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Balancing Supply and Demand in the Energy System

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All Energy – 11th May 2017

ETI10 TEN YEARS OF INNOVATION 2007 – 2017

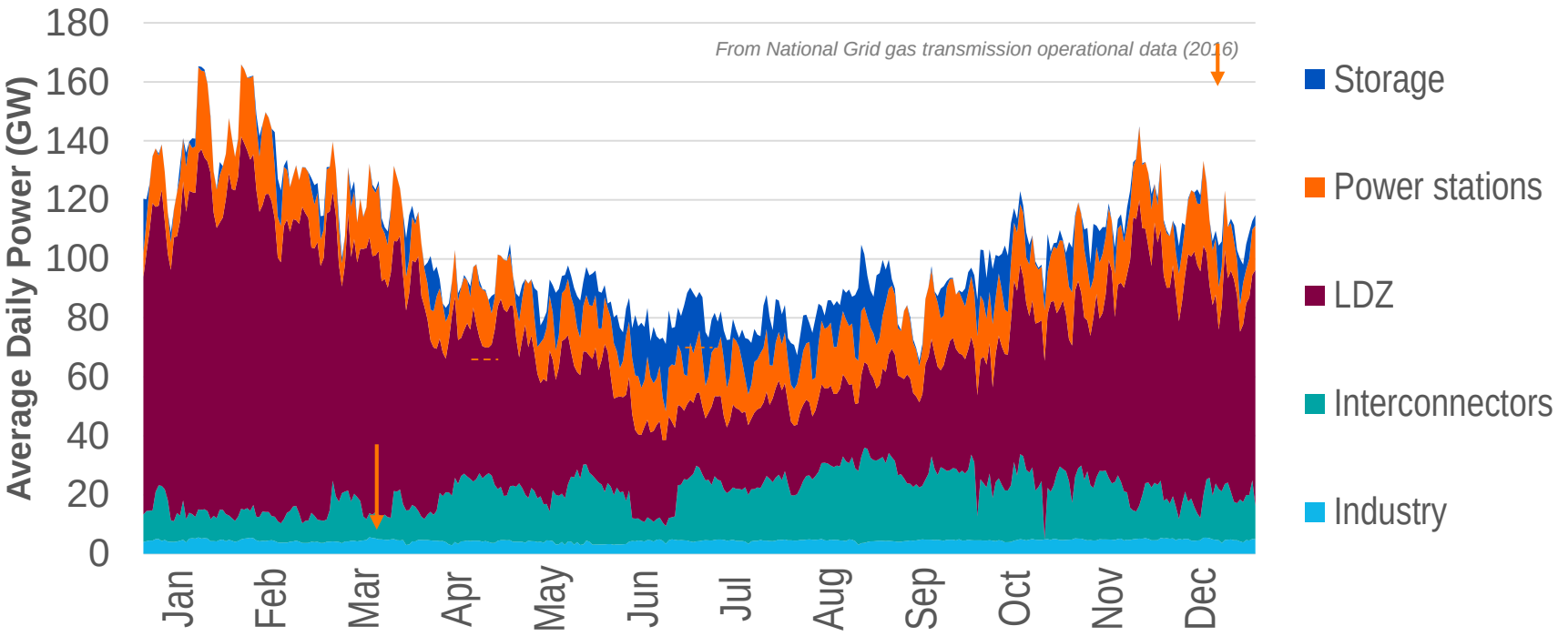
Why do we need to balance?

Supply meets demand

Technical constraints maintained

Over different time periods

Over the whole UK geography



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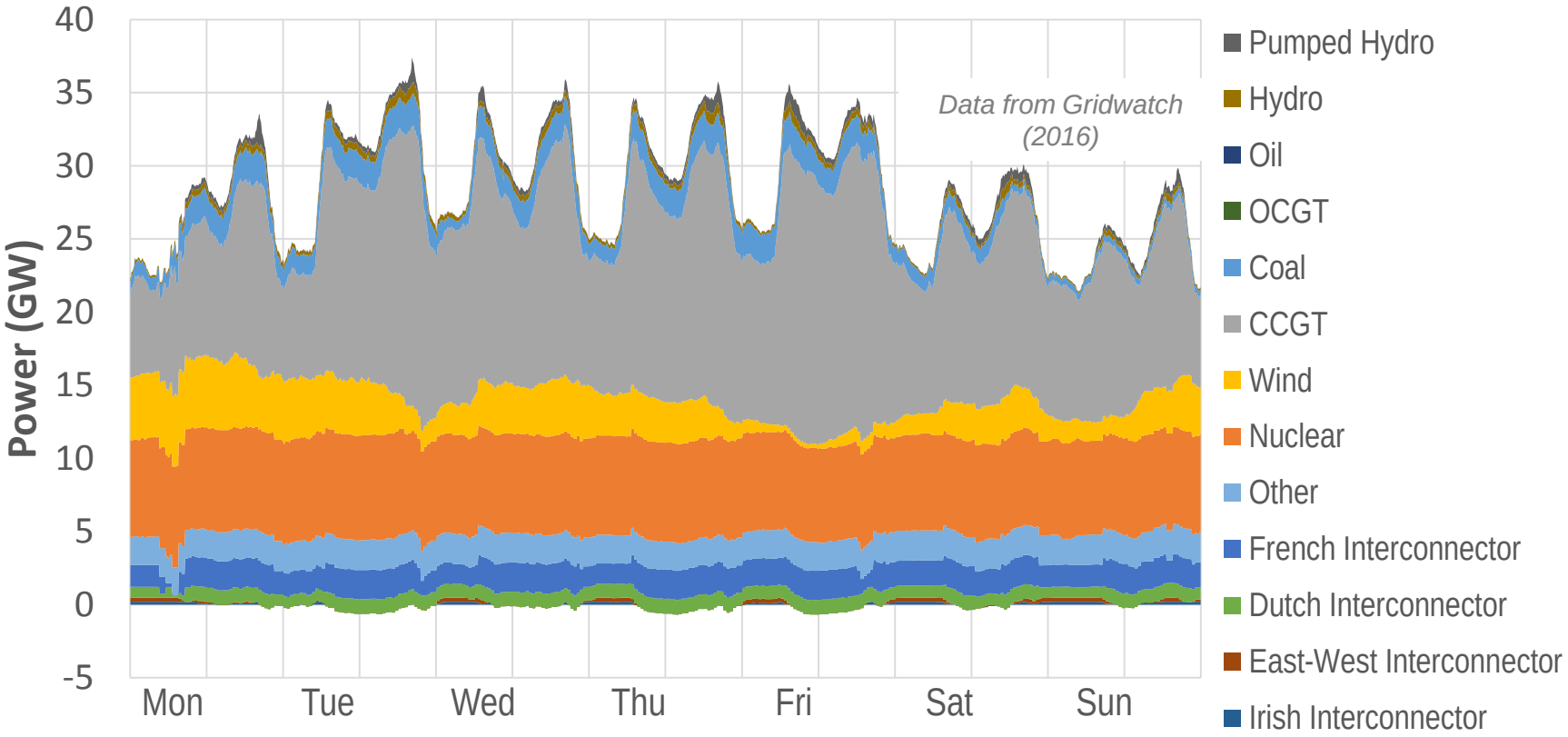

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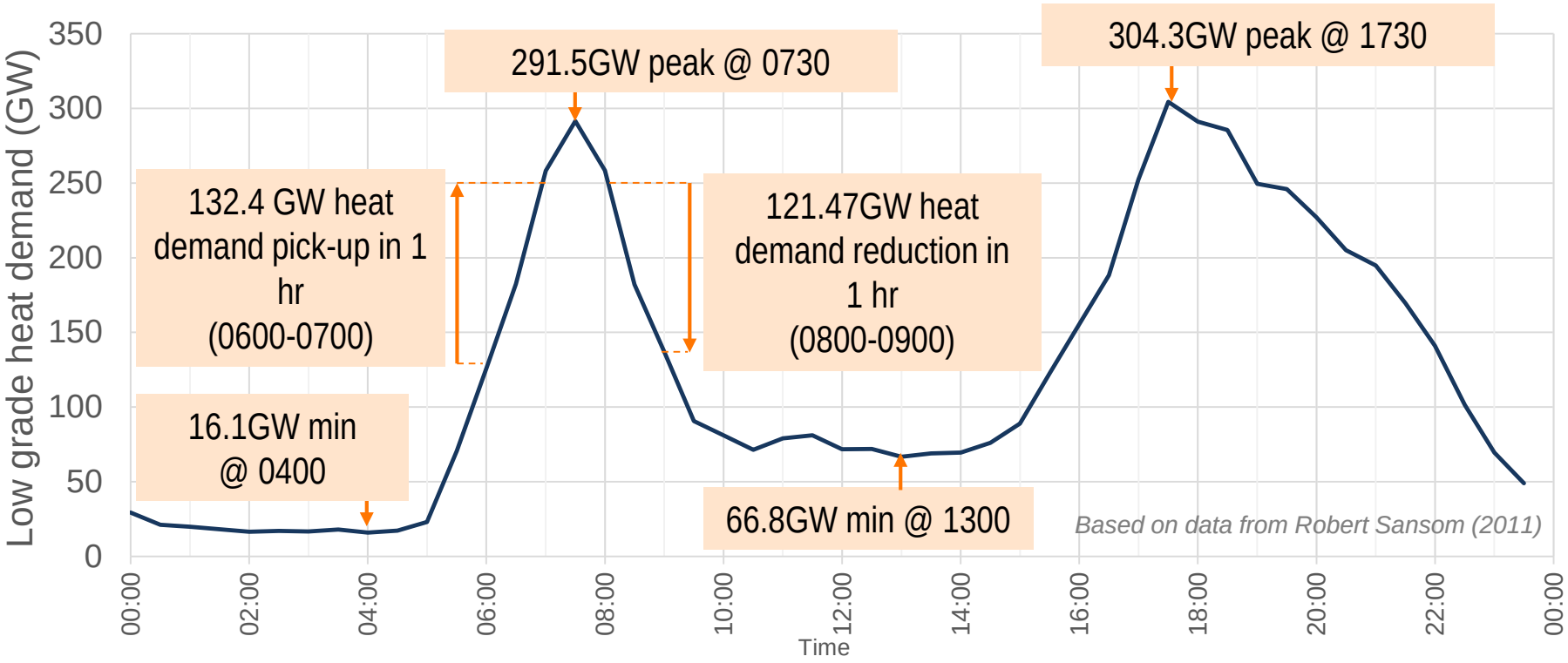
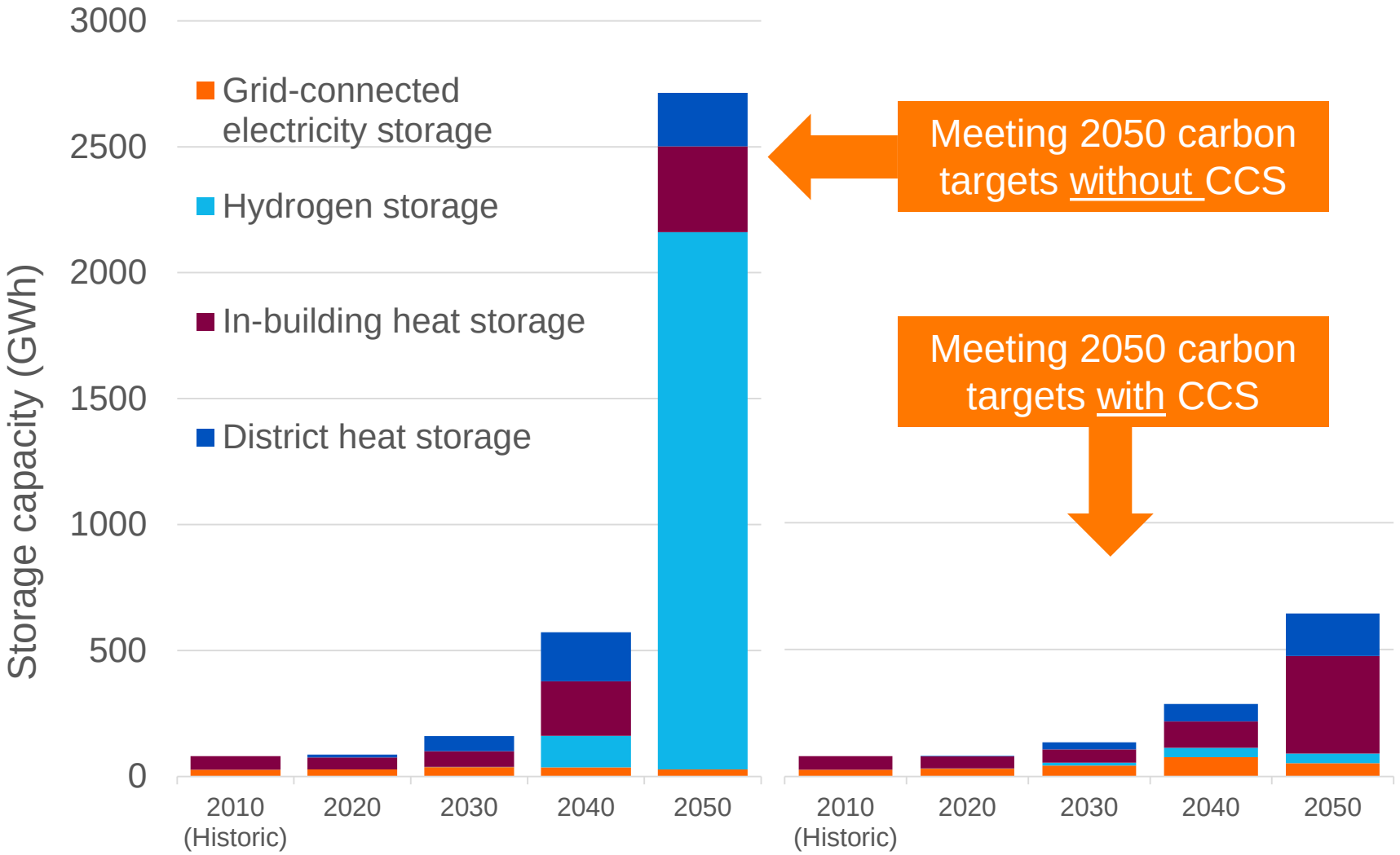


Balancing Methods

- Between 2011 and 2016 8.5GW of intermittent generation was connected to the grid
- Roughly 2GW of this is under 20MW

How much storage is needed?



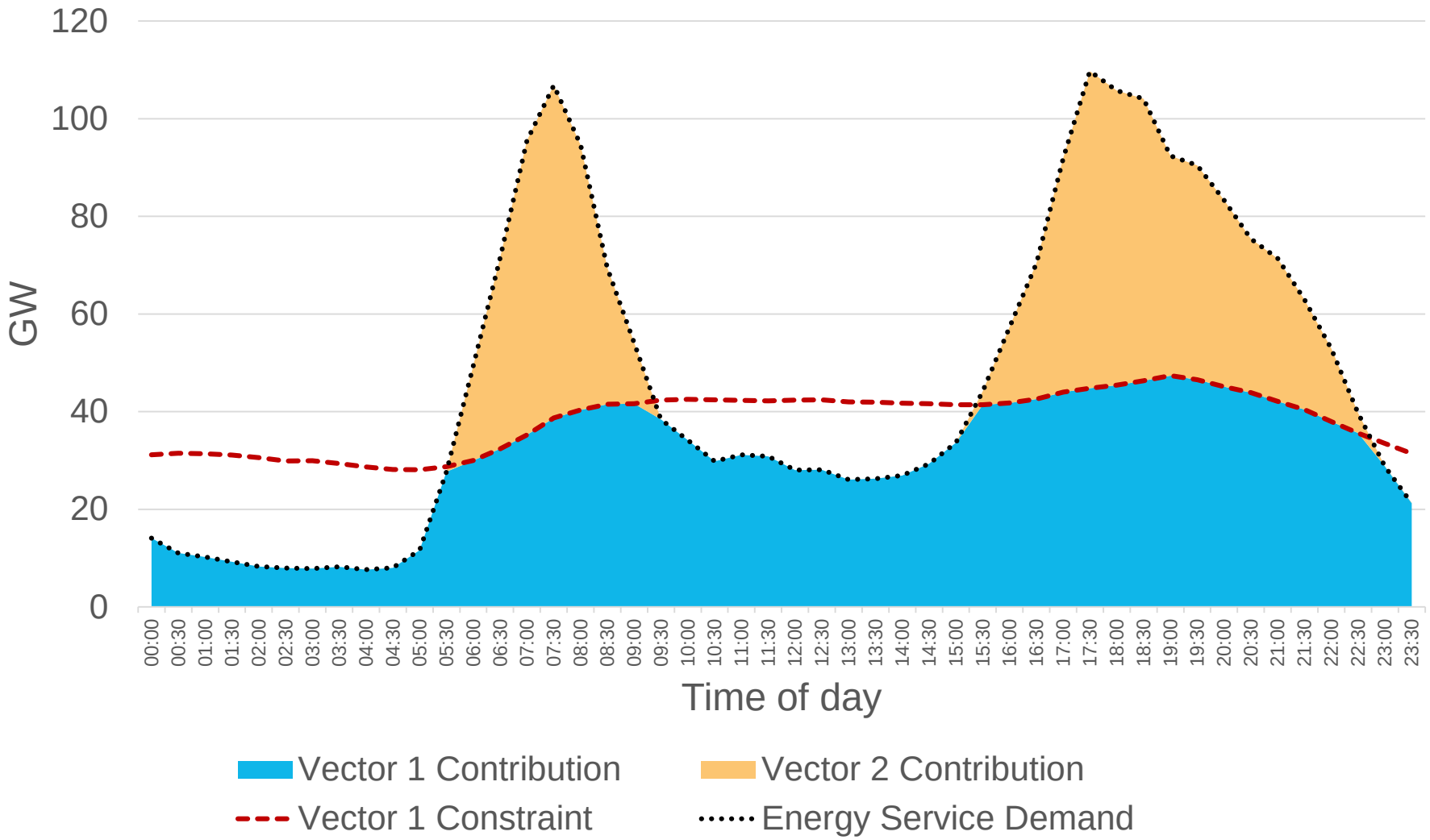
Energy Storage in Networks

Real time balance and expensive

Inherent storage and low cost dedicated storage

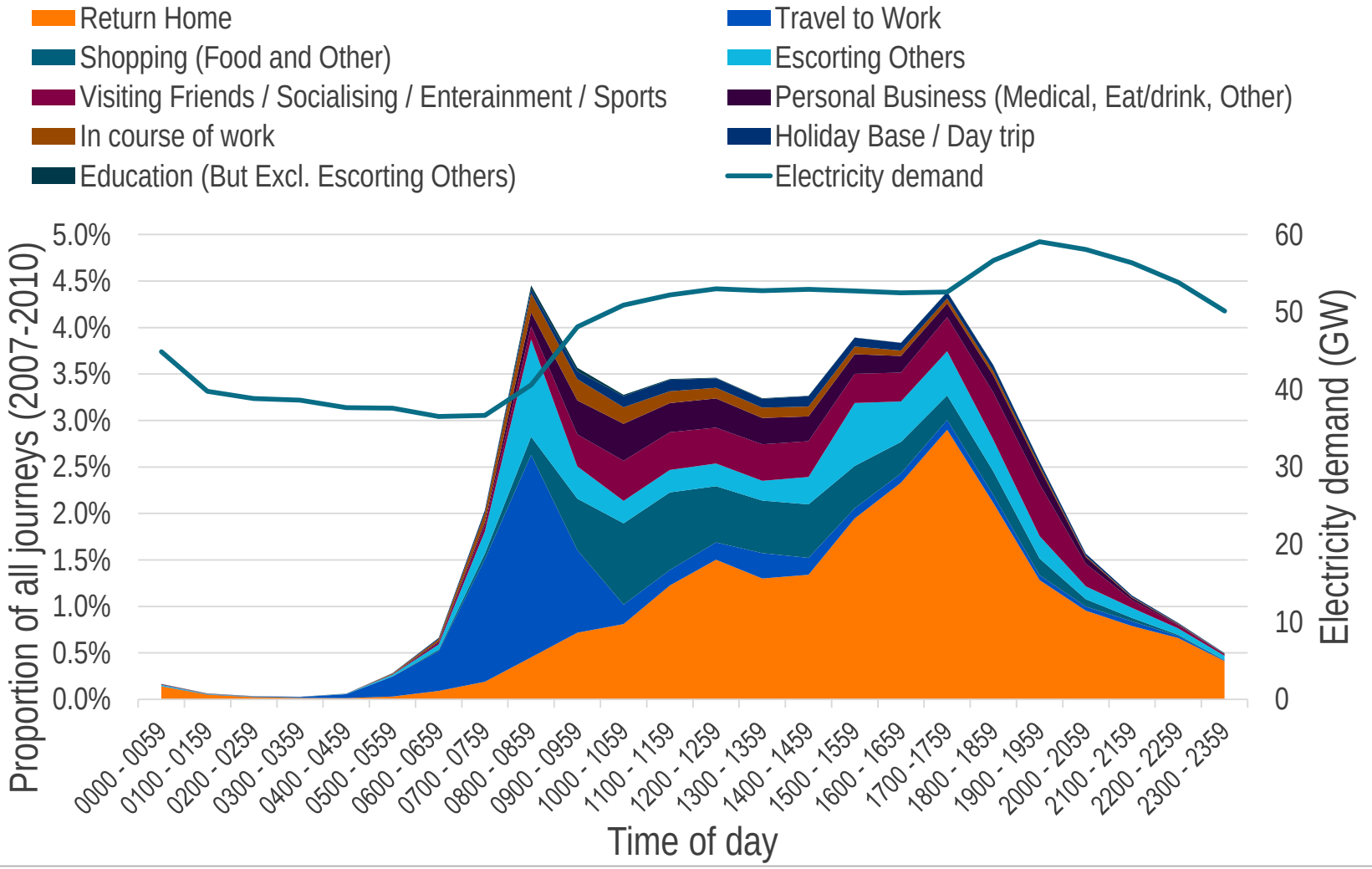
	ELECTRICITY	GAS	HEAT NETWORKS	HYDROGEN
Spatial	✓	✓	✓	✓
Hierarchical	✓	✓	✓	✓

Vector Flexibility

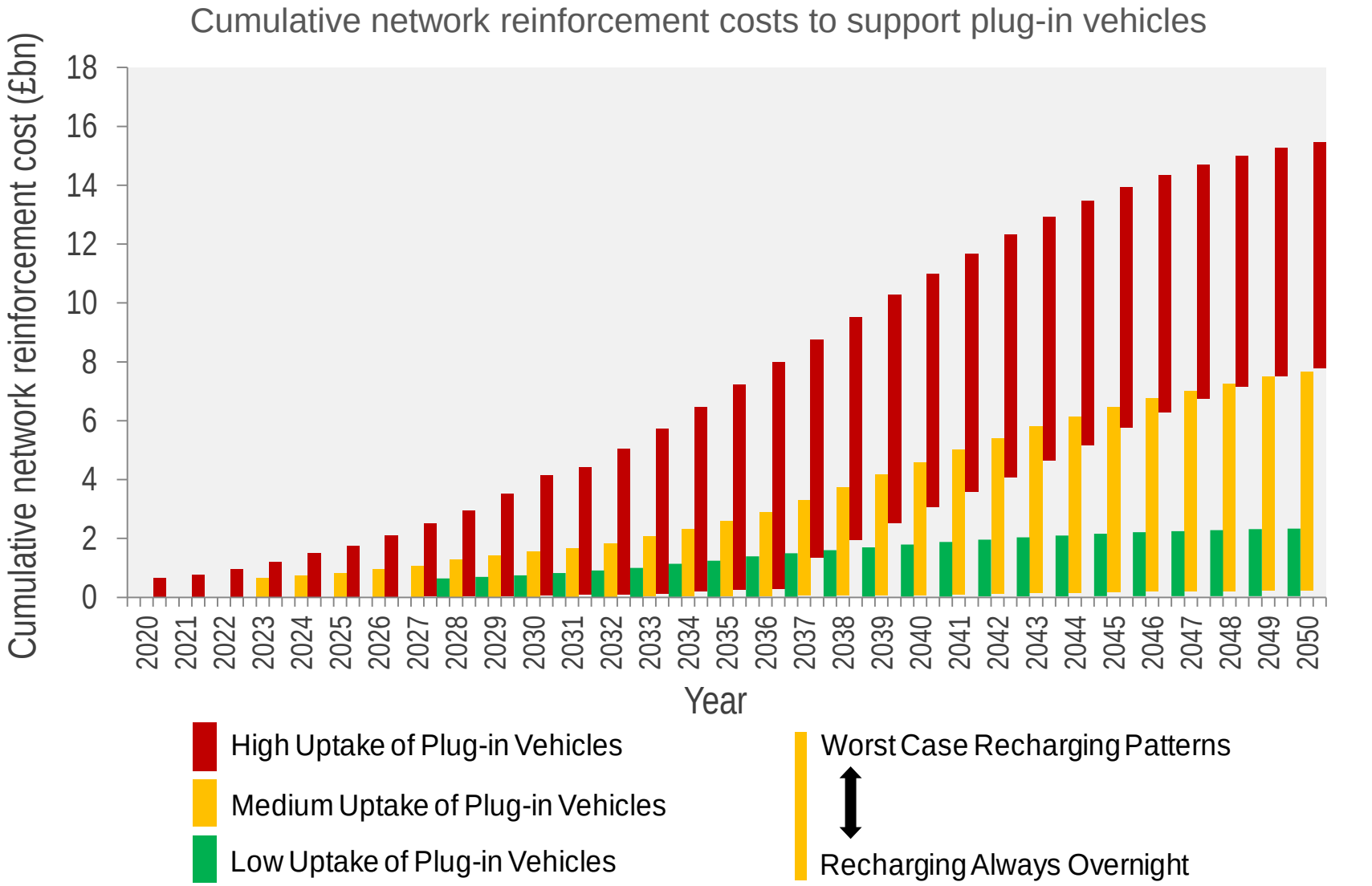


Demand Flexibility

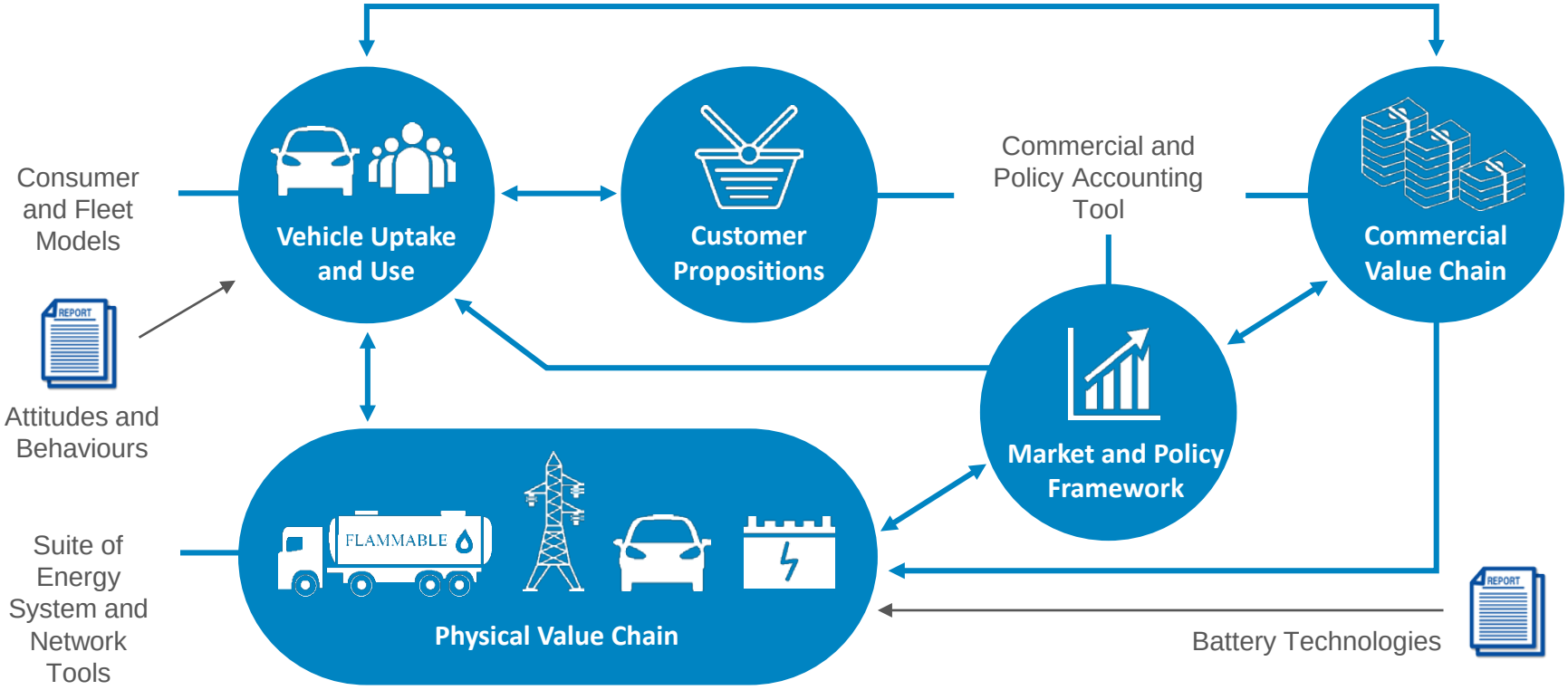
Journey arrival times (2007-2010) and Electricity demand profile (7th December 2010)



Demand Flexibility



Consumers, Vehicles, Energy Integration



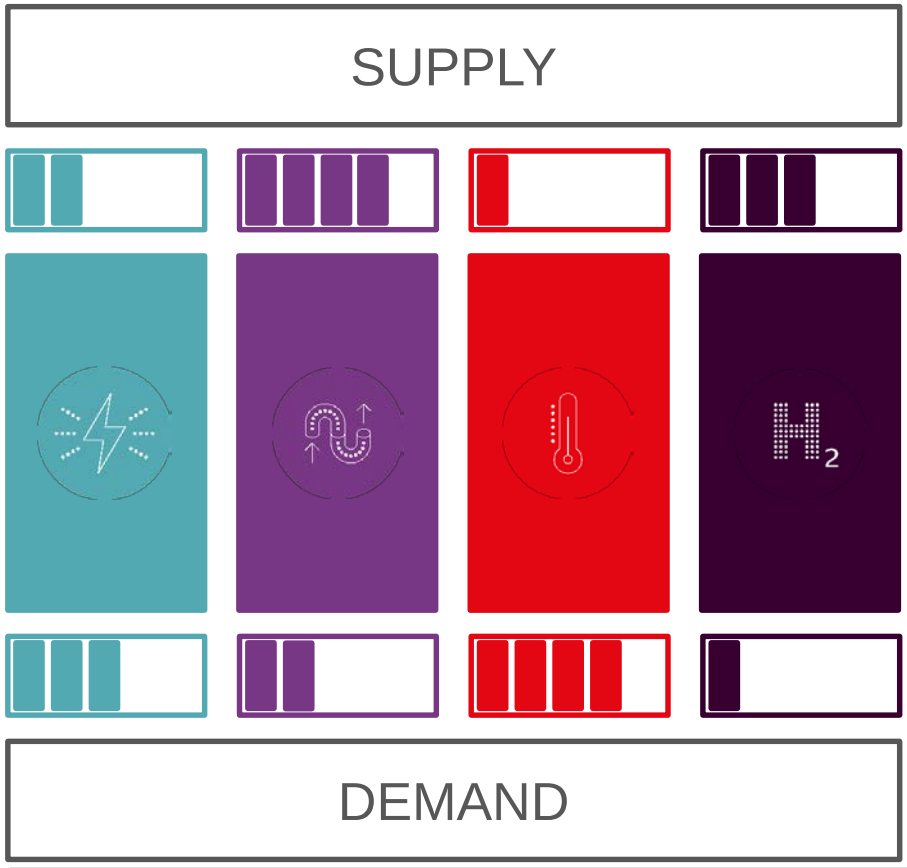
Mass Market

Charging Trials

Feeding into a whole energy systems model

The ETI Storage and Flexibility Model

For different future energy systems…



Storage and Flexibility Types

Network Levels

Spatial Positions

Services (required and desired)

Summary

- Energy balancing is critical and extends beyond the electricity system
- Numerous opportunities to achieve balancing include:
  - Energy storage
  - Demand side flexibility
  - Vector integration
- Key decisions that lead to new energy systems will affect how much and what type of flexibility is needed.
- There is a huge amount of potential that we do not currently understand about balancing within a whole energy system.
- It is possible to assess the requirements for future flexibility – tools and evidence are being developed to help with this.

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