

ENERGY POLICY MASTERCLASS: FLEXIBILITY AND STORAGE - THE LONG AND THE SHORT OF IT

Jon Saltmarsh

Chief Technology Officer

21st March 2023



About Energy Systems Catapult

Mission: Unleashing innovation and open new markets to capture the clean growth opportunity



Why do we exist?

To accelerate Net Zero innovation and deliver the future energy system



How do we work?

We do the hard stuff by taking a whole systems approach to net zero



What do we do?

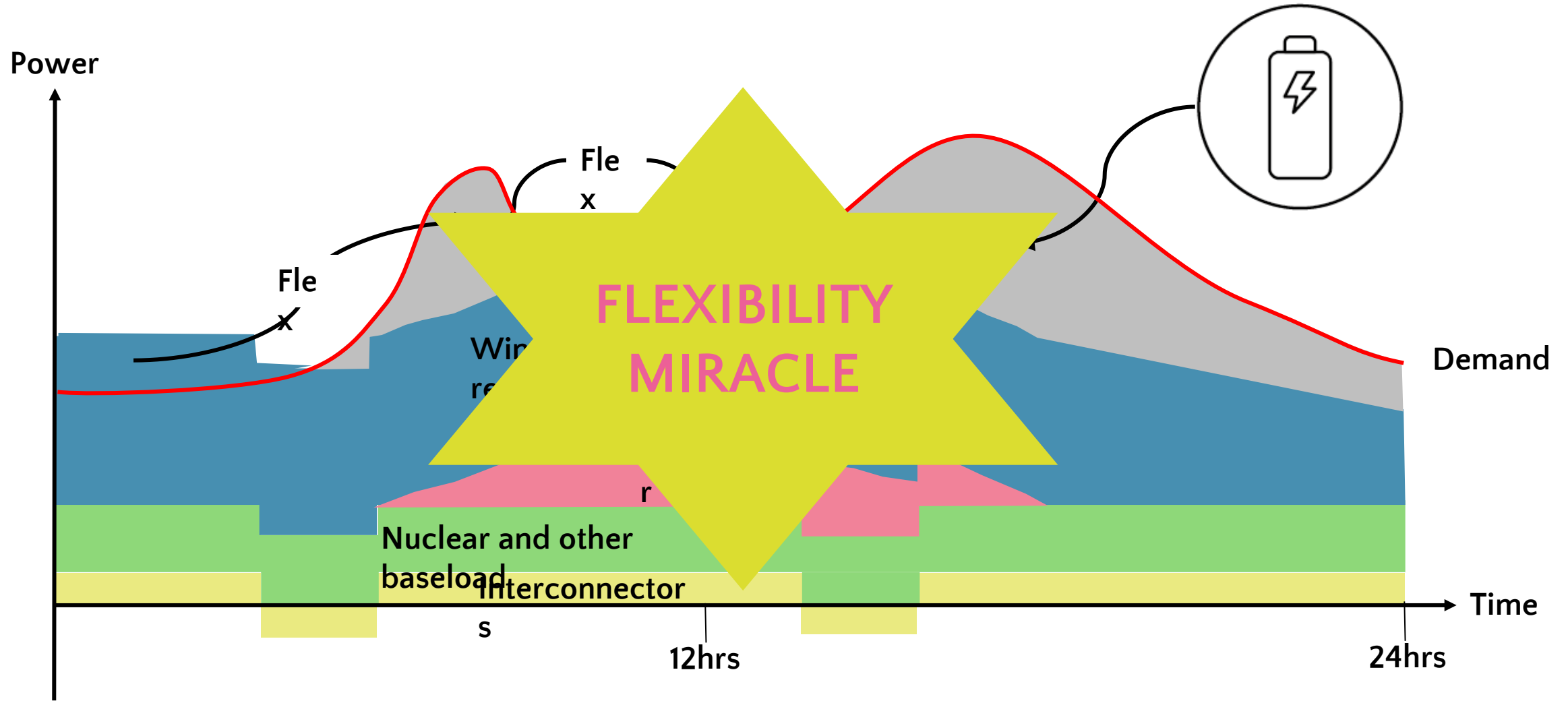
Turboboost innovation across homes, sites, places, whole systems & networks.
Design a future energy system to drive clean growth and benefit people.

Multiple solutions over several vectors will be needed to meet future system needs

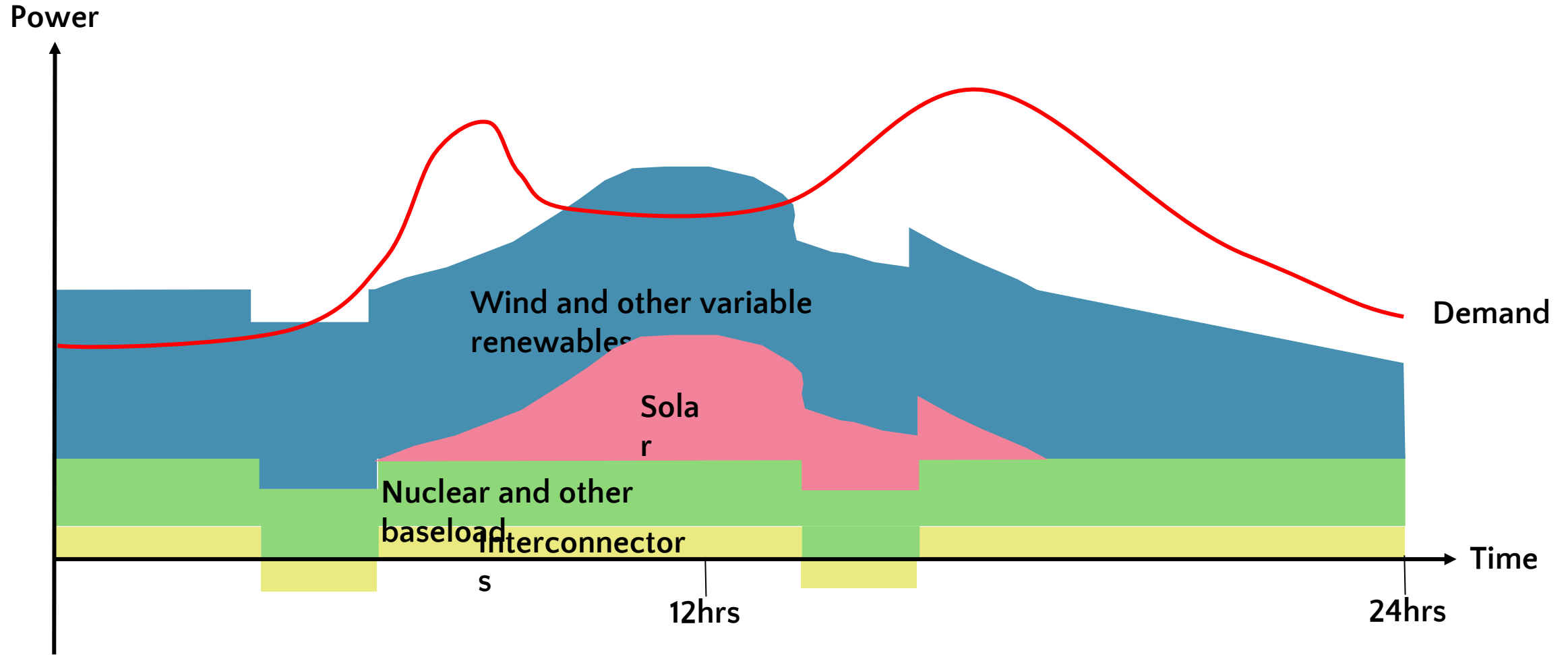
Typical Duration	Role	Vectors	Example technologies
Up to 4 hrs	Within day balancing of renewables, peak reduction, fast demand response, reserve (managing contingency events)	Electricity	Batteries, flywheels, supercapacitors, gravitational storage
Up to 4 hrs	Peak shifting	Heat	Thermal storage including: sensible thermal storage (i.e. hot water tanks), phase change materials and thermochemical storage.
Hours/ within day	Peak shifting	Electricity/DSR	EV smart charging
Up to 24 hrs	Within day balancing of renewables, inter day balancing of renewables, peak reduction reserve	Electricity	Pumped hydro storage, Compressed air energy storage, Liquid air energy storage, redox flow batteries
Long duration storage Days and weeks	Addressing prolonged periods of low renewables and seasonal peak demands, energy security	Gas	Power CCUS, Hydrogen CCUS or electrolyzers and hydrogen turbines

Many technologies can provide a combination of these roles but **no single solution can efficiently meet them all**. This means there is no “one-size fits all” solution to flexibility in the energy system....

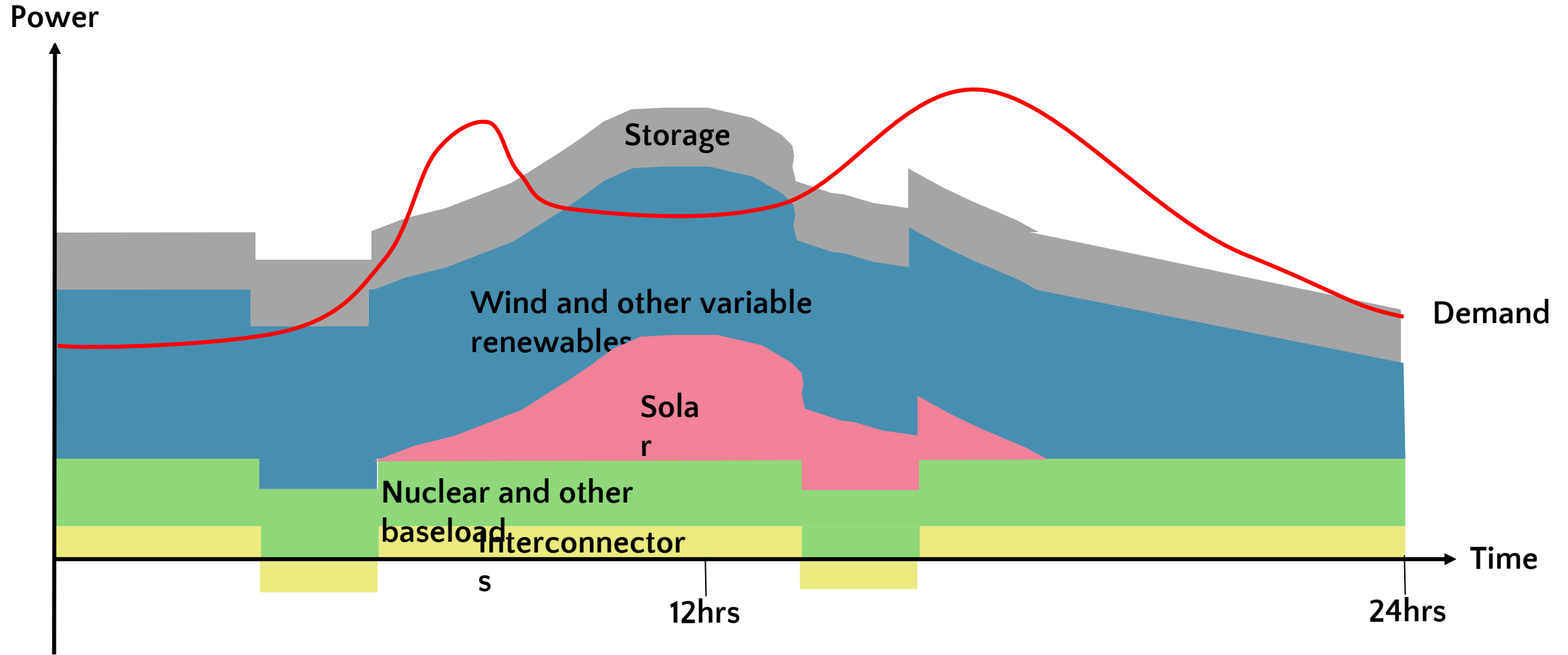
Traditional view of storage and flexibility



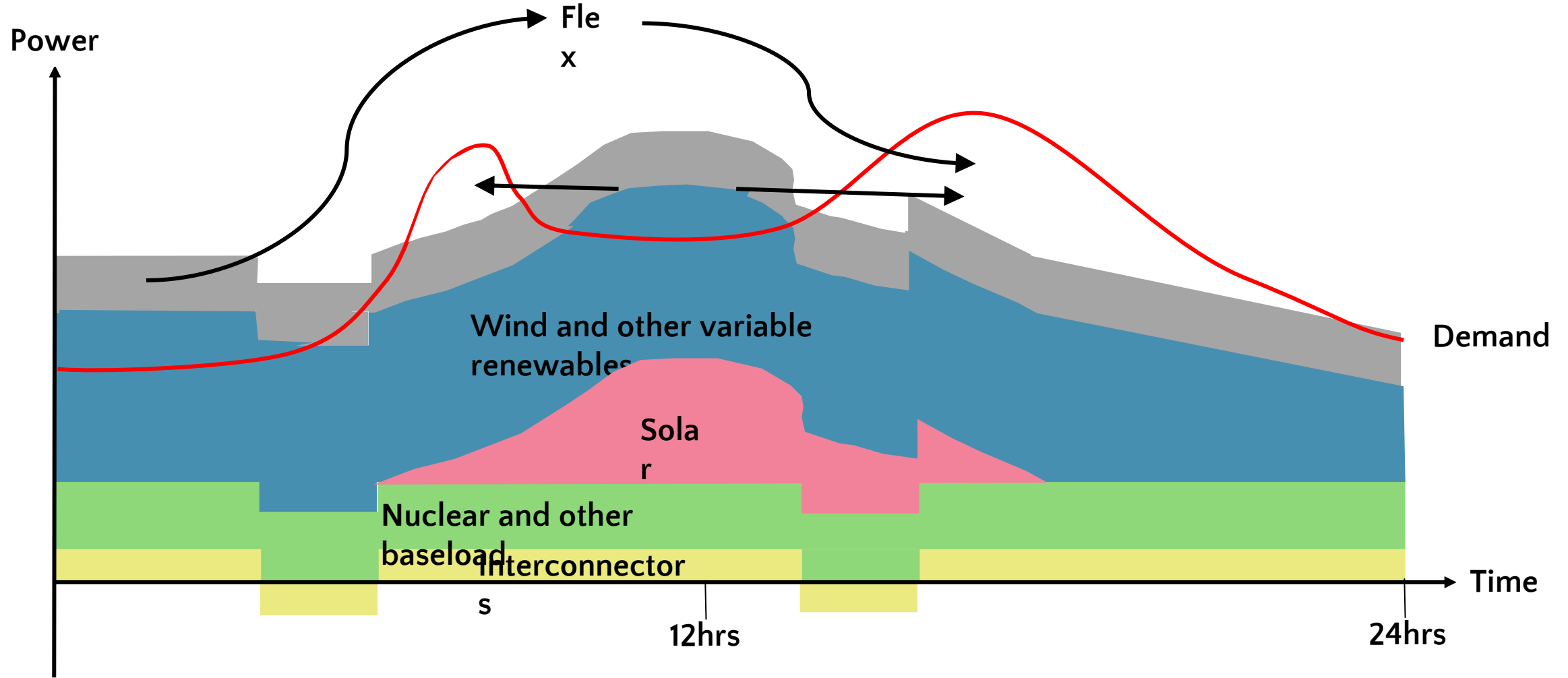
Alternative view of storage and flexibility



Alternative view of storage and flexibility

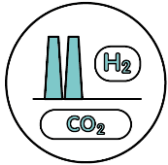


Alternative view of storage and flexibility



Implications of the alternative view

Putting long duration storage needs first and then balancing the system with flexibility



Minimises the requirement for long duration storage assets – Lowers costs



Maximises running time of all assets – either on or off for the entire day – Greater efficiency



Reduces the peak flexibility requirement – simplifies control – Lowers costs



Provides a place for medium duration storage as a cost trade-off against long and short duration storage.



Avoids the need for the “Flexibility Miracle”

OUR MISSION

TO UNLEASH INNOVATION
AND OPEN NEW MARKETS
TO CAPTURE THE CLEAN
GROWTH OPPORTUNITY.

JON.SALTMARSH@ES.CATAPULT.ORG.UK

ES.CATAPULT.ORG.UK

@ENERGYSYSCAT

