176,000 tonnes CO₂.
29. Based on assumption that a car emits 2.6 metric tonnes of CO₂ in a year, and smaller systems take 12 months to build.
30. Based on a 5kWp solar PV generating 4,250kWh annually, with a kWh equal to 0.207kgCO₂:
- a) 0.207kgCO₂ per kWh electricity from (Carbon Trust https://ctprodstorageaccountp.blob.core.windows.net/prod-drupal-files/documents/resource/public/Conversion_factor_introduutory_guide.pdf)
 - b) Once all 1.5 million homes are built this could save 1,320,000 tonnes CO₂ using calculation $((0.207 * 4,250) * 1,500,000) / 1,000$
31. <https://www.bike2workscheme.co.uk/>
32. <https://www.power-technology.com/projects/hinkley-point-c-nuclear-power-station/>
33. <https://ofgem.gov.uk/blog/monitoring-progress-connections-reform#:~:text=As%20of%20June%2C%20the%20queue,energy%20needs%20for%20net%20zero.>
34. <https://carbontracker.org/britain-wastes-enough-wind-generation-to-power-1-million-homes/>
35. 6900 is 0.12321428571428572% of the 5.6m businesses in the UK at the beginning of 2023.
36. Based on assumption of 1MW BESS and 500kWp solar and market inclusion via PARIS AI platform, this would be the equivalent of more power than the largest power station in UK currently being built (<https://www.power-technology.com/projects/hinkley-point-c-nuclear-power-station/>) supported by over 130 grid-scale battery sites (50MW sites).
37. <https://about.bnef.com/blog/what-the-home-battery-market-needs-to-scale/>
38. https://octopus.energy/blog/Consumerflexibility_ready_to_replace_coal/
39. <https://www.statista.com/statistics/1446315/home-solar-storage-batteries-installations-germany/#:~:text=The%20number%20of%20home%20solar,compared%20to%20the%20previous%20year.>
40. <https://www.energytrend.com/research/20240426-46691.html>



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