THE ASSOCIATION
FOR RENEWABLE ENERGY
& CLEAN TECHNOLOGY

The case for fair tax treatment and temporary grant support for Home Energy Storage

Supporting Green Jobs and Net Zero

Prepared by the REA's Energy Storage Forum – Home Energy Storage Working Group

Contents

Executive Summary

- Home Energy Storage will be necessary for Net Zero and beneficial to a Green Recovery.
- Domestic batteries for both the storage of electricity, and for converting electricity into heat, enable other technologies, including solar PV, heat pumps, and electric vehicles in the home, which are required for decarbonisation. Energy storage (including heat batteries) can be used to maximise the benefits of solar panels by storing energy generated in excess of what is needed on sunny days, for evenings or cloudy days.
- The combination of the VAT rise in October 2019 and the COVID-19 pandemic threatens to set back the growth of this industry.
- Battery storage is as a key growth area identified by the Government's Industrial Strategy but has not benefited from any form of grant in the past.
- The UK is falling behind in the development of a domestic battery market, which hampers the emergence of wider home energy software and IP.
- Eventually, reformed electricity markets (e.g. half-hourly settlement) will be able to enable the emergence of this market on a subsidy-free basis but until this is introduced a market failure exists.
- Industry requests urgent support for the sector in the form of VAT reduction and/or inclusion in the Green Homes Grant (GHG) or a similar incentive, developed in consultation with industry and with appropriate installation standards.
- Battery storage should be classified as an 'Energy Saving Material' in line with solar and low-carbon heat technologies.
- The REA would also support a reduced VAT rate for other ESM and clean technology installations, including low-carbon heat and solar, and inclusion in the Green Homes Grant for those technologies not already covered.

Introduction

The leading voices cited in this paper, including the Committee on Climate Change (CCC), National Infrastructure Commission (NIC), National Grid ESO, Imperial College and Bloomberg New Energy Finance (BNEF), all agree that Net Zero cannot be achieved cost effectively without dramatic increases in storage capacity, and specifically that flexibility at the edge of our electricity networks (e.g. in homes) is needed in low voltage networks as we decarbonise with technologies such as solar PV, heat pumps, and electric vehicles. Storage provides multiple services including integration and better utilisation of low-cost renewables as well as better utilisation of existing grid infrastructure while reducing the need for expensive upgrades. The Government's new Energy White Paper notes the range of services that batteries can also provide to consumers, and that clean technologies will enable the UK to 'build back better' and develop an economy fit for the future.[1]

The CCC notes how achieving Net Zero will be labour intensive and create a Net Zero workforce[2], which the Local Government Association estimates would include 1.2m high-skilled green jobs nationwide.[3] Within this, the Faraday Institute estimates 78,000 jobs would be created in battery manufacturing and supply chains alone by 2040[4], and the Business, Energy and Industrial Strategy Committee noted that further measures to support low carbon homes would help create 66,000-86,000 new jobs.[5] However, strong markets and support at the consumer level are needed to drive demand to achieve these figures. The REA would also support a reduced VAT rate for other Energy Savings Materials (ESM) and clean technologies, including low-carbon heat and solar, though the focus of this paper is home energy storage.

As the costs for domestic storage decline, and market-based incentives such as half-hourly metering and 'flexibility markets' from electricity networks emerge, the industry expects the development of a strong subsidy-free market. However, these reforms are taking time to implement resulting in the UK's domestic storage market lagging behind that of other European and North American countries. Many countries have also used subsidy schemes to kickstart their home-based markets.

Considering these opportunities, the UK should and could be a global leader in this sector. Instead, the industry is constrained by market failures and excessive cost to the consumer due to, in large part, the need to comply with EU rules. In 2019 the UK increased VAT on domestic energy storage and other Energy Savings Materials (ESM) despite the calls not to do so by the burgeoning sector.[6] This has created an unfair market price distortion against green technologies in the home, because coal and gas for domestic supplies are taxed at only 5% compared with 20% for other energy technologies.[7] Home energy storage has to date not

[1] Department of Business, Energy and Industrial Strategy (2020) Energy White Paper
[2] Committee on Climate Change (2019) Net Zero Technical Report
[3] Local Government Association (2020) Local green jobs - accelerating a sustainable economic recovery
[4] Faraday Institute (2020) UK Electric Vehicle and Battery Production Potential to 2040
[5] REA (2020) Green Recovery Report
[6] Energy Live News (2019) Huge VAT increase for solar and battery storage products
[7] HM Revenue Customs (2016) Fuel and power (VAT Notice 701/19)

benefitted from any form of direct government subsidy (akin to the Feed-in Tariff for solar PV) and the time for Government to step in and jump-start this crucial industrial segment is now.

In this paper we describe key distortions and barriers for home energy storage and provide suggestions on how to address these within the COVID-19 green recovery package.

In summary, we suggest:

1. **A lower rate of VAT for home energy storage**, in recognition of its energy and carbon benefits and to put the technology on, at the least, an equal footing with domestic coal, oil and natural gas usage (on which the VAT rate can be 5%).

2. **A temporary financial incentive for home energy storage** technologies (e.g. heat and electricity batteries), such as *inclusion* within the Green Homes Grant (GHG) scheme or the *establishment* of an equivalent to the EV Homecharge Scheme or Clean Heat Grant until market failures are corrected.

These measures should include electricity-driven heat batteries as well as battery storage for electricity use in the home. To put Energy Savings Materials on an equal footing with fossil fuels in our VAT system, a VAT cut should also be extended to these technologies, and those technologies not fully covered by the Green Homes Grant, such as solar PV, should be included in the extended scheme. REA envisages that in the future a reduction in VAT could be examined for extension to EV chargers and other complimentary smart tech.

Any incentive should be developed in consultation with industry and require adherence to appropriate and well-considered installation standards such as the IET Code of Practice.[8] Whether new or an existing mechanism, such as the GHG, the incentive or support scheme should be carefully structured and delivered to avoid creating market distortions.

All sources are listed in footnotes and at the end of this document.

[8] The Institution of Engineering and Technology (2020) Code of Practice for Electrical Energy Storage Systems, 2nd Edition . Also relevant is Energy Institute guidance (forthcoming).

The Need

- The UK will need more energy storage to move to a far greater renewable energy system, in order to balance supply and demand.
- Excess supply and inflexible demand are already significantly increasing the curtailment of renewable and conventional power sources at substantial consumer cost.
- Domestic battery storage can cut grid infrastructure costs.

The UK is making good progress increasing our share of electricity generation from renewable sources in line with the Climate Change Act, Net Zero ambition and Paris Agreement. However, while much renewable power comes from baseload sources, this can often be weather dependent, so much of this energy is not always produced when it is needed. This means that energy is sometimes wasted at high cost, and we burn fossil fuels as back up capacity. A growing body of evidence from leading sources shows the UK is falling behind on flexibility needed to meet renewable power targets:

- National Grid ESO forecasts the need for up to around 40GW of electricity storage by 2050 to achieve Net Zero at the lowest cost, up from 4GW today.[9]
- The Prime Minister's recently announced Ten Point Plan sets a commendable goal for the UK to quadruple the amount of wind power we produce by 2030, to 40GW.[10] If we are to achieve this, we will need significant increases in services to provide grid flexibility.
- The National Infrastructure Commission recently increased the recommended target for deployment of renewables in our electricity system to 65% by 2030 The NIC has also re-iterated the importance of driving flexibility to facilitate renewables and Net Zero, as set out in their earlier landmark 2016 report : *Smart Power*.[11]
- The Committee on Climate Change's Net Zero core scenario assumes renewables must provide at least 59% of electricity, but 50+% is achievable only with much greater electricity system flexibility. Flexibility will reduce consumer costs by £3-8bn p.a. by 2030 and £16bn p.a. by 2050.[12]
- Bloomberg New Energy Finance finds 'the rate of battery deployment before 2040… has a very large influence on the speed of the renewable energy transition in the U.K,' and faster battery deployment reduces carbon emissions by 13% and fossil backup capacity by 12% by 2030.[13]
- The Energy Transition Readiness Index, commissioned by Drax and Eaton, ranks the UK 8th out of 9 Western European markets in terms of electricity grid flexibility from an investor's perspective.[14]

[9] National Grid ESO (2020) Future Energy Scenarios
[10] Prime Minister's Office and Department for Business, Energy and Industrial Strategy (2020) The Ten Point Plan for a Green Industrial Revolution
[11] National Infrastructure Commission (2020) Renewables, Recovery, and Reaching Net Zero
[12] Committee on Climate Change (2019) Net Zero Technical Report
[13] Bloomberg New Energy Finance (2018) Flexibility solutions for high renewable energy systems
[14] Drax and Eaton (2019) Energy Transition Readiness Index

Supply and demand on the grid

The UK is having to pay increasing amounts to curtail generation when we have surplus, from £165m in 2010 to £636m in 2019[15] (across transmission and distribution networks), and unprecedented curtailment measures have recently been introduced.[16]

This scenario is becoming increasingly common. Battery storage is needed to ensure our generation can run economically and at a higher capacity, reducing the cost to consumers and ensuring investors get the best returns on infrastructure.

Grid infrastructure costs

The increase in peak electricity demand from electrification of transport and heat to meet climate targets is set to require widespread low voltage network infrastructure upgrades at significant cost to consumers, in tandem. Subsequent to the studies cited earlier, he Government's Smart Systems and Flexibility Plan goes further to assert that flexible energy technologies can reduce this cost by up to £40bn by 2050.[17] Evidence from the Electricity Networks Association[18], Imperial College[19] and Element Energy[20] finds that residential flexibility technologies in particular will be critical to unlocking the full scope of savings and achieving 100% low carbon energy.

In summary, home energy storage is a key part of the solution to ensure that:

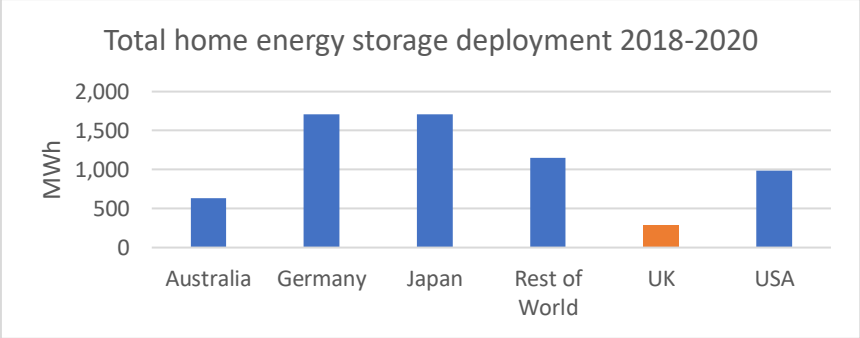
1. The UK can continue to deploy renewable electricity, and surplus energy is stored and used rather than wasted.
2. Carbon emissions are reduced.
3. Costs are kept to a minimum.

[15] National Grid ESO (2020) System balancing reports
[16] Ofgem (2020) Grid Code Modification Proposal GC0143 'Last resort disconnection of Embedded Generation'
[17] HM Government & Ofgem (2017) Upgrading our Energy System: Smart Systems and Flexibility Plan
[18] The ENA estimated that £10bn of investment would be required by 2030 to upgrade the distribution network to cope with electric vehicles and heat, of which 90% is required in ageing local, low voltage networks. Distributed electricity storage is ideally placed to alleviate peak demand at the local level.
[19] Imperial College (2018) Blueprint for a post carbon society
[20] Element Energy (2019) The value of flexibility

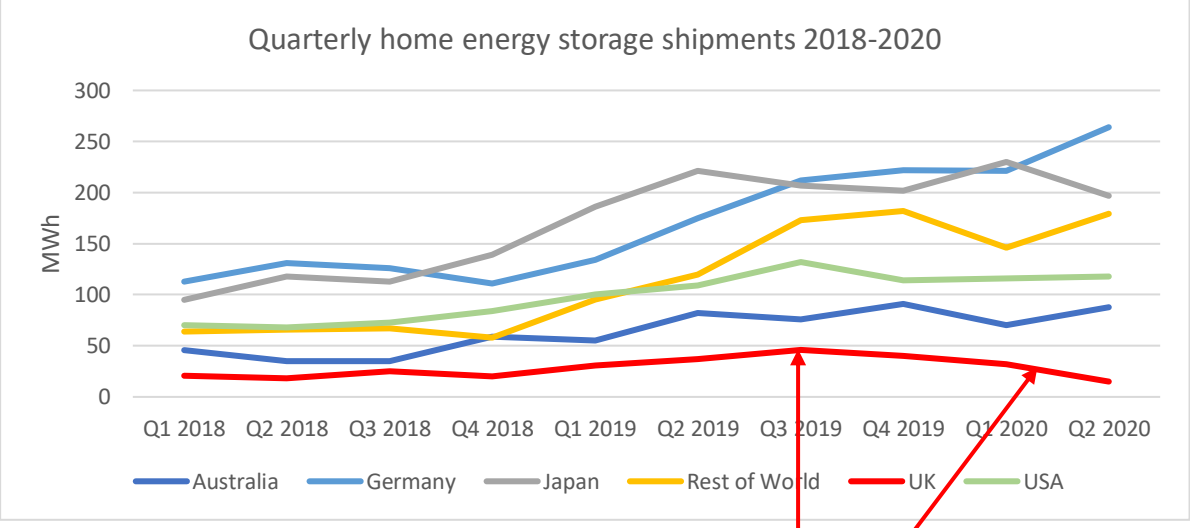
The Market and Global Comparison

- The UK's nascent home energy storage market has innovators that have developed pioneering energy storage technology and supply contracts that support it.
- The rise in VAT & COVID-19 have hit the UK's home energy storage market.
- The UK is falling behind in developing this market compared to other advanced economies (see Annex for additional information).

Deployment is far from on track to meet the need identified. Consultancy IHS Markit surveys all major storage providers, with anonymised sales figures covering approximately 76% of the global market. The data shows that the **UK market is significantly behind equivalent markets globally and could grow faster if market barriers were removed, unlocking significant benefits for the UK on its journey to net zero.**



Source: IHS Markit, 2020



[21]

Source: IHS Markit, 2020[22]

01/10/19: VAT on home energy storage increased to 20%

Q1- Q2 2020: COVID-19 pandemic begins

This is significant as the domestic energy market is a crucial growth market for the UK. While Italy installed around home energy storage 9,000 units (providing around 89MWh of

[21] These graphs do not include electrically-charged heat batteries.
[22] IHS Market Global Residential Storage Index, Q2 2020

flexibility) in 2019, and Austria installed c.5,500, the UK (which has a larger economy than either country) installed c.5,000 (providing around 38MWh of flexibility).[23]

Domestic energy storage technologies and innovative supply contracts that support energy storage, which have been pioneered in Britain, for example by companies such as Moixa[24] and Octopus Energy[25], is now being deployed internationally. Still, a strong domestic market needs to grow if we are to see other success stories emerge.

[23] Solar Power Europe (2020) European Market Outlook for Residential Battery Storage 2020-2024
[24] Moixa 2018: Moixa Launches GridShare Platform Across 3500 Homes in Japan
[25] Current News (2020): Octopus Energy Expands Into the US Market with Evolve Acquisition

The Challenge

There are policy and regulatory issues contributing to the slow pace of growth in home energy storage:

1. **Market failure: UK home energy storage users are under-rewarded relative to the benefit they provide.**

Most domestic electricity tariffs are a single fixed rate 24/7 and/or are settled on standardised profiles rather than a more granular half-hourly basis. Within a 24-hour, average day, the actual market price of electricity can vary from 8p/kWh to 23p/kWh, and frequently significantly lower and higher. Thus, domestic electricity tariffs do not represent the true market rates of electricity during peak and off-peak times. This means that homeowners and other operators (e.g. utilities and demand-side aggregators) with storage are under-rewarded relative to the system value they provide, including enabling the use of more renewable energy and reducing dependency on fossil fuels.

To illustrate this, a storage customer on a dynamic half-hourly smart tariff can save 3 times more than the same customer on a flat rate tariff. Therefore, the full potential of the technology has not yet been unlocked, and this will continue to be the case for several years according to Ofgem's market-wide half-hourly settlement timelines (the smart meter delivery target is 2024; no deadline for settlement consultation).

2. **Unfair tax treatment: VAT increased to 20% despite energy and carbon benefits.**

Following VAT changes last year, all energy storage device installations are currently taxed at 20%. Lower rates of VAT in this sector are tied to the social goods they provide, which include environmental benefits. Organisations such as the NIC and National Grid ESO continuously affirm the critical role energy storage must play in reducing carbon emissions to achieve Net Zero; renewable energy cannot be deployed at sufficient levels without it.

Consumers buying energy storage value it based on:

A) reducing grid electricity imports;

B) carbon benefits from reducing peak demand and facilitating renewables.

Electricity consumption from the grid (produced in part from burning gas and coal) and purchased oil and natural gas for burning in domestic boilers are taxed as low as 5%, while purchasing home energy storage systems to reduce fossil fuel use is taxed at 20%. This creates an unjust market price distortion against green technology and clean energy.[26]

With regard to B), low rate VAT eligibility is presently driven by a narrow definition of "energy saving" within the home, which is out of step with the technology's widely accepted carbon benefits. This clearly makes no sense within the framework of our legally binding requirement to reach Net Zero by 2050.

3. **Lack of support for flexibility: the missing piece of the Net Zero strategy.**

To meet our climate targets the Government provides time-limited support to kickstart deployment of new low carbon technologies including electric transport (EV and charger

[26] Green Alliance (2020) Added value: improving the social and environmental impact of UK VAT

grants), low carbon heat (RHI, Green Gas Support Scheme, Clean Heat Grant, Green Homes Grant (GHG), Public Sector Decarbonisation Scheme (PSDS), Social Housing Decarbonisation Fund Demonstrator), energy efficiency (GHG, SHDFD and PSDS), and previously domestic renewable electricity generation (Feed-in Tariff). These are all very welcome initiatives, though it is important to highlight the urgent need for flexibility services support to keep costs in check as heat and transport become further electrified and at the same time reap the zero carbon benefits as the UK advances renewable energy deployment. Despite this need and the present market failures described, there is no Government support available for home energy storage and other load-shifting technologies, which move electricity consumption from one time period to another. The UK is out-of-step in this respect among leading markets (see annex). If we are to meet our Net Zero targets, our strategy must include energy flexibility alongside low carbon energy and energy efficiency.

4. **Market failure: smart home energy storage is overcharged.**

We welcome in broad terms, the work BEIS is doing to resolve double charging of final consumption levies and Balancing Service Use of System (BSUoS). However, the changes introduced to date only benefit standalone licensed utility-scale installations and no solution has yet been developed to remove these unfair double charges from home energy storage due to its location behind domestic energy meters.

Now that export tariffs are available (although not many and not half-hourly) it means domestic users are charged when they import power and reimbursed when they export power. Grid and policy levies are applied to both the imported and exported power to calculate the total price that you pay / are paid, i.e. including network and policy costs as well as just wholesale price.

Final consumption levies are intended as a levy on the "final consumption" of electricity. It means that the cost of paying for policies (like the FiT) is shared out equally via a levy on a per kWh basis amongst everybody who is consuming electricity. The way that these levies are applied is that they are charged on a per kWh basis for all imported electricity at the meter point (which indicates the site is consuming electricity from the grid), and they are not reimbursed for exported electricity.

This distortion continues to be unresolved, hindering the economic case for installing home energy storage, and putting this important sector at a competitive disadvantage while artificially inflating the cost of consumer costs. In terms of impact, when importing from and exporting to the grid for grid services and time-of-use tariffs customers are charged £48/MWh (4.8p/kWh) in levies on electricity they do not consume. Considering an average off-peak rate for buying electricity from the grid is 8p/kWh, and final consumption levies are 4.8p/kWh, the correct cost is 3.2p/kWh; customers purchasing a home energy storage device are therefore charged at a significantly higher rate than they 'should' be.

Brexit, Jobs, and a Green Recovery

- The UK is now free to set its own rules on VAT for services that provide a social good such as home energy storage.
- Home energy storage can help to create a battery supply chain in the UK and contribute to a Green Recovery.

In 2019, the UK Government argued that the increase in VAT was necessary in order to comply with legislation from the European Union. The changes even increased VAT on some solar PV systems to 20%, while electricity from fossil fuel sources is taxed as low as 5%. Whilst the REA argued that the UK Government should have shown leadership and challenged the EU-wide VAT legislation for these technologies, the end of the transition period on 1st January 2021 provides a chance to reverse the VAT hike within the UK. We have an opportunity to leap ahead in the global energy transition and to develop a manufacturing base and expertise in this industry that could make the UK a world-leader. This is one part of a broader and unprecedented opportunity to change the present situation following the Government's commitment to a green recovery.

The Committee on Climate Change has recommended the use of tax changes to incentivise the lowering of carbon emissions in the economic recovery.[27] They also highlight that investments in climate technologies are skills and labour demanding. These jobs are spread across the UK and ready to roll out as part of a targeted and timely stimulus package. Their Net Zero report has shown that the net zero economy will require a growing net zero workforce.

Developing a greener workforce: the facts

- Oxford University's recent analysis has found that climate investments create twice as many jobs as those in fossil fuels, and, more specifically, investment in clean infrastructure, R&D and energy efficiency were 3 of the top 5 performing stimuli following the 2008 financial crisis.[28]
- The Business, Energy and Industrial Strategy Committee (2019) notes that creating low-carbon homes and reducing VAT on energy saving materials could create at least 66,000-86,000 new jobs, save £270 per person per year in energy bills and generate a net value to the UK economy of £7.5 billion.[29]
- The Faraday Institute estimates that with the right support and investment, 78,000 jobs could be created in battery manufacturing and supply chains by 2040.[30]
- The Local Government Association has highlighted how achieving Net Zero will create 700K green jobs in the UK by 2030 and 1.2M by 2050, up from 185K today. Nearly half

[27] Committee on Climate Change (2020) Take urgent action on six key principles for a resilient recovery
[28] Nicholas Stern, Joseph Stiglitz, et al (2020) Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?
[29] REA (2020) Green Recovery Report, citing Rosenow et al (2018) 'The remaining potential for energy savings in UK households', Energy Policy, Vol. 121, pp. 542 -552, and Guertler and Rosenow (2016) 'Buildings and the 5th Carbon Budget', in House of Commons' Business, Energy and Industrial Strategy Committee (2019) Energy Efficiency: building towards Net Zero.
[30] Faraday Institute (2020) UK Electric Vehicle and Battery Production Potential to 2040

of these (46%) will be in clean electricity generation and associated infrastructure. Importantly, they will be evenly spread across the UK, boosting skills and filling the widening regional employment gap.[31]

In all of these cases, support from consumers is needed to drive the demand that will support this growth, which will ultimately increase Government tax revenue.

[31] Local Government Association (2020) Local green jobs - accelerating a sustainable economic recovery

The Way Forward: Two Remedies

The lack of support and unfair tax treatment do not reflect the importance of this technology as emphasised in BEIS' Smart Systems and Flexibility Plan. On the contrary, the technology is presently constrained by market failures, the 20% rated VAT level has not helped deployment, and the UK is behind in global markets. UK businesses are being put at risk at a pivotal time.

1. **Level the tax playing-field, introduce a lower rate of VAT on home energy storage.**

HMT has previously cited the EU's requirement 20% VAT on energy storage, but the European Court of Justice (ECJ) made clear that VAT could be reduced where a product supports a 'social good', which must surely include getting to Net Zero to mitigate climate change. As the UK is no longer in the EU, UK Government can now set its own VAT rates on home energy storage, as noted by Minister for Business, Clean Energy and Growth, Kwasi Kwarteng MP in October 2019.[32] Jesse Norman MP, Financial Secretary to the Treasury, also stated in June 2019, that 'it will be perfectly possible and not difficult for a future Government to reverse the change …after we leave the EU'.[33]

The Carbon Trust has so far been unable to classify home energy storage as "energy saving" when viewed through the narrow lens of reducing the quantity of energy consumed within a home. There are several strong reasons for broadening the scope here to include storage:

"Energy saving" or "energy efficiency" is a useful concept in trying to reduce energy usage generally. However, as the grid transitions to a zero-carbon energy system, it is imperative to take account of the carbon savings, along with generation and demand peak reduction benefits, enabled by flexibility technologies such as battery storage systems.

As the grid transitions to ever higher proportions of renewable electricity generation and the electrification of transport and heating, an efficient electricity system will require drastic improvements in *when* electricity is used, not just *how much* electricity is used:

- Where installed alongside solar PV, storage increases the use of self-generated electricity in the home, reducing a home's use of grid electricity during peak demand periods and increasing the 'efficiency' of the carbon savings available to the home from consuming self-generated solar electricity. On sunny summer days when a household is out, appliances are often unused and the energy generated goes to waste. Energy storage solves that problem by enabling the household to use that energy after sunset when panels are no longer generating electricity.
- Similarly, where storage charges from the grid at times of excess renewable generation on the grid, storing that electricity helps to avoid that generation being curtailed, again improving the 'efficiency' in how that zero-carbon electricity is used, rather than letting it go to waste.
- Storage is also used to charge from the grid overnight, when electricity demand, cost and carbon intensity are lowest, and discharge during the early evening when electricity demand, cost and carbon intensity are often high.

[32] Hansard (2019) Photovoltaic and Battery Storage Systems: VAT
[33] Hansard (2019) The Value Added Tax (Reduced Rate) (Energy-Saving Materials) Order 2019

- Further, storage provides peak or load shifting services that enables improved utilisation of the electricity network, enabling more clean technology (like home EV charging) to be connected while helping to reduce the need for, and significant cost associated with, reinforcing the network to meet unmanaged peak demand growth.
- In the future, as the adoption of technology like smart meters and smart devices such as energy storage increases, consumers will be empowered to switch to lower tariffs whenever possible, reducing the peak demand and consumer costs.

All of these efficiency benefits in terms of carbon energy savings and grid cost savings from improved utilisation of existing infrastructure are key enablers for the energy transition that should be recognised as part of an expanded understanding of 'energy saving' or 'energy efficiency'.

In effect, the concept of 'energy saving' should be expanded to incorporate wider carbon benefits and grid resource efficiency gains as well as the direct energy cost savings enabled by home battery storage. Given the range of direct energy cost savings as well as additional system / societal benefits enabled by the use of home storage, home battery storage systems should be directly considered as product that should be included on the 'energy savings material' list and eligible for low rate VAT.

2. Introduce a temporary financial incentive for home energy storage.

The contribution to energy and grid costs savings enabled by battery storage is still not fully recognised and inadequately valued under the UK's electricity market framework as it stands today. To bridge this market failure and to help stimulate a green recovery, financial incentives should be provided in an equivalent form to grants currently offered for other clean technologies such as electric vehicles and chargers.

Though disappointed by the decision to exclude batteries from the Green Homes Grant, the REA and Storage Sector welcome the news that in the Public Sector Decarbonisation Scheme and Social Housing Decarbonisation Fund Demonstrator, the opportunity is left open for applicants to include batteries if they feel it is appropriate for their scheme. Whilst these schemes are set to prioritise 'fabric first' and low-carbon heating, we believe there is nonetheless a clear case for a scheme to support the growth of home energy storage and other technologies, such as solar, which is not fully included in the programme

BEIS should provide an equivalent scheme or amend the scope of energy efficiency stimulus measures such as the Green Homes Grant, or equivalent schemes (Renewable Heat Incentive, Clean Heat Grant or Green Gas Grant) to include and encourage the uptake of smart home energy storage.

This incentive scheme should only need to be available for a limited period until the market failures referred to above have been addressed, e.g, when there is market-wide half-hourly settlement and/or billing of all domestic electricity, and there are fully established and adequate price signals for flexibility so that the value of smart home energy storage can be reflected in the monetary savings to users. To help manage the transition from a government supported incentive to pure market delivery, incentives could be structured to incrementally step down over time to prevent "start-stop" to the industry.

In the Annex we provide evidence of existing support schemes in other markets which, coupled with the deployment data provided by IHS Markit earlier in this document, indicate the scales of support required to boost deployment in this market.

It is essential that any support (tax or grant) should be structured to avoid market distortions, and to incentivise storage to provide generation and load shifting capabilities and to ensure products installed are appropriate to the net zero ambitions for our future energy system.

Any future inclusion in the Green Homes Grant should apply to both electricity and electricity-driven heat batteries, as these are also both an enabling system for solar and EVs.

Summary of benefits

A VAT reduction and financial incentive would:

- Compensate for current market failures.
- Provide a valuable asset for society.
- Unlock an important social good: accelerated low-cost decarbonisation.

- Energy storage is widely accepted as critical to achieving Net Zero.
- Lowering VAT could help grow the market and realise the Faraday Institute's projection of 78,000 jobs in battery gigafactories and supply chains.[34] Such measures could also help towards achieving 66,000 and 86,000 jobs sustained annually through the encouragement of investment in energy efficiency measures.[35] The REA's Review 2020 estimates that between 108,900 and 153,500 jobs could be generated in Flexibility and EVs by 2040.[36]
- IHS Markit predicts home energy storage will be hit particularly hard by COVID-19 due to homeowner financial concerns and fear of interpersonal contact.[37] The measures identified will support businesses in this sector at a critical time. The Government has shown willingness to support businesses through VAT by extending a 15% VAT cut until January.[38] Emerging markets such as home energy storage are vulnerable to economic shocks, but we know this market will be more resilient in future and will be necessary to decarbonisation.
- Improving the competitiveness of our residential storage market will help to create a UK battery installation and manufacturing sector fit for the future by encouraging the growth of domestic supply chains and investment, unlocking global markets and export potential.
- More residential energy storage would help our security of supply by enabling households to avoid taking electricity off the grid at peak times. This would reduce pressure on the grid at times of high demand and could also ease pressure by discharging at times of lower supply.
- Home energy storage will help better utilise lowest cost renewable energy. For instance, many homeowners with solar PV installed on their rooftops find that during working days in the summer, the high amounts of energy converted from sunshine go unused because they are not at home. Residential energy storage enables consumers to save that energy for the evenings when they get home and their panels stop converting energy into electricity at sunset. With 1 million solar PV and solar thermal installations already in the UK, encouraging greater uptake of energy storage could save a significant amount of energy from going to waste.[39]

[34] Faraday Institute (2020) UK Electric Vehicle and Battery Production Potential to 2040
[35] House of Commons, BEIS Committee (2019) Energy Efficiency: Building Towards Net Zero
[36] REA (2020) Review 2020
[37] Energy Storage News (2020) Behind-the-meter energy storage to be heavily hit by COVID-19, but industry growth will be resilient
[38] BBC News (2020) VAT cut to be extended for hospitality sector
[39] Department for Business, Energy and Industrial Strategy (2020) Solar photovoltaics deployment

Annex: Support for home energy storage in other markets

There are incentives available for home energy storage in Germany, Czech Republic, Italy, Sweden, Ireland, Austria, Switzerland, Belgium, Scotland, Australia, Japan, and the US (list not exhaustive).[40] Here we highlight some key examples:

Germany has promoted network flexibility by providing support through its development bank, KfW for energy storage systems when installed alongside Solar photovoltaic (PV) energy production systems. This maximises value-for-money from both technologies: ensuring that any domestic storage system can feedback into the grid and making the best use of solar systems by storing excess energy in peak productivity times. The programme currently includes a low-interest loan for 100% of the costs associated with stationary battery storage systems related to a solar PV installation, and a repayment subsidy which was, in June 2017, at 16%.[41] In addition, there are state-level support programmes in place. The Bavarian state provides €500 for a storage system of at least 3 kWh, and a further €100 per additional 1 kWh. This programme is also linked to the installation of a solar PV system.[42]

Ireland offers a grant which, like Germany, is linked to the installation of a PV system. The grant is for a fixed €600 for the battery storage system and is connected with a variable grant for the PV system up to €2,400. This scheme is limited to households built and occupied before 2011.[43]

In the **USA**, several states (including California, Oregon, Nevada, Massachusetts, New York, New Jersey, and Virginia) set energy storage mandates or targets, or provide incentives.[44] In California, the Self-Generation Incentive Program (SGIP) provides rebates of $850 per kWh under the Equity rebate or $1,000 per kWh under the Equity Resilience rebate. Since 2018, Maryland has offered a tax credit on 30% of the installed costs for an energy storage system.[45] In Nevada the public energy supplier Nevada Energy operates an incentive scheme, dependent on whether the customers want to vary energy use based on grid demand. For residential consumers, the variable scheme is for $0.19 per Wh or 50% of the equipment costs up to $3,000 (lesser of). The non-variable scheme is for $0.095 per Wh, or 50% of the equipment costs up to $1,500 (lesser of).[46]

As a direct response to the economic impact of it's COVID-19 lockdowns and a sign of its determination to building back greener, **Italy** has extended their "Eco-bonus" scheme to provide income tax deductions of up to 110% for building renovation measures that promote energy efficiency and installing solar PV and storage. The tax deduction can be claimed by the tax payer over 5 years or alternatively assigned to a third party (e.g. installer,

[40] In Australia, Germany, Italy, Switzerland, and the US, these measures vary at state and regional level.
[41] PV Magazine (2017) KfW granted incentives to 3,200 solar storage projects so far this year
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product supplier or private finance company) allowing the tax payer to receive the full deduction upfront through private financing.[47]

These schemes show that other countries with advanced economies are well-aware of the need to establish a globally competitive home energy storage industry. The technology in these markets is maximising energy efficiency in the home and increasing the flexibility of energy systems by reducing the curtailment of renewable generation and displacing the use of fossil-based generation, in turn realising savings for all consumers by improving the utilisation of existing network capacity and avoiding unnecessary grid reinforcement. With the right incentives for the Green Recovery, the UK has an opportunity to catch up and then play a leading role in the global market.

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