

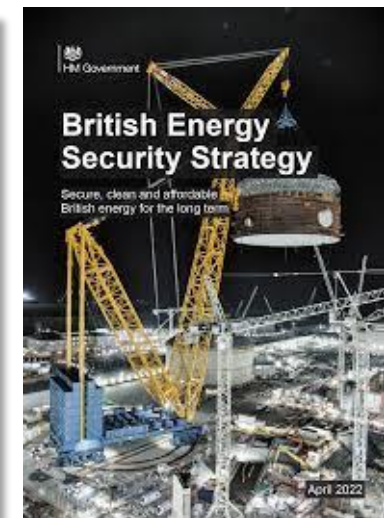
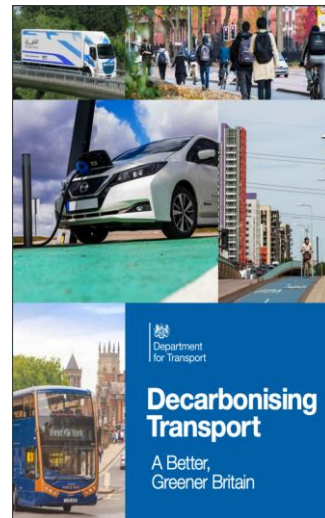
Delivering a smart, secure, flexible and interoperable electricity system

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Background – The path to net zero

The UK has legally committed to decarbonising all sectors of the UK economy to meet our net zero target by 2050, with a commitment to decarbonise the power sector by 2035, subject to security of supply.



Smart systems and flexibility plan

- **Flexibility** means shifting energy in time or location to balance supply and demand. This is essential for decarbonising power, buildings and transport.
- To meet the UK's target to have net zero emissions by 2050, we will have to shift away from fossil fuels and use low carbon sources of energy for flexibility. This means:
 - **More intermittent or inflexible generation**, particularly from wind and solar
 - **Increased electricity demand**, as we electrify transport and heat
- System costs will be lowered by reducing the amount of generation and network needed to decarbonise.
 - saves up to **£10 billion per year by 2050**
 - reduces system costs **between £30-70bn from 2020 to 2050**
 - creates **up to 24,000 jobs by 2050**
 - Give **consumers more control** over their energy bills and more security.
- These low carbon sources will be used in a **smart** way – enabled by data and digitalisation.



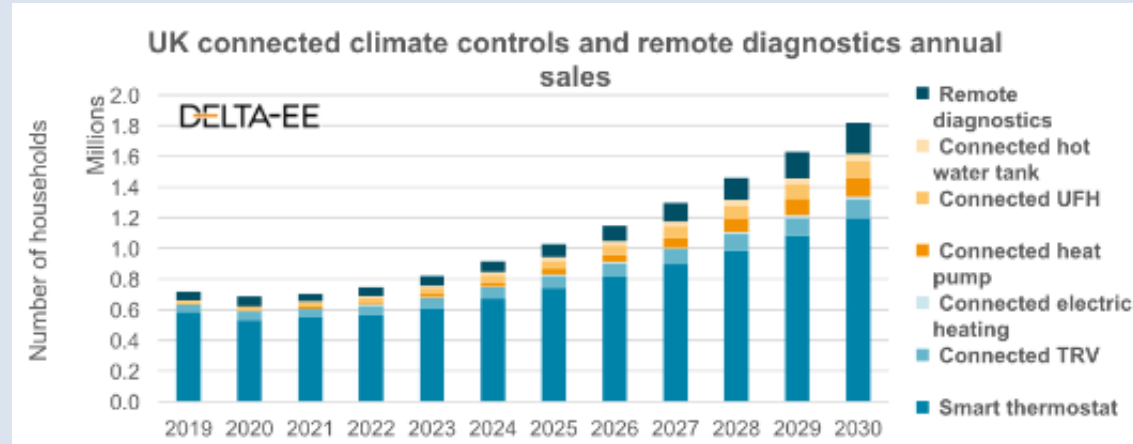
Energy Smart Appliances (ESAs) can play a significant role in delivering a smart energy system. Their deployment is already happening at pace. This carries both opportunities and risks.



6.9-11.3 million domestic heat pumps installed by 2035¹.



10 million EVs by 2030².



The total value of DSR to the GB power system between 2022 and 2050 is estimated at £40-50bn⁵.



- Reduced need for physical infrastructure
- Improved energy security
- Lower consumer bills
- Lower environmental impact



- New risks to consumers and the grid:
- Cyber security and grid stability impacts
 - Potential for consumer detriment, such as being locked into unsuitable services

2. Heat pumps figures – Net Zero Strategy: Build Back Greener (2021)

3. EV figures – Taking Charge: The EV Infrastructure Strategy (2022)

4. Diagram Source: Delta-EE: Review of UK market (2022)

5. Analytical annex to the Electricity Network Strategic Framework



Timelines

Recent key events:

June 2021: Taskforce on Innovation, Growth and Regulatory Reform supports Government's objectives to deliver a smarter energy system

July 2022: consultation for delivering a secure and smart electricity system published alongside Energy Bill with powers to support proposals

June-December 2022: The first and second part of the EVs (Smart Charge Points) Regulations 2021 came into force

March 2023: Powering Up Britain published, including Government response to July 2022 consultation, confirming the proposals

2024 – 2025: secondary legislation for proposals is put in place

Long term implementation

● **~2025: Implementation of:**

- Standardised time of use tariffs
- Cyber security protections for large load controllers
- Consumer protection via licensing of DSRSPs

● **~Mid-late 2020s: Implementation** of device and system-level technical standards for energy smart appliances.



The Electric Vehicles (Smart Charge Points) Regulations 2021

- Made under powers granted in the Automated and Electric Vehicles Act 2018
- Since 30th June 2022, all charge points sold for private use and workplaces in Great Britain must have smart functionality, communication abilities, ability to respond to demand side response signals, and will charge at off-peak times by default.
- Regulations address the risks of smart, too:
 - Grid stability – randomised delay functionality
 - Interoperability to allow changing energy supplier
- From 30th December 2022, additional security requirements came into force.
 - Cybersecurity – ETSI and PAS1878

Draft Legislation: This is a draft item of legislation. This draft has since been made as a UK Statutory Instrument: The Electric Vehicles (Smart Charge Points) Regulations 2021 No. 1467

Draft Regulations laid before Parliament under section 18(4) of the Automated and Electric Vehicles Act 2018, for approval by resolution of each House of Parliament

DRAFT STATUTORY INSTRUMENTS

2021 No.

ROAD TRAFFIC

The Electric Vehicles (Smart Charge Points) Regulations 2021

Made - - - - - ***
Coming into force - - - - - 30th June 2022

The Secretary of State, in exercise of the powers conferred by sections 15, 16, 17 and 18 of the Automated and Electric Vehicles Act 2018⁽¹⁾ ("the 2018 Act"), makes the following Regulations. In accordance with section 18(4) of the 2018 Act, a draft of this instrument has been laid before Parliament and approved by a resolution of each House of Parliament. The Secretary of State has consulted such persons as the Secretary of State considered appropriate in accordance with section 18(3) of the 2018 Act before making these Regulations.

PART 1
Introduction

Citation, commencement and extent

1.—(1) These Regulations may be cited as the Electric Vehicles (Smart Charge Points) Regulations 2021 and come into force on 30th June 2022.
(2) These Regulations extend to England and Wales and Scotland.

Interpretation

2. In these Regulations—
"civil sanction" means a compliance notice or a civil penalty imposed pursuant to Schedule 2;
"communications network" means an electronic communications network, being a transmission system for the conveyance, by the use of electrical, magnetic or electro-magnetic energy, of signals of any description;

(1) 2018 c. 18.



Vehicle-to-Everything (V2X) bidirectional charging

- A developing technology where the UK is recognised as a world-leader.
- Expect to play an increasing role over the coming years. Technology and business models have been developing at pace.
- **£30m government innovation funding 2018-2022** to support a range of Vehicle-to-Grid projects:
 - Largest domestic demonstration >300 vehicles
 - Delivered new technologies, tariffs
- **Call for Evidence (2021)** - Key barriers currently include a lack of compatible vehicles, high hardware cost, and uncertain viability of business models for wide range of consumers.
- **Up to £12.6m Vehicle-to-X innovation programme 2022-2025**
 - Phase 1 includes developing new, lower cost hardware compatible with more vehicles, and wide-ranging business models.
 - Phase 2 focuses on real-world demonstrations trialling novel hardware, software, and business model approaches.

Vehicle-to-Grid project

The diagram shows a circular flow of energy between different vehicle types and the grid. The segments are: car (yellow), domestic (orange), commercial (purple), van (light blue), bus (green), and car (dark blue). The projects associated with these segments are: Powerloop (top left), v2 Go! (top right), BUS2GRID (right), SMART HUBS (bottom right), e-velocity (bottom right), e-flex (bottom left), e4Future (left), and Sciurus (left).

Sciurus project – domestic customers using Indra charger

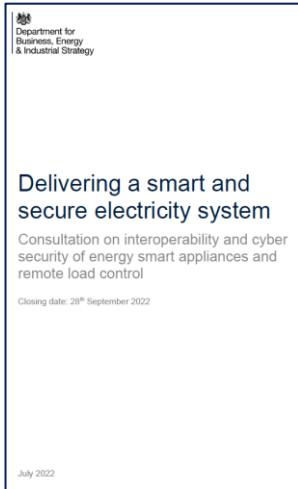
EV-elocity project – council and commercial fleets

E-flex project – council and commercial fleets




Powerloop project – domestic customers



Government priorities for the domestic DSR market



In July 2022, the UK Government announced ambitious plans to:

-  1. Create the right technical frameworks to unlock the benefits of smart for domestic-scale consumers.
-  2. Protect the security of the electricity system, ensuring that remote control of electrical load is an asset not a hazard.
-  3. Ensure that consumers are confident to engage with the smart electricity system and create a level playing field for participating companies.

In March 2023, the Government response to the Smart and Secure Electricity System (SSES) consultation was published.

- 84 organisations responded to the consultation including ESA manufacturers, trade associations, energy systems, network operators, etc.
- The response includes:
 - 14 key policy decisions.
 - Commitment to consult further on a number of areas.
 - Proposed phased approach to implementation.



Powers we are taking in the Energy Security Bill: *For the regulation of ESAs and Load Control*

The Bill provides SoS enabling powers to **regulate proportionately and as needed** the growing market of ESAs ensuring cyber security, data privacy and technical interoperability measures support a competitive market, grid stability, and consumer protection and choice.

How will the Bill achieve this?

- Ensure devices meet **minimum technical requirements** for cyber security, data privacy and grid stability.
- Create a regulatory framework for organisations providing DSR to **domestic** and **small non-domestic consumers**.
- Allow us to **mandate** that certain appliances must have **smart functionality**.
- While also ensuring the **operator licencing regime** works for consumers and the grid.



Next steps for the SSES programme

Proposal /Indicative timeline	2023	2024	2025	2026	2027	2028
Development and adoption of an ESA standard	Primary legislation put in place Further detail of proposals to be consulted on		Secondary legislation developed		Window for proposals to become operational	
Introducing the "smart mandate" to heat technologies	Primary legislation put in place		Secondary legislation developed		Window for proposals to become operational	
ESA minimum requirements						
Tariff interoperability	Further detail of proposals to be consulted on		Secondary legislation developed		Window for proposals to become operational	
Introducing a licensing regime						
Expanding the scope of the Network and Information Systems Regulations 2018 to include certain load controllers	Primary powers to amend NIS Regulations put in place		Window for proposals to become operational, supported by the Cyber Assessment Framework			



International engagement



- **To understand how different countries are approaching policy proposals** for encouraging and preparing for increased flexibility within their respective electricity systems.



- **Identify opportunities** for international cooperation.



- **Share best practice and knowledge** on policy and technical solutions internationally on smart energy, the electricity grid and demand side response.



- **Understand and address common risks and challenges** including how to address new routes for cyber-attacks, grid stability, consumer protection, and interoperability.

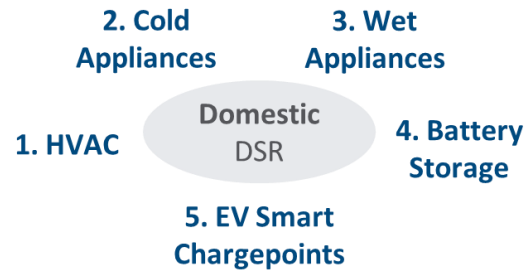


- **Aid policy development that will inform further consultations** on the detail of how SSES proposals will work in practice



Energy smart appliances and domestic demand side response standards

PAS 1878 & 1879 and policy principles



**Interface A
Open-ADR**

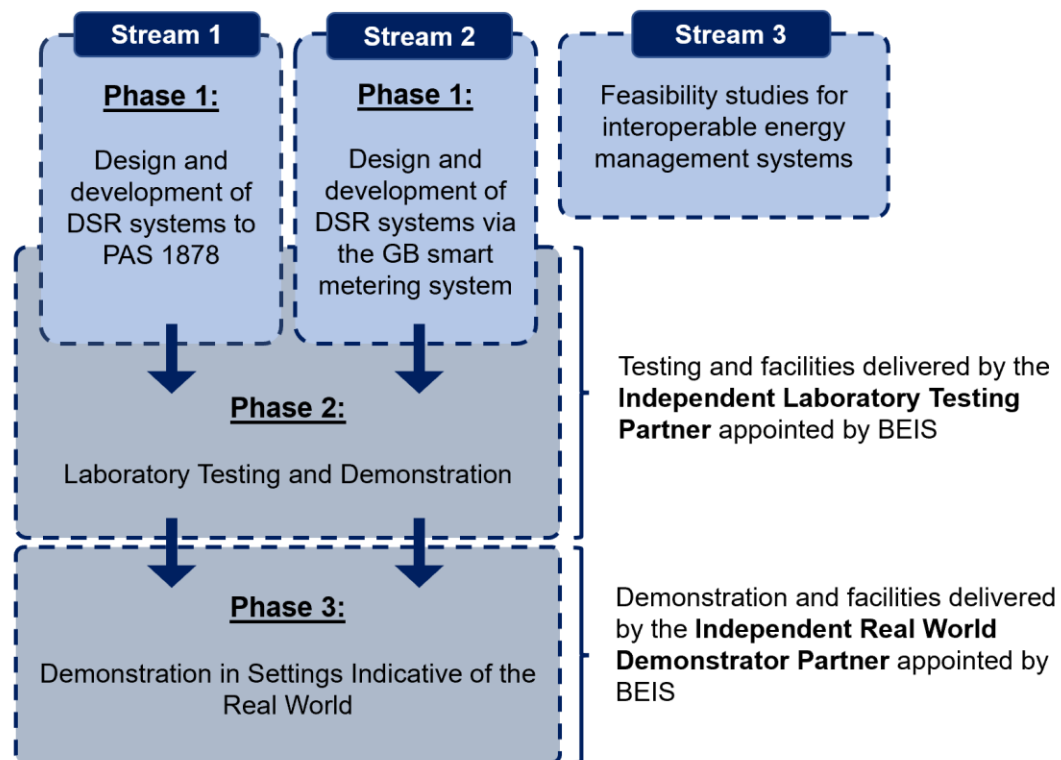
**Enabling
consumer choice**

Policy Principles	
1. Interoperability	the ability of an ESA to work seamlessly across any DSR service operated by any system player.
2. Data privacy	the secure storing of data on the device or with any controlling party.
3. Grid-stability	the prevention of outages on the grid caused by erroneous operation of ESAs.
4. Cyber-security	the prevention of unauthorized access to an ESA by third-parties.



Interoperable demand side response programme

The IDSR programme provides over **£12.8m funding for 13 projects**, including independent testing/demonstration partners, for the development and demonstration of energy smart appliances for the delivery of interoperable demand side response.



www.gov.uk/government/collections/interoperable-demand-side-response-programme



In summary

