

# UK Electricity Storage Policy Overview

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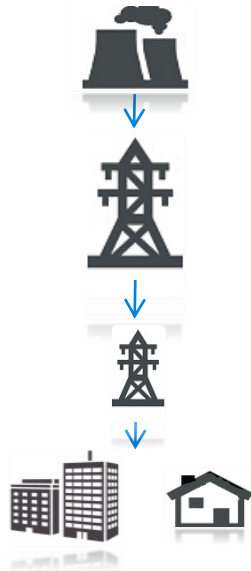
Department for Energy Security and Net Zero



HM Government

# Fundamental Shift

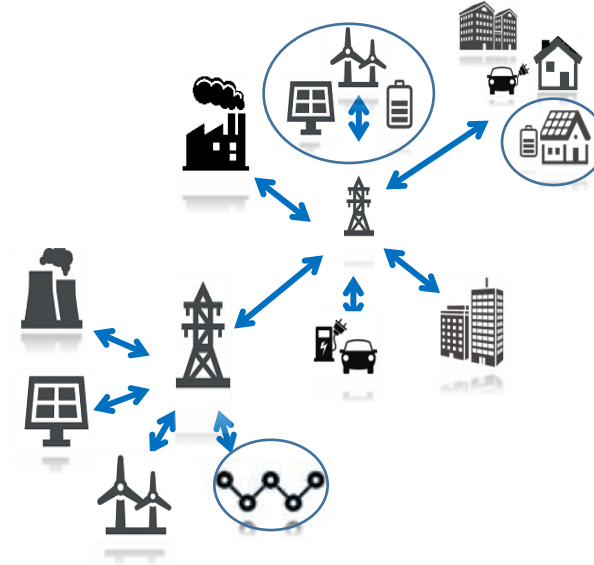
## Yesterday



- Carbon intensive
- Centralised generation
- Predictable supplies

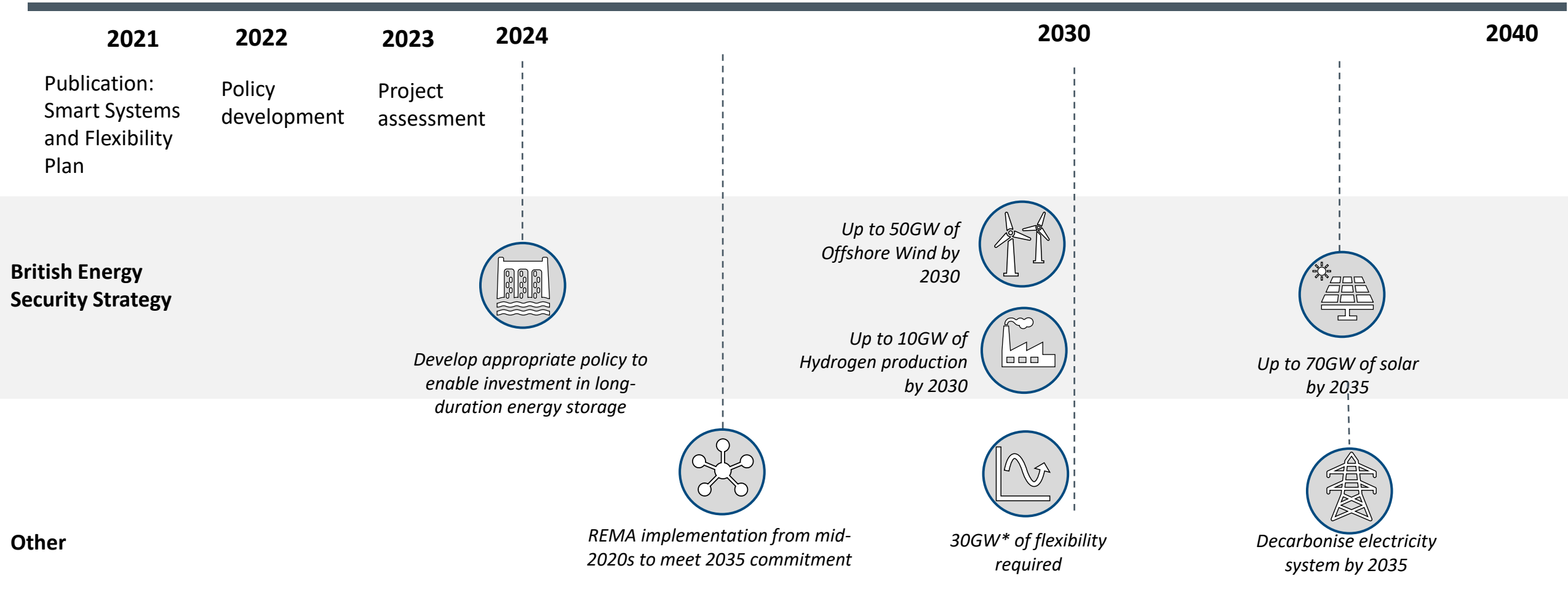


## Emerging System – increased interactions



- Low carbon
- Interconnectors
- More distributed
- Storage
- Demand side response
- Electric vehicles/heat
- Big data & AI
- Smart grids

# UK Government Ambition



# Electricity Storage

Electricity Storage: electricity in – storage - electricity out

**Short duration electricity storage:** electricity out for up to 4 hours

Lithium-ion battery  
Lead-acid battery  
Flywheels  
Super capacitors

**Large-scale, long-duration electricity storage (LLES):** electricity out for more than 4 hours

**power LLES:** LLES with applications only in electricity sector

Pumped hydro storage  
Liquid air energy storage (LAES)  
Compressed air energy storage (CAES)  
Flow Batteries  
Gravitational  
Long duration batteries

**hydrogen to power :** electrolysis – hydrogen storage – electricity out

**Low carbon hydrogen storage** interacting with the electricity system

**Inter-seasonal storage**

CCS produced hydrogen – hydrogen storage – electricity out

Electrolysis – hydrogen storage – use in other sectors

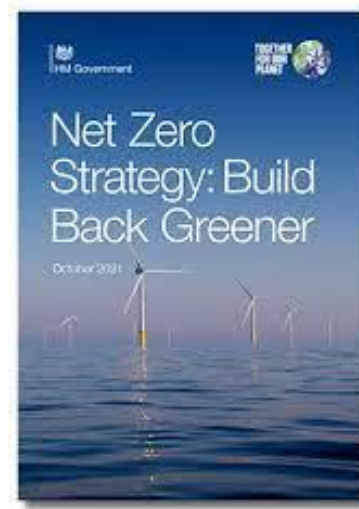
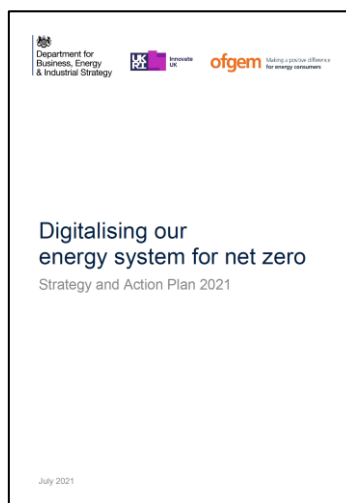
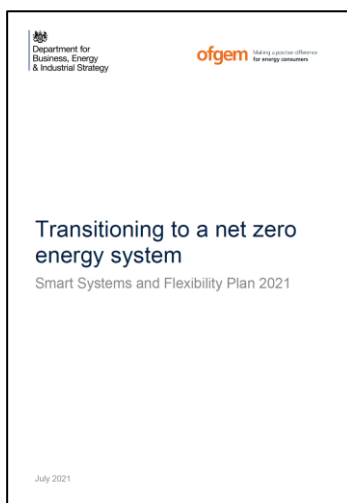


# The transition to a smarter more flexible system...

Smart Systems and Flexibility  
Plan; Energy Digitalisation  
Strategy  
July 21

Net Zero Strategy  
Nov 21

British Energy Security  
Strategy  
Apr 22



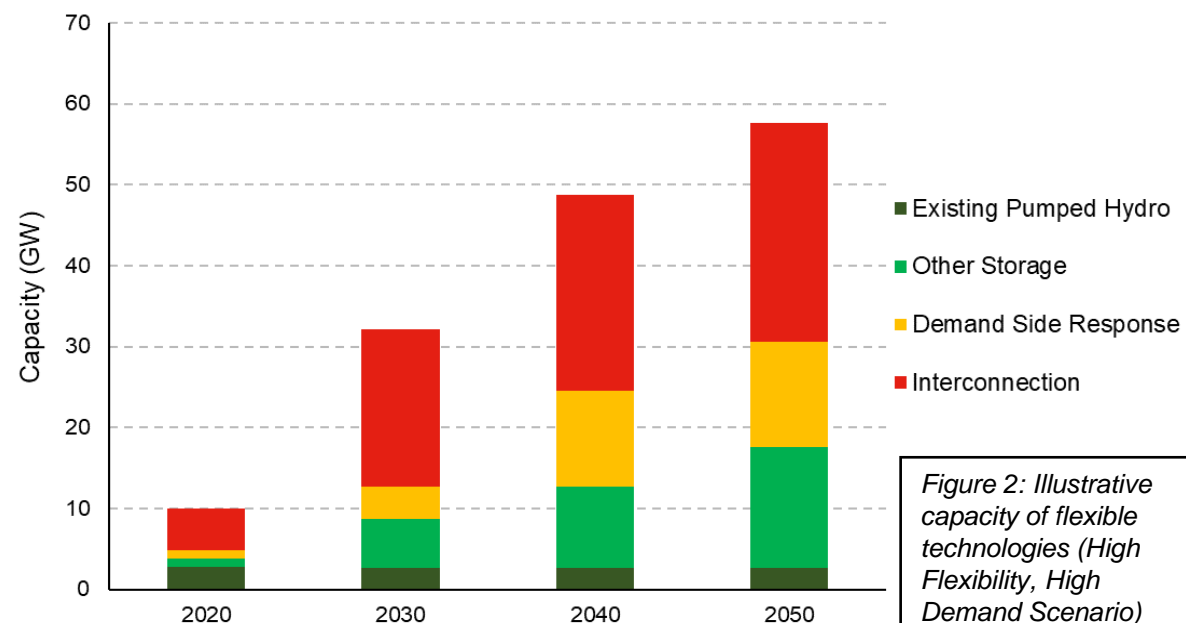
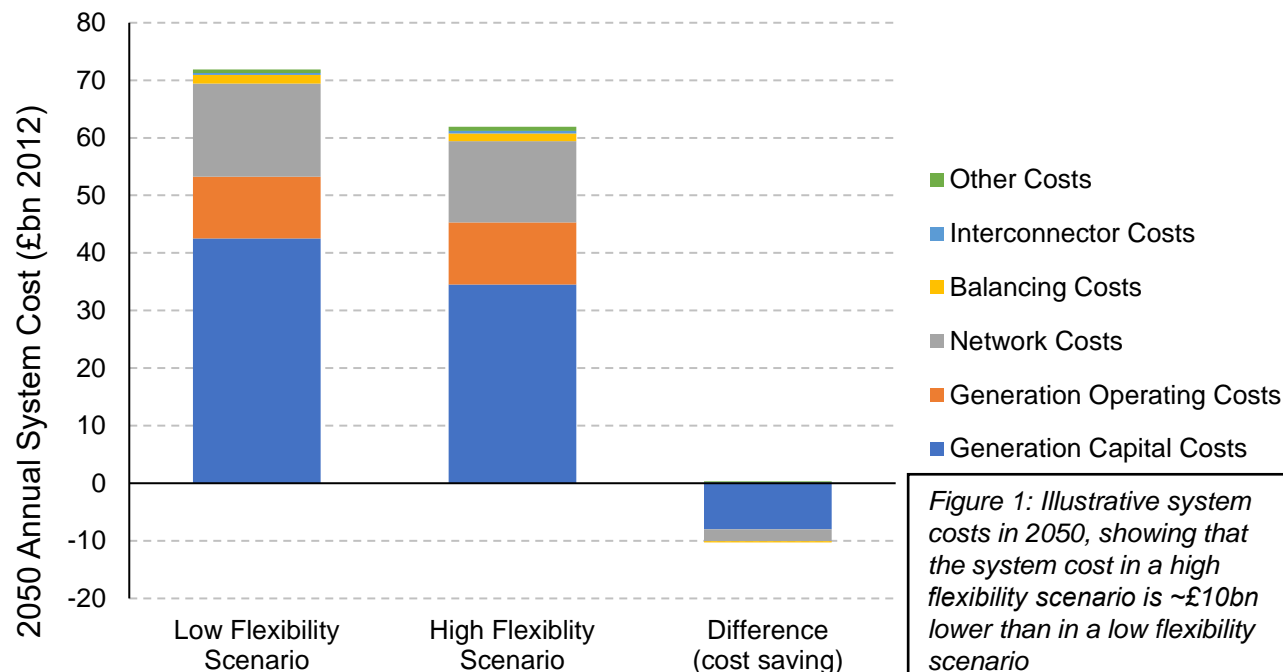
# 2021 Smart Plan Analysis: Low carbon flexibility is essential to meet net zero

We estimate that we will need around **30GW of low carbon flexible assets by 2030**, which represents a three-fold increase on today's levels.

By 2050, in our modelled scenarios, **around 30GW of combined short-term storage and flexible demand (DSR), and 27GW of interconnection could** .

- save up to **£10 billion per year by 2050** at 5g/kWh (high demand, no hydrogen scenario). by reducing the amount of generation and network needed to decarbonise
- reduce system costs between **£30-70bn from 2020 to 2050**.
- create up to **24,000 jobs**.

We assume around 15GW of storage (60GWh of storage capacity) and 15GW of DSR (but these are largely substitutable). We have **not explicitly modelled longer-duration storage**, or the role that flexibility could play in managing local network constraints. If these aspects were considered, it is likely that **additional flexibility could lead to lower system costs**.



# Analysis: the role of flexibility in a net zero system

Updated analysis showing how much flexibility may be needed in a net zero system, and from what sources & technologies

## Facilitating flexibility from consumers

Framework for driving participation and protecting consumers, through perspective of domestic, fuel poor, SME, I&C, local and public consumers. Support the deployment and uptake of smart, digital technologies. Regulatory approach to ensure cyber security and interoperability for smart appliances and flexibility providers. Includes enabling smart buildings and smart electric vehicles.

## Removing barriers to flexibility on the grid

Identification and removal of specific regulatory barriers to smart technologies, including large-scale long-duration storage, domestic and small-scale storage. Includes interconnection policy to increase interconnector capacity, to enhance the role of interconnection as a flexibility asset internationally, and to ensure a consistent and scalable approach to interconnector operability.

## Reforming markets to reward flexibility

Improving market design and coordination so that flexibility providers can secure revenues across multiple markets. Ensure flexibility is fairly rewarded, improve co-ordination and address carbon intensity of flexibility markets.

## Digitalising the system

Set out joint strategic approach to digitalisation and opening up data across energy sector, to provide leadership and coordination, incentivise change, and develop innovative system-wide digital solutions and architecture.

## Innovation, skills and monitoring

Set out how we will monitor how much flexibility is coming forward, assess whether this is in line with estimated system needs, and propose the indicators we'll use to know whether/how to adapt our approach.  
Set out approach to innovation for both technologies and business models across each of the above smart systems themes

# 2021 Smart Plan: Government's vision and priorities over the coming years

## VISION

By the mid-2020s we will have created a best-in-class regulatory framework for storage at all scales. There will be a level playing field for domestic and small-scale storage. Customers will be confident in the benefits of and framework for installing storage in homes and businesses. First-of-a-kind longer duration storage technologies will be built.

## ISSUES

- **Continue progress towards a best-in-class regulatory system** – The regulatory framework was not built with electricity storage in mind. We have made significant progress in clarifying and amending the treatment of storage within the framework however there are still some barriers remaining.
- **Facilitating the deployment of large-scale and long-duration storage** – Storage that can provide flexibility over longer durations will be essential for achieving net zero. Currently, large scale and long duration storage faces barriers that are preventing it from deploying. Novel technologies have not yet reached commercialisation or been demonstrated at scale.
- **Removing barriers and distortions to domestic and small scale storage** – Domestic and small-scale storage is important for providing flexibility to the system and ensuring that energy from small-scale renewables can be used at peak times, lowering demand from the grid. However, this market is nascent and there are barriers preventing domestic and small-scale storage from operating on a level playing field.





# Policy and Regulatory Barriers

## Delivering Smart Plan actions and identifying additional barriers

Continuing to deliver on Smart Systems and Flexibility Plan, we want to understand from stakeholders whether they are on track, how best these can be driven towards implementation and whether there are follow on actions?

- Planning guidance
- Definition of storage
- Business rates
  
- Connections
- Innovation

## Facilitating the deployment of domestic/small scale storage

The 2021 Smart Plan have identified barriers to the deployment of storage at a domestic/small scale level.

- Health and Safety and asset registration
- Smart Export Guarantee
- Removal of final consumption levies
- VAT

## Facilitating the deployment of large-scale, longer-duration storage

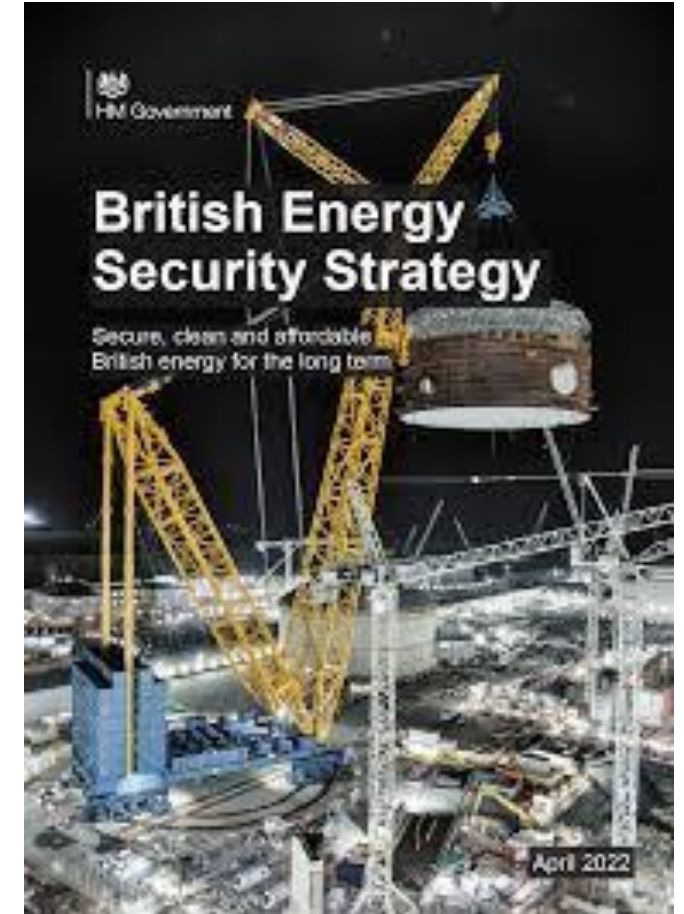
Stakeholders have identified that large-scale, longer duration storage may struggle to deploy due to high upfront costs.

- How challenges should be addressed in policy/regulatory frameworks
- Facilitating a level playing field
- Innovation needs for this type of storage

# Large-scale Long Duration Electricity Storage

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- *‘encouraging all forms of flexibility with sufficient large-scale, long-duration electricity storage to balance the overall system by developing appropriate policy to enable investment’*
- Further analysis and energy system modelling
- Review of Electricity Market Arrangements (REMA), Capacity Market.



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# Questions