

# Policy approaches to maximise smart charging in Great Britain

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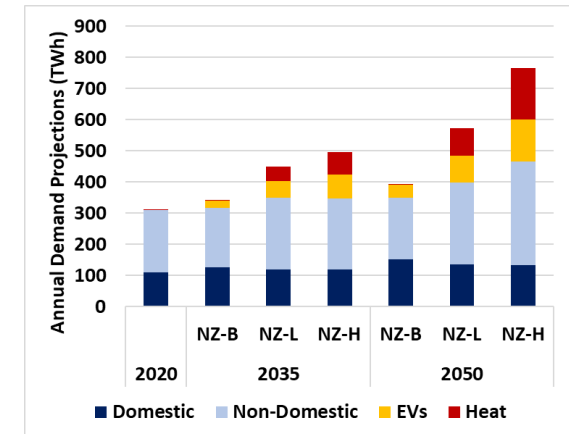


# A Net Zero Energy System



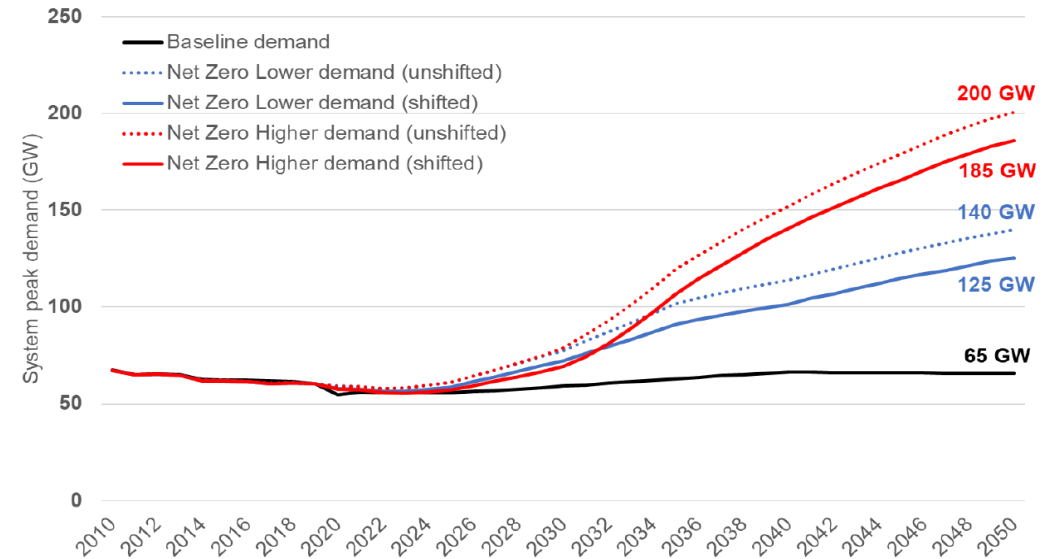
- UK commitment to **net zero** emissions by 2050.
- Ambitious targets to increase **renewable, intermittent generation** to achieve this e.g. 50 GW of offshore wind by 2030, as part of fully decarbonised power system by 2035 (subject to security of supply).
- Increasing electrification to decarbonise sectors:
  - **heat** – installation of 600,000 heat pumps per year by 2028
  - **transport** – phase out sale of new petrol and diesel cars and vans by 2030, all new cars and vans fully zero emission by 2035.

→ demand for electricity to approximately double by 2050, with larger fluctuations than at present.



# A Smart, Flexible Energy System

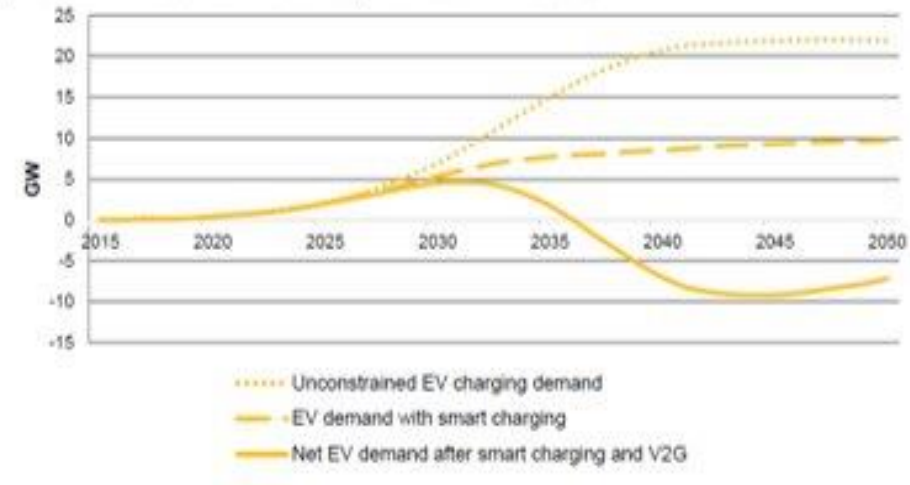
- **Flexibility** – adjusting when and how electricity is generated and used – utilising storage, dispatchable generation, interconnectors to other countries, demand side response (changing timing of when electricity used).
- Increasing flexibility can maximise use of energy from renewable sources and reduce the need for additional generation and network infrastructure – £10bn per year savings by 2050.



# Flexibility from Electric Vehicles

- Electric vehicles have significant potential to provide flexibility – **smart charging** overnight when demand is low, or at times of plentiful renewable generation.
- **Vehicle-to-X (V2X) bidirectional charging** technologies allow EVs to store energy when prices are lower, and export when they are higher, to for example a home, a building, or the energy system (V2G).
- Smart charging **benefits the energy system** (savings passed on to all consumers), and **reduces charging costs** for EV drivers.
- However, there are risks associated:
  - **Grid stability** – large numbers of charge points could respond synchronously, causing large fluctuations in demand.
  - **Cyber security** – internet-connected smart charge points are a potential target for hackers.
  - **Interoperability** – consumers could be locked in without protection.

Figure 1: Electric Vehicle Charging Behaviour at ACS winter peak system demand (Consumer Transformation Model) - National Grid FES2020



# Electric Vehicles (Smart Charge Points) Regulations 2021

- From 30 June 2022, all charge points sold for private (domestic and workplace) use in Great Britain (England, Scotland, Wales) will need to have smart functionality and meet minimum device-level requirements.
- **Smart functionality** = can send and receive information, respond to signals to change rate or time of charging through the charge point.
- Regulations require **default off-peak charging**, which can be modified.
- Requirements to meet **cyber security** standards, and a **randomised delay** to facilitate grid stability.



# Advancing Vehicle-to-X Bidirectional EV Charging

- A nascent technology, but where the UK is a world-leader.
- Up to **£30m innovation funding 2018-2022** to support a range of Vehicle-to-Grid projects:
  - Largest domestic demonstration >300 vehicles
  - Delivered new technologies, tariffs
- Key barriers currently include a lack of compatible vehicles, high hardware cost, and uncertain viability of business models for wide range of consumers.
- **New Vehicle-to-X innovation programme launched in 2022** – Phase 1 includes developing new, lower cost hardware compatible with more vehicles, and wide-ranging business models; Phase 2 will enable demonstration.
- Expect to play an increasing role over the coming years, though some uncertainty in precise technologies and business models.



# Wider work to facilitate smart charging and V2X

[Icons from FlatIcon.com]



**Networks** funding and charging to facilitate EV flexibility.

**Markets involvement of EVs** – including Review of Electricity Market Arrangements.

**Device and organisation regulation** – proposals for smart appliances to be interoperable with different demand side response service providers, and organisations providing demand side response to be licensed and regulated.

**Consumers** – improving information provision and consumer service standards.

**Facilitating time-of-use tariffs** – smart metering rollout and Market Wide Half Hourly Settlement.



# Conclusions and future work

- A net zero energy system with increasing renewable generation and electrification of heat and transport is one that can significantly benefit from greater flexibility.
- Electric Vehicles are well primed to provide this flexibility, by shifting charging and by acting as mobile storage.
- **So far....** Smart charge point regulations creating smart capability in private settings; Vehicle-to-X innovation projects helping to remove barriers to this nascent technology.
- **In future...** working to increase smart practice in private settings; investigating potential of, and barriers to, smart charging in public; continuing to monitor and remove barriers to increase the roll-out of Vehicle-to-X bidirectional charging.
- Any questions? How does our approach to facilitating smart charging compare and contrast to that of Korea?

