



A Salary Sacrifice Scheme for Residential Batteries

**A collaboration between the ESA (UK), LSE Skills
Accelerator and Practera**

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1. Executive Summary

Residential batteries are a key component of the UK's energy transition. They allow consumers to generate savings on their energy bills in the hundreds of pounds per year, through maximising self-consumption of onsite generation, participation in flexibility markets and shifting electricity consumption from expensive, carbon-intensive peak hours to cheaper, cleaner off-peak hours. In doing this, they also generate substantial carbon savings and reduce strain on the grid, directly contributing towards the government's Net Zero and Clean Flexibility targets. Finally, these contributions significantly improve the business case for other Low Carbon Technologies, such as solar panels and heat pumps, further advancing progress towards electrification and Net Zero.

A salary sacrifice scheme is a way to increase uptake of residential batteries that is legislatively simple, commercially proven and – studies suggest – popular. The UK already has a working template in the EV scheme, with the 2017 Optional Remuneration Arrangements (OpRA) providing the legal framework. A single secondary legislation amendment extending the existing ultra-low emission vehicle exemption to qualifying residential battery storage systems would suffice to set up this scheme. A commercial proof of concept already exists. HEVA Energy operates a limited salary sacrifice scheme for residential solar, home batteries, and EV charge points under the existing OpRA framework, with NHS Trusts and the National Lottery Community Fund among early participating employers. Demand tripled in the month following launch, demonstrating the appetite for such schemes. Finally, according to Electrify Research's Homeowner Electrification Tracker Study (HETS), such monthly instalment plans are the most popular external finance route for households considering battery storage or solar. They are also equally popular among the low- and high- income households surveyed.¹ More In Common's recent work has emphasised that high energy bills are a major concern across the income distribution. 41% even of those earning £100,000 p.a. say they have recently argued with their household over energy bills. It therefore points out that support measures only targeted at the most vulnerable are likely to be unpopular given the breadth of discontent. A salary sacrifice scheme would support the 'squeezed middle' who may be ineligible for Warm Homes grant funding, but still suffering from high energy costs.

Initial modelling suggests that at central (50,000-household) uptake, the Exchequer would forgo a maximum of £22.8 million a year in income tax and National Insurance. The true cost is likely to be

¹ Electrify Research, *Home Electrification Tracker Survey* (2026) <https://www.electrifyresearch.co.uk/>

significantly less than that for a number of reasons. A battery could be fully bought out inside five years, and continue providing value to consumers and the grid over its ten to fifteen-year warranty, amortising its cost over a longer period. The figure also assumes all participants to be higher rate taxpayers, which would not be the case in practice. Finally, no BiK offset is modelled, bringing costs down even further once a BiK rate analogous to the EV scheme's 3-4% is introduced. That expenditure would procure hundreds of pounds of bill savings for each household, 450MW of distributed clean flexibility, potential carbon savings of 16,425tCO₂e equivalent, along with further savings driven by greater uptake of other residential LCTs.

Taken together, this is a policy that costs the Treasury tens of millions rather than billions, requires a single legislative amendment, and delivers consumer, grid, and climate benefits that plausibly exceed the cost several times over. The infrastructure, the tax logic, and the policy precedent are in place. All that is missing is the extension of that logic to a technology the government has already identified as essential to Clean Power 2030 and Net Zero 2050.

2. Introduction

2.1 The Energy Storage Association

The Energy Storage Association (ESA) is the United Kingdom's first trade body dedicated exclusively to the residential, commercial, and industrial energy storage sector. Founded in June 2025, it was established to fill a gap in the policy landscape. While solar generation had Solar Energy UK, the diverse organisations making up the energy storage value chain in the UK had no dedicated voice in government. The ESA was created to provide that voice.

Chaired by Baroness Luciana Berger, the ESA's membership spans grid, commercial and industrial and residential scale storage of both electricity and heat. It comprises energy suppliers, equipment manufacturers, system optimisers, wholesalers and academic institutions. It operates through four working groups covering Fire Safety, Cybersecurity and Interoperability, Long Duration Energy Storage, and General Policy and Regulation. Its core purpose is to translate members' experiences into evidence-based policy recommendations and to lobby government directly on the barriers preventing the sector from reaching its potential.

2.2 The Government's Clean Energy Commitments

The United Kingdom is legally bound to reach net zero by 2050, with a commitment to deliver Clean Power by 2030 and reduce emissions by at least 68% against 1990 levels under the Paris Agreement through Nationally Determined Contributions (NDC) 2030. In its 2026 Progress Report to Parliament, the Climate

Change Committee warned that the slow pace of electrification is putting these targets at risk, and that without urgent further action both 2030 commitments may become out of reach.²

The government has responded with a substantial programme. Its £15 billion Warm Homes Plan is the largest public investment in home upgrades in British history and is centred on rolling out solar panels, heat pumps, insulation, and battery storage.³ The Boiler Upgrade Scheme offers grants of up to £7,500 for heat pump installation,⁴ and the Clean Flexibility Roadmap, 2025 sets out how consumer-owned batteries can help balance the electricity grid.⁵ The strategic logic is clear. As the grid becomes cleaner, electrifying homes and transportation multiplies the carbon benefit, but doing so at scale requires battery storage to manage the surges in demand that millions of electric homes and vehicles will create. Batteries also ensure that a clean grid powered by renewables which supply infrequent energy generation, is made more consistent through energy storage.

Despite these commitments and the clear demand-supply factors, there is a significant contrast in the fiscal mechanisms supporting the rollout batteries and that of technologies like electric vehicles or heat pumps.

When HMRC tightened salary sacrifice rules in 2017 through the Optional Remuneration Arrangement (OpRA) framework, it deliberately exempted ultra-low emission vehicles, recognising their wider societal benefits.⁶ The resulting EV salary sacrifice scheme is now one of the most effective green technology incentives in the UK tax system. Employees pay for a leased electric car from their gross salary, saving income tax and National Insurance, employers save on National Insurance contributions, and the only taxable element is a Benefit-in-Kind charge of just 4% of the car's list price compared to up to 37% for petrol vehicles.⁷

The argument in this report is that precisely the same logic applies to residential battery storage. A home battery, like an EV, carries a significant upfront cost (typically around £4000) that deters adoption. Like an EV, it delivers immediate consumer savings, reduces carbon emissions, and generates substantial system-wide benefits through avoided grid infrastructure costs. Like an EV, it is a technology the government has explicitly identified as central to its Net Zero ambitions.

² Climate Change Committee, *Progress in Reducing Emissions: 2026 Report to Parliament* (2026) <https://www.theccc.org.uk/publication/progress-in-reducing-emissions-2026-report-to-parliament/>

³ Department for Energy Security and Net Zero, *Warm Homes Plan* (2026) <https://www.gov.uk/government/publications/warm-homes-plan/warm-homes-plan-html>

⁴ Ofgem / Department for Energy Security and Net Zero, *Boiler Upgrade Scheme* (2022, updated 2026) <https://www.gov.uk/apply-boiler-upgrade-scheme/what-you-can-get>

⁵ Department for Energy Security and Net Zero *Clean Flexibility Roadmap* (2025) <https://www.gov.uk/government/publications/clean-flexibility-roadmap>

⁶ HMRC, *Optional Remuneration Arrangements* (2017, updated 2020) <https://www.gov.uk/government/publications/optional-remuneration-arrangements/optional-remuneration-arrangements>

⁷ HMRC, *Work out the appropriate percentage for company car benefits* (2026) <https://www.gov.uk/guidance/company-car-benefit-the-appropriate-percentage-480-appendix-2>

Australia's energy transition provides the clearest available evidence for what a residential battery salary sacrifice scheme could achieve. When Australia failed to incentivise storage alongside solar, the result was grid instability, negative wholesale prices, and continued gas dependence at peak times. These problems required a costly national battery rebate programme to correct.⁸ The UK, at an earlier stage of its solar rollout, has the opportunity to avoid that sequence entirely. A salary sacrifice scheme would do what Australia's original policy failed to: make battery storage

accessible at the moment households are making decisions about solar, embedding flexibility into the system from the beginning rather than retrofitting it at greater cost later.⁹

This report provides the cost-benefit evidence base for a residential battery salary sacrifice scheme: what it would cost the Exchequer, what it would save consumers and government, how it would contribute to climate targets, and what barriers would need to be addressed. The aim is a specific, costed, and achievable policy proposal built on existing HMRC infrastructure and aligned with commitments the government has already made.

3. Salary Sacrifice Policy Design (EVs)

This report builds on the foundation provided within the current Salary Sacrifice Policy in regard to Electric Vehicles (EV). In the interest of clarity, it is beneficial to understand the structure and functioning of this policy.

3.1 Summary

In using this mechanism, an employee agrees to give up part of their gross (pre-tax) salary in exchange for a non-cash benefit, in this case a leased vehicle, which remains a company car that is provided to the employee. The appeal of this scheme comes from the benefit to both the employee and employer: the employee avoids Income Tax and National Insurance on the sacrificed portion of salary, while the employer saves employer National Insurance (currently 15%) on that same sacrificed amount, this employer NI saving is the primary financial incentive for businesses to offer the scheme, and schemes are typically structured to run at net-zero cost to the employer as a result.

⁸ RenewEconomy, *Rooftop solar incentives without battery storage are no longer fit for purpose* (2024)

<https://reneweconomy.com.au/rooftop-solar-incentives-without-battery-storage-are-no-longer-fit-for-purpose/>

RenewEconomy, *Big battery told not to charge as rooftop solar repeatedly pushes grid demand below zero* (2025)

<https://reneweconomy.com.au/big-battery-told-not-to-charge-as-rooftop-solar-repeatedly-pushes-grid-demand-below-zero/>

⁹ Solar Citizens / RenewEconomy, *One year on, Cheaper Home Batteries has changed the grid. Now it's time to redesign the energy market* (2026) <https://reneweconomy.com.au/one-year-on-cheaper-home-batteries-has-changed-the-grid-now-its-time-to-redesign-the-energy-market/>

3.2 The functioning of this policy is as follows:

1. The Employer is responsible for contracting a salary sacrifice provider/leasing company.
2. The employee selects the vehicle from the approved list.
3. The employer leases the vehicle, deducting the cost of such service from the employee's contractual gross salary by monthly costs.
4. The employee pays Benefit-in-Kind tax on a notional value, calculated as the vehicle's P11D (list price) multiplied by the BiK percentage. This notional value (not the P11D value itself) is added to the employee's income and taxed under normal Income Tax rules at their marginal rate.
5. The scheme is formed under a contractual term, where insurance, services, tyres, breakdown cover, and road tax are fixed into one monthly cost.

3.2 The significance of this scheme

The Optional Remuneration Arrangement (OpRA) rules, introduced in 2017, closed down the tax advantages of salary sacrifice for most benefits (cars of any fuel type, gadgets, gym memberships, etc.) by requiring the benefit to be valued at the higher of the salary sacrificed or its normal taxable value, thereby eliminating the saving in almost every case. However, an explicit exemption was retained for vehicles emitting 75g/km CO₂ or less, meaning these benefits continue to be valued using their normal, low Benefit-in-Kind rate regardless of the salary sacrificed. Combined with the government's decision to set deliberately low BiK rates for zero-emission vehicles specifically, this exemption is what makes EVs the one category where salary sacrifice remains a materially effective tax incentive, for employees and employers alike, despite the added administrative complexity and conditionality this introduces.

4. Fiscal Impact and Treasury Analysis

A salary sacrifice scheme for home battery storage will cut UK government tax revenue, following the same tax rules as the existing EV salary sacrifice policy under HMRC's 2017 OpRA rules. Employees give up part of their pre-tax salary to get a home battery, which lowers taxable pay and reduces three types of government income: personal income tax, employee National Insurance, and employer National Insurance. EVs receive full tax breaks under OpRA, and this analysis assumes home batteries will get the same relief to drive uptake.

4.1 Sources of Lost Government Revenue

1. Lower income tax: Employees pay tax only on their remaining salary, at their standard marginal rate.
2. Lower employee National Insurance: Staff do not pay contributions on the sacrificed salary.
3. Lower employer National Insurance: Companies avoid payroll tax on the portion of wages used for battery systems.

(This draft does not include Benefit-in-Kind tax adjustments for home batteries. EVs carry a small BiK charge that offsets some lost tax, but there are no official HMRC BiK rules for residential storage yet. The figures below therefore show the maximum possible revenue loss to the Treasury.)

This model follows the HMRC/OBR¹⁰ approach used for company car tax measures to establish the tax base (participants) projected under three scenarios, pre- and post-scheme tax regimes applied to estimate a static cost, and no behavioural response assumed (i.e. participation is not assumed to change in response to the tax treatment itself). As with HMRC's own company car costings, the size of the tax base is the primary source of uncertainty.)

4.2 Core Calculation Assumptions

Average full cost of a residential battery: £4,000 for a 10KWh system, repaid over a 5-year salary sacrifice period, equal to £800 sacrificed per year per participant.

(The average sacrifice period for EVs is 2-3 years, but considering the longer warranty life of a battery a 5-year sacrifice period has been modelled.)

Calculations are based on higher-rate taxpayers (40% income tax), with 2% employee NI and 15% employer NI. This therefore constitutes the *theoretical maximum* cost to the treasury. In practice, the costs would be significantly lower, as not all participants would be higher rate tax payers.

¹⁰ HM Treasury, *Autumn Statement 2022: Policy Costings* (2022)
https://assets.publishing.service.gov.uk/media/63761099d3bf7f720cfc0040/CCS1022065440-001_SECURE_HMT_Autumn_Statement_November_2022_Web_accessible_1.pdf

Certified by the Office for Budget Responsibility; see also OBR, *Economic and Fiscal Outlook November 2022* (2022)
https://obr.uk/docs/dlm_uploads/CCS0822661240-002_SECURE_OBR_EFO_November_2022_WEB_ACCESSIBLE.pdf

Annual tax loss per person:

- Income tax: £320
- Employee NI: £16
- Employer NI: £120

Total: £456

(This modelled formula (income tax + 2% employee NI + 15% employer NI) is the standard industry methodology used by every provider calculator, but the *aggregate Exchequer cost* has not been independently verified by government for EVs.)

4.3 Annual Revenue Loss by Participation Level

Scenario Participants Annual Tax Loss

Low uptake 10,000 = £4.56 million

Medium uptake 50,000 = £22.8 million

High uptake 100,000 = £45.6 million

(These numbers are rough estimates. Actual losses will shift based on battery prices, participants' tax brackets, company take-up, contract lengths, future BiK rules and tax rate changes.)

4.4 HEVA Energy's salary sacrifice pilot offers real-world reference for scheme operation and fiscal costs.

Category	Detail	Estimated Value (per participant/year)	Notes
Cost: Income tax foregone	Reduced taxable pay for higher-rate taxpayer	<i>Not quantified by Heva</i>	
Cost: Employee NI foregone	No NI on sacrificed salary	<i>Not quantified by Heva</i>	

Cost: Employer NI foregone	Heva states employers can reduce NI contribution liabilities per participating employee annually	£2,500 (Heva's own reported figure)	Reflects a larger sacrificed sum for full system cost over 3 years only and/or bundles of solar+battery+EV charger, not battery alone
Total estimated Treasury cost	Combined lost tax/NI	£1,000–£3,268 depending on system size	
Benefit: Reduced consumer finance dependency	Heva schemes replace 12% APR finance	N/A	Case study saved £8,300 versus quoted retail price of £17,000 over 36 months — reduces household debt exposure, indirect fiscal benefit via reduced financial distress
Benefit: Energy bill savings → reduced fuel poverty support	Lower reliance on government energy support schemes	Household-level: employee on £60,000 with full solar and battery system saves £171/month vs £123/month net cost	Suggests real household savings that could reduce need for Winter Fuel Payment / Warm Home Discount claims among eligible participants
Benefit: Employer uptake momentum	Demand signal	Demand tripled in a month since launch; NHS Trusts and National Lottery Community	Suggests uptake could scale faster than Low/Medium/High scenarios

		Fund already participating	
Benefit: Domestic manufacturing/installation activity	Job creation, VAT/corporation tax from installers	<i>Not quantified by Heva</i>	Installer partners handle grid permissions and installation, this activity generates VAT and corporation tax

5. Consumer Economics and Adoption

Residential batteries provide increasing value for consumers due to increasingly volatile energy costs that have become a feature of recent years. The Guardian cites that energy bills could rise to £1,714 thanks to the Iran war.¹¹ Energy caps are increasingly costing consumers, creating economic incentive for consumers to adapt and implement residential batteries within their homes. However, the biggest barrier for consumers is currently upfront costs. The salary sacrifice scheme offers the potential to offset this.

Residential batteries offer household benefits through electricity storage. This allows homes increased self-consumption of onsite generation (whether from solar PV or other technologies) and reduces consumption during peak grid hours, enabling users' reduction of energy costs. This is significant amidst the UK's fluctuating energy prices and the rise of time of use tariffs. Time of use tariffs reflect the cost of energy generation, which is higher at peak times and lower otherwise.¹² By storing energy via residential batteries, users can avoid routing energy from the grid and use their own excess energy stored within the batteries. Batteries also offer users the opportunity to generate income from energy companies. The UK's volatile electricity pricing, combined with existing infrastructure that enables participation in wholesale, flexibility, and capacity markets, creates a favourable environment for residential battery adoption. Although, the value is dependent upon the self-consumption of the consumer themselves.

¹¹ Jillian Ambrose, *Home Batteries: A 'Gamechanger' for Cutting Energy Bills?* (2026)

<https://www.theguardian.com/money/2026/may/09/home-batteries-cutting-energy-bills-fuel-prices-electricity-costs>

¹² Timur Yunusov and Jacopo Torriti, *review of Distributional effects of Time of Use tariffs based on electricity demand and time use* (2021) <https://doi.org/10.1016/j.enpol.2021.112412>

There is mounting evidence of the contribution batteries can make to consumer energy bills, with or without solar panels. One ESA member now provides a 10KWh system designed for social housing tenants that can typically reduce bills by 75% on average¹³ through a combination of load-shifting and flex-market participation. In the context of larger homes, a £3000, 10KWh Fox system has been reported to reduce energy bills by 30% simply using E.On next's time-of-use tariff, likewise without solar panels.¹⁴ A government-backed study from 2021 suggested a household could save around £850 a year from completely electrifying, installing solar PV and batteries, and disconnecting from the gas grid.¹⁵ Earlier this year – before the most recent energy price shock – The Guardian reported savings of around £760 a year, just from installing solar and batteries on a household with average electricity usage.¹⁶ Battery costs continue to fall and performance continues to increase. While the financial benefits of residential batteries are dependent on energy consumption and tariff structures, falling technology costs combined with a salary sacrifice scheme could make residential battery storage accessible to UK consumers in spite of concerns over initial investment.

There is demonstrable demand for such a scheme. According to Electrify Research's Homeowner Electrification Tracker Study (HETS), monthly instalment plans are the most popular external finance route for solar and storage across high- and low-income households. The study surveyed homeowners considering battery storage or solar (or both) and compared two wealth groups to show range (rather than completeness). Point-of-sale funding is the standout external-finance route. Around one in three homeowners identify it as a preference, with very little variation between groups (30% for the lower income/home-value group and 34% for the higher group). Unlike cash or savings, its appeal is not concentrated among the better-off. The top preference overall is cash or savings. This varies considerably between the two groups, with far less appetite (or ability) to select these options among the lower income/home-value group. There is clear reluctance to extend borrowing through a bank / other lender / mortgage. These are the least popular choices, with minimal difference between the groups. HEVA Energy reports that demand for its salary sacrifice pilot tripled in the month following launch, confirming in practice, what this survey suggests.

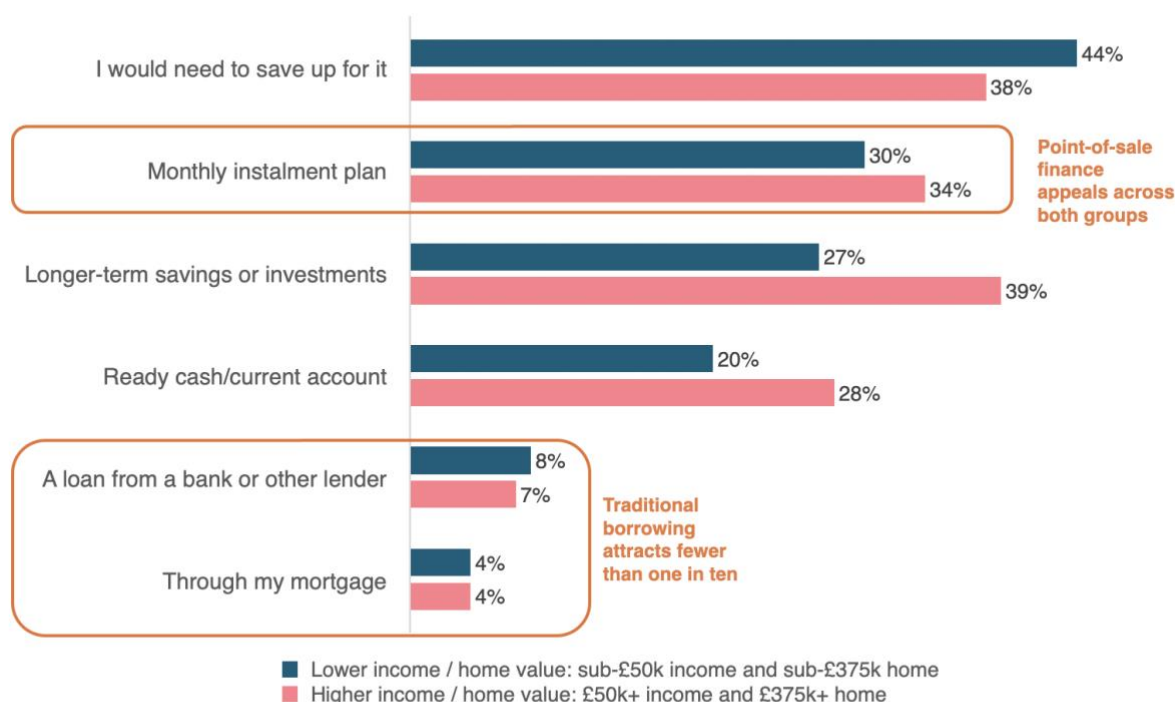
¹³ South of Scotland Enterprise, *Galashiels pensioner receives home energy system featuring world-first battery chemistry* (2025) <https://www.southofscotlandenterprise.com/news/kight-power-hub>

¹⁴ Tristan Rutherford, *The simple home tech that can slash electricity bills by a third* (2026) <https://www.telegraph.co.uk/money/consumer-affairs/home-battery-slash-electricity-bills-without-solar-panels/>

¹⁵ Department for Energy Security and Net Zero, *Warm Homes Plan* (2026) <https://www.gov.uk/government/publications/warm-homes-plan/warm-homes-plan.html#chapter-2-our-vision-for-uk-homes>

¹⁶ Jillian Ambrose, *Home Batteries: A 'Gamechanger' for Cutting Energy Bills?* (2026) <https://www.theguardian.com/money/2026/may/09/home-batteries-cutting-energy-bills-fuel-prices-electricity-costs>

HETS: Funding preferences among solar & battery considerers, by income and home value



Source: Electrify Research HETS tracker study, 2023–2026 -12 waves of UK market research combined. All homeowners considering solar panels, battery storage or both. Multi-response. Lower group: income below £50k and home value below £375k (sample size = 469). Higher group: income £50k+ and home value £375k+. (sample size 346)

6. Climate Impact and Electrification

The residential battery salary sacrifice scheme can be described as a policy of targeted flexibility and electrification, rather than just as a tax incentive to households. This policy is based on a similar existing salary sacrifice scheme, where HMRC describes Optional Remuneration Arrangements as those arrangements where the employee sacrifices salary for the sake of receiving the benefit, thus providing a basis for the policy development in relation to the residential battery salary sacrifice scheme.¹⁷

A relevant market precedent already exists. HEVA Energy markets salary sacrifice for solar panels, batteries and EV chargers, allowing employees to pay through pre-tax salary and claiming savings of up to 40% on clean energy assets.¹⁸ This demonstrates that residential energy technologies can be delivered through existing salary sacrifice mechanisms, although evidence on long-term uptake, consumer

¹⁷ HM Revenue & Customs, *Optional Remuneration Arrangements* (480: Appendix 12) (2019) <https://www.gov.uk/guidance/optional-remuneration-arrangements-480-appendix-12>

¹⁸ HEVA Energy, *Solar panels, batteries and EV chargers on salary sacrifice* (n.d.) <https://www.heva.energy/>

participation and fiscal impacts remains limited. Consequently, the case for wider policy adoption should be supported by further government evaluation rather than commercial evidence alone.

The case for intervention is strongest when measured against the UK’s flexibility gap. According to DESNZ and NESO, Great Britain will require between 51 GW and 66 GW of green flexibility until 2030, up from the 24 GW in 2023 to help implement Clean Power 2030.^{19 20} Residential battery storage systems will not fill this capacity gap on their own, but can do so through consumer-driven flexibility by charging when electricity is cheaper or cleaner and discharging during evening peaks.

6.1 Uptake scenario rationale

In the absence of any national residential battery salary sacrifice program, it is impossible to predict future participation rates based on an existing data set. This study thus uses the low, medium, and high uptake assumptions applied in the Fiscal Impact analysis for 28.6 million UK households and flexibility criteria within the country.²¹

Scenario	Households	Share of 28.6 million UK households	Interpretation
Low	10,000	≈0.04%	Controlled pilot and limited employer participation
Central	50,000	≈0.17%	Successful early deployment across multiple large employers
High	100,000	≈0.35%	Strong employer participation and early national scale

¹⁹ Department for Energy Security and Net Zero, *Clean Flexibility Roadmap* (2025) <https://www.gov.uk/government/publications/clean-flexibility-roadmap>
²⁰ National Energy System Operator, *Clean Flexibility Roadmap* (2025) <https://www.neso.energy/industry-information/flexibility/clean-flexibility-roadmap>
²¹ Office for National Statistics, *Families and Households in the UK: 2024* (2025) <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2024>

This is a series of scenarios for testing policies, and not forecasts. The low scenario tests the ability of the program to show any benefit at pilot stage. The central scenario gives a fair basis for modelling. The high scenario tests the consequences of rapid diffusion.

6.2 How EV evidence supports this range

Salary sacrifice EV scheme makes an excellent case study since it shows that low-carbon schemes offered by employers can be scaled rapidly. According to the BVRLA, the company's salary sacrifice fleet increased by 61% in 2024, while nine out of ten additions were composed almost entirely of battery electric vehicles.²² The EVs market saw a registration of almost half a million new battery electric cars in 2025, representing 23.4% of all new registrations.²³

However, batteries are not directly comparable with cars:

- They generally cost less than EVs, which may support uptake.
- Their consumer benefits are less widely understood, and risks are widely exaggerated.
- Participation requires property suitability and usually homeowner or landlord consent.
- A battery is fixed to a property, whereas an EV is a familiar employee benefit.
- Employer awareness and provider capacity are currently much less developed.

In light of this, therefore, the scenarios should be set out as being as conservative as possible in relation to the established EV market.

Using a central uptake scenario, up to 450MW could be shifted off the daily evening peak. A small but material flexibility benefit – and far from the only system benefit the proposal introduces.

²² British Vehicle Rental and Leasing Association, *Customers holding breath in erratic economy* (2025) <https://www.bvrla.co.uk/home/discover/news-and-analysis/customers-holding-breath-in-erratic-economy>

²³ Society of Motor Manufacturers and Traders, *UK new car market breaches two million as almost one in four buyers go electric* (2026) <https://www.smmmt.co.uk/uk-new-car-market-breaches-two-million-as-almost-one-in-four-buyers-go-electric/>

Central scenario – Flexibility and Electrification Impact

Indicator	Central estimate	Calculation or basis
Participating households	50,000	Central scenario shared with Fiscal Impact section
Battery capacity	10 kWh	Illustrative capacity
Distributed storage capacity	450 MWh	$50,000 \times 10 \text{ kWh} \times 0.9 \text{ depth of discharge}$
Assumed discharge capability	10 kW per household	See above
Peak flexibility	450 MW	$50,000 \times 10\text{kW} \times 0.9 \text{ depth of discharge}$
Maximum annual shifted electricity	164.25 GWh	$450 \text{ MWh} \times 365 \text{ full cycles}$
Heat-pump uptake sensitivity	2,500–7,500 households	5–15% scenario range
Central heat-pump case	5,000 households	10% illustrative case

The proposal also complements the Government's Warm Homes Plan by improving the affordability of low-carbon heating technologies without requiring direct capital grants. In doing so, it reinforces existing government investment in domestic electrification while expanding consumer participation in flexible energy use.

The modelling logic follows ClimateXChange²⁴, which examined building-level storage alongside zero-carbon heat technologies and found that batteries can reduce household energy costs by storing off-peak electricity for later use. The mechanism is therefore not “battery ownership causes heat-pump adoption”; it is battery + smart tariff → lower running costs → stronger heat-pump economics → improved adoption conditions.

²⁴ ClimateXChange, *Building-level energy storage: Reducing consumer bills to deliver zero-emissions heat* (2022) <https://www.climateexchange.org.uk/projects/building-level-energy-storage-reducing-consumer-bills-to-deliver-zero-emissions-heat/>

Current evidence does not quantify how many battery adopters would later install heat pumps. Therefore, the 5–15% heat-pump uptake range is scenario analysis, not a behavioural forecast. This remains relevant to policy, as heat pumps play an important role in the decarbonisation of heating systems, the IEA notes that heat pumps lead to a minimum of 20% decrease in greenhouse gases, with a maximum of 80% decrease in cleaner electricity systems.²⁵

However, battery storage alone is not sufficient to address all barriers for installing heat pumps, as evidenced by research by Energy Systems Catapult that notes initial costs, installer availability, consumer knowledge and payback uncertainty among others as barriers. Rather, residential batteries address one important constraint expected operating costs within a broader package of policies designed to accelerate low-carbon heating.

Without battery	With battery
Higher peak electricity purchased	Lower peak electricity purchased
Lower off-peak electricity use	Higher off-peak electricity use
Higher heat-pump operating cost	Lower heat-pump operating cost
Limited consumer flexibility	Greater consumer flexibility
Higher reliance on peak gas generation	Lower reliance on peak gas generation

6.3 Emissions modelling

When calculating the emission savings from battery storage in homes, one should take into consideration the variation of carbon content of electricity during different times of day. While annual grid emissions factors are constant regardless of timing of consumption, the carbon savings of deferring electricity consumption depend on the time when electricity was used since the electricity generation mix is adjusted depending on demand, renewables, imports, and gas-fired power stations.

This temporal pattern is shown by the evidence collected by the National Energy System Operator (NESO). According to NESO, the average carbon intensity of the grid in 2024 stood at about 125

²⁵ International Energy Agency, *The Future of Heat Pumps* (2022) <https://www.iea.org/reports/the-future-of-heat-pumps>

gCO₂/kWh, but there were times when carbon intensity had been brought down to 19 gCO₂/kWh through increased use of renewable energy, a differential of over 100gCO₂/kWh between off-peak hours and the system *average* – not the system peak.²⁶ The half-hourly data on carbon intensity collected by NESO shows that emissions are continually varying with system conditions, including electricity demand, wind and solar generation, interconnector flows and fossil-fuel generation. In a similar way, RenewableUK²⁷ claims that the flexibility factor relies upon moving electricity consumption to periods of low carbon intensity, with an observation that up to 30% of UK electricity production is done by using gas-fired power stations. All of these facts demonstrate that there is no official emissions factor for the peak shaving approach and the estimation must consider uncertainties.

As a result, this report uses a scenario-based approach instead of a particular emissions factor.

Carbon scenario	Differential	Reduction from 164.25 GWh shifted
Conservative	50 gCO ₂ e/kWh	8,212.5 tCO ₂ e
Central	100 gCO ₂ e/kWh	16,425 tCO ₂ e
High	150 gCO ₂ e/kWh	24,637.5 tCO ₂ e

The figure of 100 gCO₂e/kWh does not come from any government figures but serves as the midpoint from which one can determine the potential benefits of altering demand from the more carbon-heavy times of day to the less carbon-heavy times of day.

The central calculation is:

164.25 GWh × 100 gCO₂e/kWh = approximately 16,425 tCO₂e per year.

²⁶ National Energy System Operator, *Britain's Electricity Explained: 2024 Review* (2025) <https://www.neso.energy/news/britains-electricity-explained-2024-review>

²⁷ RenewableUK, *New threats and new tools: Reinventing energy security for an era of instability* (2026) <https://www.renewableuk.com/media/pgobbk3c/new-threats-and-new-tools-reinventing-energy-security-for-an-era-of-instability.pdf>

In accordance with HM Treasury's Green Book²⁸, the analysis of residential battery salary sacrifice should be based on a proper counterfactual and various possible schemes. The corresponding counterfactual will be the use of residential batteries without a special financial incentive for the government. In terms of this counterfactual, the following variants should be compared by the government: the existing policy, an employer pilot program with a fixed timeframe, and a salary sacrifice scheme nationwide.

Public expenditures would primarily comprise forgone Income Tax and National Insurance contributions, administration, regulation, and any fiscal risks arising from higher-than-expected take-up rates. Gains would be lower energy bills for consumers, increased flexibility on the demand side, reduced balancing needs, potential deferral of grid investment, better utilisation of renewable resources, and greater electrification of the home. Ofgem expects £30-70 billion savings on the system side for flexible energy consumption by 2050, whereas the government expects flexibility to cut the need for investments into distribution networks by around 15%, which means savings of £6.7-£7.9 billion from 2024 to 2050.^{29 30} The figures provided above are for the entire system and wider economic opportunity that the scheme could support and are not to be associated exclusively with domestic batteries.

The complete cost-benefit analysis needs to determine the net present value of the social value over the lifetime of the policy, perform tests on low, medium, and high uptake, and carry out sensitivity analysis on battery costs, tax ranges, consumer involvement, battery dispatch, and network savings. The concept of optimism bias must also be included in those assumptions which currently do not have the support of market evidence, especially consumer uptake and behaviour. This will give HM Treasury the ability to determine if the benefits to society outweigh the initial tax expenditure, in the long run.

6.4 Consumer-Led Flexibility and Behavioural Evidence

One of the key considerations with respect to the suggested salary sacrifice scheme for residential batteries is that the success of consumer-driven flexibility is not solely dependent upon flexible technologies but also on the motivation and capability of consumers. It is noted from DESNZ, Ofgem, and the International Energy Agency (IEA) reports that, despite household desire to cut energy costs, only a small number of households actually want to make repeated manual changes to their energy consumption

²⁸ HM Treasury, *The Green Book: Appraisal and Evaluation in Central Government* (2026)

<https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

²⁹ Ofgem, *Ofgem lays the groundwork for consumer-friendly flexible energy use* (2024) <https://www.ofgem.gov.uk/press-release/ofgem-lays-groundwork-consumer-friendly-flexible-energy-use>

³⁰ UK Government, *Electricity Distribution Networks Study: Government Response* (2025)

<https://www.gov.uk/government/publications/electricity-distribution-networks-study-government-response>

patterns and constantly monitor the electricity prices during the times of use.^{31 32 33} In reality, consumers will be unwilling to alter their behaviour, for instance, postpone the operation of appliances due to reduced power costs at night. The problem of consumer inertia hinders the implementation of demand response programmes, despite financial motivation being in place.

The battery storage system resolves this problem by ensuring automation in the flexibility market, unlike the traditional method which requires constant effort from the consumer. Once installed, the system will ensure that the battery charges when there is low demand for electricity and high production of renewable energy and discharges when there is high demand in the evening. In this way, consumers do not have to change their behaviour but will enjoy reduced prices and renewable electricity. DESNZ has highlighted home battery storage systems along with the smart heat pumps and smart EV charging as the crucial technology that would be able to provide flexibility through automatic demand shift and ease the burden on the electricity network.³⁴

Indeed, it must be stated that apart from theoretical modelling, this type of policy is also backed up by empirical findings. One example is the Living Lab project carried out by Energy Systems Catapult, one of the biggest living laboratories for low carbon technologies in the United Kingdom, which examines the actual use by households of various mixes of residential batteries, heat pumps, solar photovoltaic technology and electric cars in England, Scotland, Wales, and Northern Ireland.³⁵ Unlike other models, the Living Lab studies real consumer behaviour across diverse property types and household characteristics therefore providing valuable evidence for national policy design.

This is shown in the Living Lab whereby battery-powered homes can automatically react to price changes in electricity without changing their behaviour. Batteries ensure an increase in the use of electricity during periods of low-cost electricity through charging and decrease the use of electricity during high-demand periods through discharging of charged energy. Residences equipped with solar PV systems combined with battery storage contribute to increased levels of self-consumption of electricity produced within the residence and decreased reliance on electricity imports from the grid, and residences using heat pumps show flexibility patterns in their electricity consumption that can be optimised without sacrificing the comfort of households.³⁶ These observations serve as evidence for the fundamental assumption made in this report – automation, not behavioural change, is the key element of batteries' flexibility potential.

³¹ Department for Energy Security and Net Zero, *Clean Flexibility Roadmap* (2025) <https://www.gov.uk/government/publications/clean-flexibility-roadmap>

³² Ofgem, *Tracking energy consumers' use of low carbon and flexible products and services* (2025) <https://www.ofgem.gov.uk/research/tracking-energy-consumers-use-low-carbon-and-flexible-products-and-services-2025>

³³ International Energy Agency, *The Value of Demand Flexibility* (2023) <https://www.iea.org/reports/the-value-of-demand-flexibility>

³⁴ Department for Energy Security and Net Zero, *Clean Flexibility Roadmap* (2025) <https://www.gov.uk/government/publications/clean-flexibility-roadmap>

³⁵ Energy Systems Catapult, *Grid impacts of heat pumps, EVs and solar revealed* (2025) <https://es.catapult.org.uk/insight/grid-impacts-of-heat-pumps-evs-and-solar-revealed/>

³⁶ Energy Systems Catapult, *Making flexibility fair: Helping vulnerable consumers reap the benefits of flexibility* (2025) <https://es.catapult.org.uk/insight/making-flexibility-fair-helping-vulnerable-consumers/>

This is further substantiated by Ofgem's consumer research, which shows that flexible programs will be more successful if they are easy, convenient and don't require much from consumers' side.³⁷ The same way, International Energy Agency claims that demand flexibility is a key aspect of future low-carbon electricity generation as it helps to minimise peaks of consumption, better utilise network capacity and integrate larger amounts of renewable energy.³⁸ Overall, it can be seen that batteries for houses need to be considered as much more than just storage systems, but as technology that helps to remove behavioural obstacles, makes household electrification more economically viable, and improves the case for associated technology such as heat pumps and electric cars.

As a result, the importance of a residential battery salary sacrifice scheme goes much further than merely saving on individuals' electricity bills. By eliminating behavioural barriers and allowing an automated form of participation in flexibility markets, residential batteries have the potential to engage households in the use of flexibility markets, reduce costs associated with electrified heat and help achieve broader aims of the government in relation to Clean Power 2030, the Seventh Carbon Budget, and Net Zero 2050.³⁹

7. Implementation Feasibility and Policy Benchmarking

7.1 Policy Foundation

A residential battery salary sacrifice scheme does not require new primary legislation. The Optional Remuneration Arrangement (OpRA) framework, introduced by HMRC in 2017 and already governing the EV salary sacrifice scheme, provides the legal infrastructure needed.

Using the similar mechanism that provides the explicit exemption for ultra-low emission vehicles from the general OpRA rule could be extended to cover qualifying residential battery storage systems, which would be the single legislative amendment required to bring home batteries within the same advantageous tax treatment.

Such policy has a clear target which is to create a policy lever to accelerate the adoption of a technology that has been identified as a key component of its Clean Power 2030 programme, the Clean Flexibility Roadmap 2025, and the Warm Homes Plan, together aimed at achieving decarbonisation.

³⁷ Ofgem, *Tracking energy consumers' use of low carbon and flexible products and services* (2025)

<https://www.ofgem.gov.uk/research/tracking-energy-consumers-use-low-carbon-and-flexible-products-and-services-2025>

³⁸ International Energy Agency, *The Value of Demand Flexibility* (2023) <https://www.iea.org/reports/the-value-of-demand-flexibility>

³⁹ Department for Energy Security and Net Zero, *Clean Flexibility Roadmap* (2025)

<https://www.gov.uk/government/publications/clean-flexibility-roadmap>

A single secondary legislation amendment extending the existing ultra-low emission vehicle exemption to qualifying residential battery storage systems would suffice. The precedent is set, the mechanism exists, and implementation could proceed via secondary legislation and an HMRC guidance update, thereby reducing the time and cost in introducing this policy.

7.2 Operational Precedent and Policy Functionality

A commercial proof of concept already exists. HEVA Energy operates a salary sacrifice scheme for residential solar, home batteries, and EV charge points under the existing OpRA framework, with NHS Trusts and the National Lottery Community Fund among early participating employers. Critically, HEVA has already resolved the key structural question of employee mobility: ‘early termination protection is built into the lease, where payments pause automatically if an employee goes on parental leave or changes employer, and at the end of the term, employees can purchase the system at fair market value or continue on a nominal monthly fee’.⁴⁰ The government does not need to design these mechanisms from scratch; they exist and have been tested commercially.

Unlike a leased vehicle, a home battery cannot be physically recovered when an employee leaves. This is commonly raised as a barrier, but is in practice a structural advantage. A battery that stays with the property continues to deliver grid flexibility and carbon reduction benefits at no further cost to the Exchequer. The government makes one fiscal sacrifice and receives an ongoing public return for the unit's operational life (another five years on a conservative warranty, and up to ten years on a best-in-class warranty) without the repeat BiK liability generated as exemplified by successive EV lease cycles. The contractual framework for employee departure and early termination, already developed commercially by HEVA, simply needs to be codified in HMRC guidance.

7.3 Structural Barriers

1. **Renter costs:** Approximately 35% of UK households rent.⁴¹ A scheme that offers such a lengthy contractual obligation risks becoming a great cost on corporations who would have to offset such risk on the consumer due to the risk consumers turning to the early termination clause. This area requires further research and analysis. Rather than excluding renters, a policy could perhaps explore whether social and private landlords could participate on behalf of tenants, or whether a parallel grant or zero-VAT mechanism is required.

⁴⁰ Robin Whitlock, *Heva Energy launches UK-first salary sacrifice scheme for solar and batteries* (2026) https://www.renewableenergymagazine.com/pv_solar/heva-energy-launches-ukfirst-salary-sacrifice-scheme-20260512

⁴¹ Erin Yuurday, *Number of Homeowners and Renters in the UK* (2026) <https://www.clearscore.com/learn/insurance/number-homeowners-and-renters-uk>

2. **Self-employed exclusion:** Sole traders and non-incorporated self-employed individuals have no employer to sacrifice to and are locked out entirely. Limited company directors and umbrella company contractors can participate, but sole traders, often homeowners that would otherwise qualify, require a distinct instrument such as a capital allowance or self-assessment relief.
3. **SME administrative burden:** Small employers without dedicated payroll functions face disproportionate compliance costs. Provider-side digital administration should be a mandatory condition of scheme approval, not a voluntary feature.
4. **BiK classification:** Residential storage has no established HMRC Benefit-in-Kind rate. A deliberately low rate, analogous to the 3-4% applied to EVs, should be established through a targeted Treasury consultation before the scheme launches. However, with this being anticipated as a widely successful policy, the government faces additional risks that go beyond those encountered with EV salary sacrifice rules (discussed below).

7.4 Policy Beneficiaries

Salary sacrifice is structurally more valuable to higher earners. The tax saving is proportional to the marginal rate: a 40% taxpayer receives twice the subsidy of a 20% taxpayer for the same battery. The monthly commitment also requires financial security that lower-income households are less likely to have. This tilt towards middle and higher earners is the same dynamic implicit in the EV salary sacrifice scheme – however, the resulting benefits are the same. In stimulating demand, the scheme will strengthen the energy storage sector in the UK allowing supply chains and economies of scale to build, thereby gradually bringing costs down for all consumers.

In providing relief to the ‘squeezed middle’ alongside the Warm Homes Plan, which supports the more vulnerable, a salary sacrifice also *reduces* political risk rather than creating it. Energy bills are having significant impacts on households across the income spectrum. According to a report by More in Common, fewer than three in ten Britons feel they could absorb a further increase in energy bills. 41% of those earning £100,000 say they have argued with their household over energy bills. Under these circumstances, narrowly targeted support measures risk a backlash because so many feel they are only just managing.⁴² A salary sacrifice scheme in conjunction with the Warm Homes Plan would offer balanced, cost-effective relief to all segments of British society, incentivising broad uptake of carbon-saving, flexibility enhancing renewable technologies.

⁴² More in Common, *Britain's High Energy Bills: The Permacrisis that keeps on burning* (2026)
<https://www.moreincommon.org.uk/research/britains-high-energy-bills-the-permacrisis-that-keeps-on-burning/>

8. Conclusion

The case for extending salary sacrifice to residential batteries rests on the proposition that UK already has a working template for it in the EV scheme, the technology need is undisputed, and the fiscal mechanism to bridge the two requires no new legislative architecture, only an extension of the existing OpRA exemption.

The costs are real but bounded and modelled in advance. At central (50,000-household) uptake, the Exchequer forgoes a maximum of £22.8 million a year in income tax and National Insurance, rising to £45.6 million under high uptake, or falling to £4.56 million in a cautious pilot. These figures will fall further once full lifetime amortisation, BiK offset, and lower tax rate participation is taken into account.

The benefits are broader than the costs and compound across three levels. Consumers gain immediate, tangible savings as evidenced from commercial pilots that point to household savings in the hundreds of pounds a year, plus reduced reliance on high interest consumer finance to fund the upfront cost that currently deters adoption. This relief applies to a broad income range, not purely the most vulnerable. This will complement the Warm Homes Plan's targeted grants and ensure broad support for the energy transition. The grid gains flexibility precisely where it is scarcest: 450 MW of distributed storage at central uptake, contributing toward the 51-66 GW of flexibility DESNZ says is needed by 2030, while displacing carbon intensive peak generation for an estimated 7,300 to 21,900 tonnes of CO₂e avoided annually depending on assumptions. And the Treasury stands to benefit through system-wide flexibility projected to save the energy system £30-70 billion by 2050 and cut distribution network investment needs by £6.7-7.9 billion. Savings a battery salary sacrifice scheme would help accrue at no direct capital cost to government.

The risks are identifiable and manageable, not disqualifying. Renter and self-employed exclusion, and the tilt toward higher earners are to some extent limitations, but they are the same limitations already accepted in the EV scheme, and commercial precedent (HEVA Energy) has already solved the harder operational problems around employee mobility and early termination that once looked like the biggest barrier to a battery specific scheme.



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