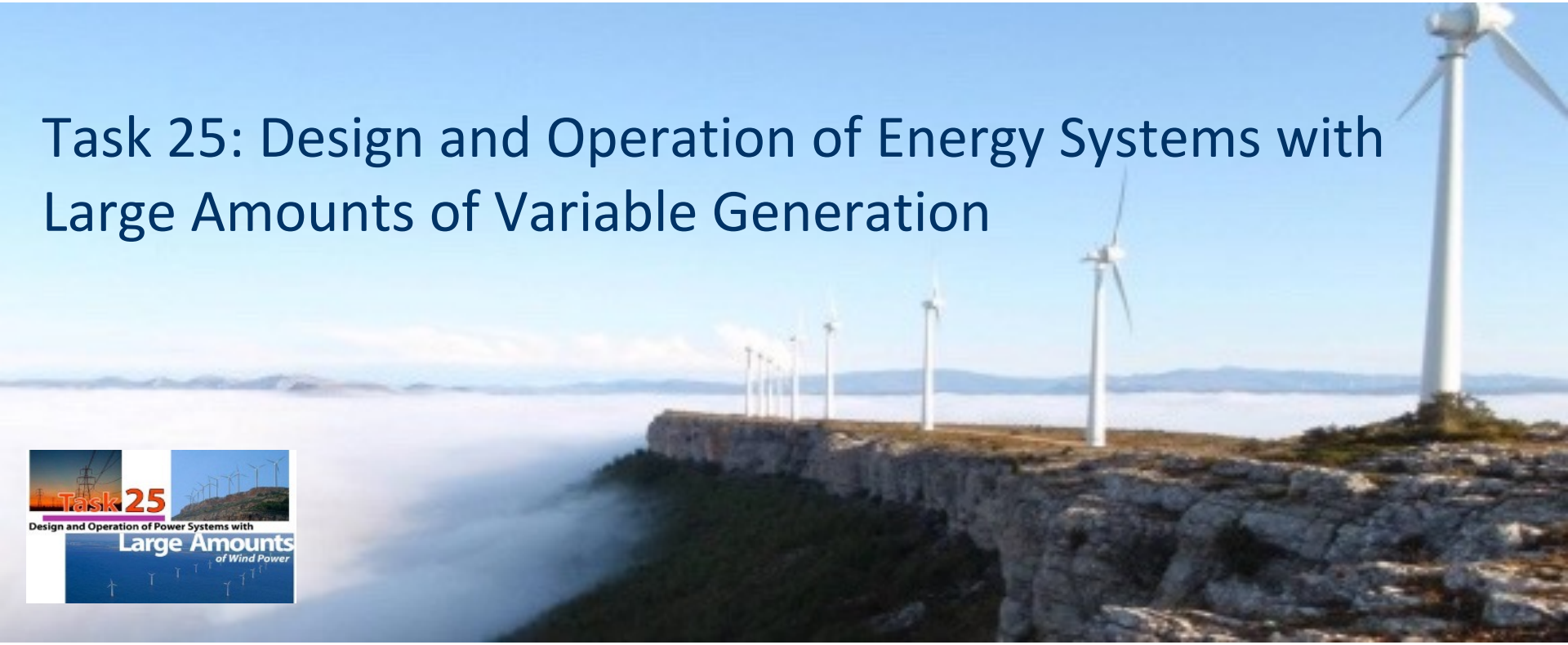
Flexibility for resilience



Task 25: Design and Operation of Energy Systems with Large Amounts of Variable Generation

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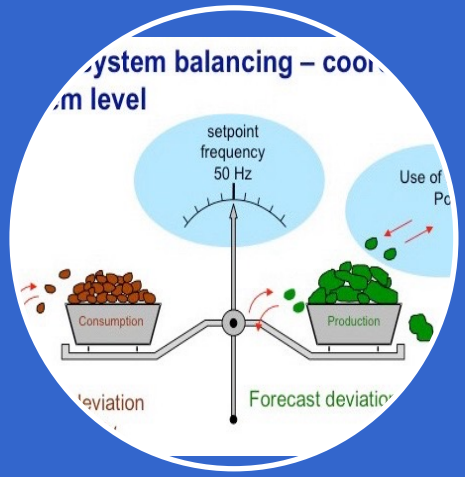
IEA ISGAN workshop,3 Oct, 2022

iea wind

Resilience – short and long term

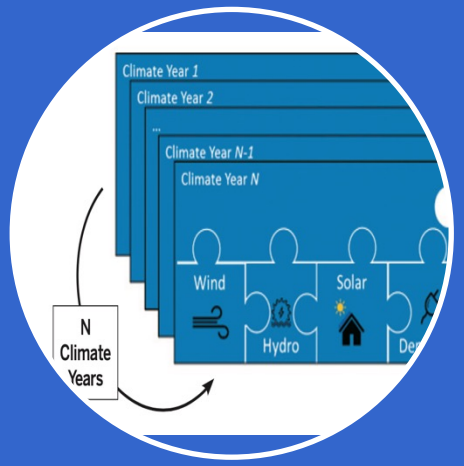
Stability

keep the power system resilient to disturbances and external events; control interactions



Short term balancing

demand and supply in balance – weather impacts like storms



Long term balancing

Increased weather dependency, extreme rare events of low wind, solar, hydro resource

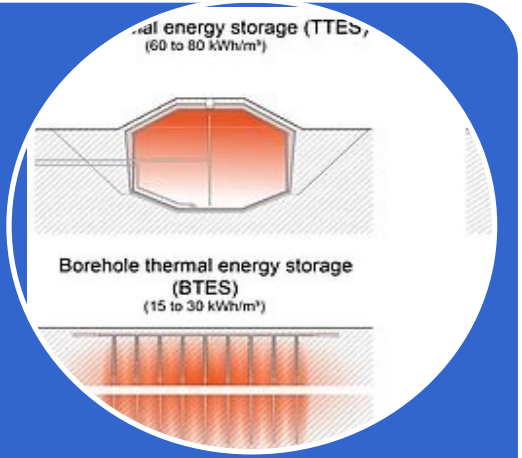
seconds, minutes, hours, seasons/years

Resilience solutions

Stability: How to operate non synchronous system?

How to get resilience from wind, solar, batteries? exploit wider flexibility of inverters, not just replicating synchronous machine features

Short term balancing: technology solutions are there (use demand, wind and solar and storage) - how to incentivise?



Long term balancing:

no more fixed load paradigm, optimise a combination of peakers, storage and demand side. How to incentivise smart sector coupling with all power2X storage options?

no mass
all brains

large and
fast markets

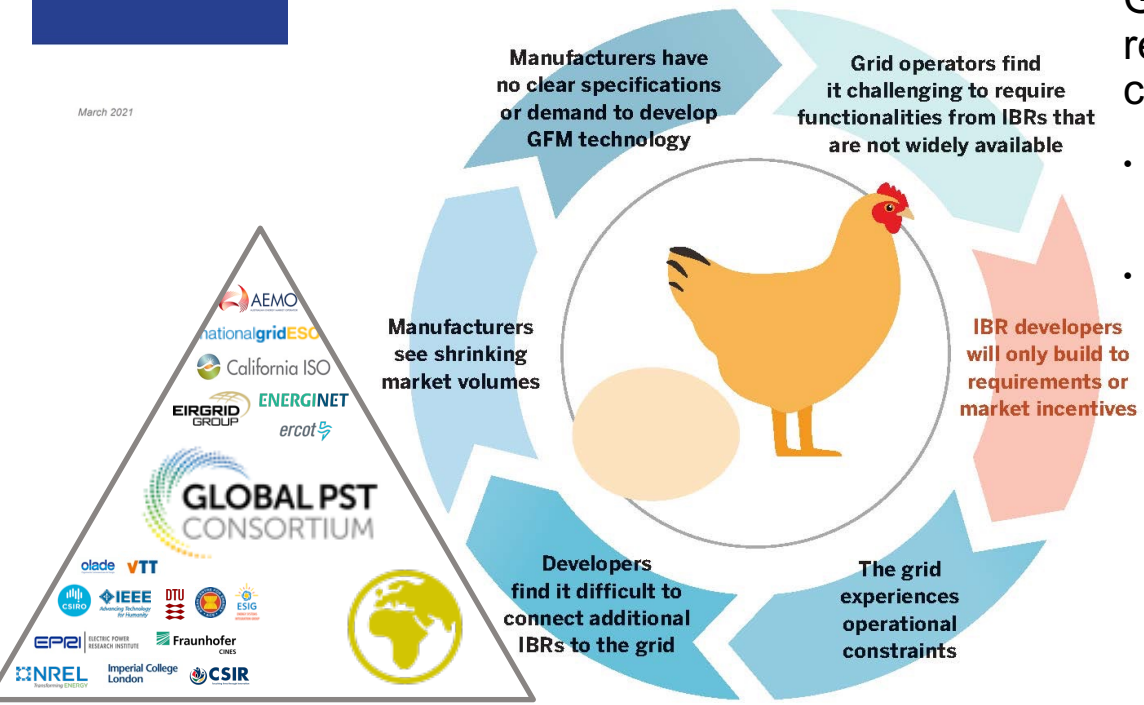
huge energy systems
power, heat, gas,…

More complexity and amount of data is exploding - digitalisation

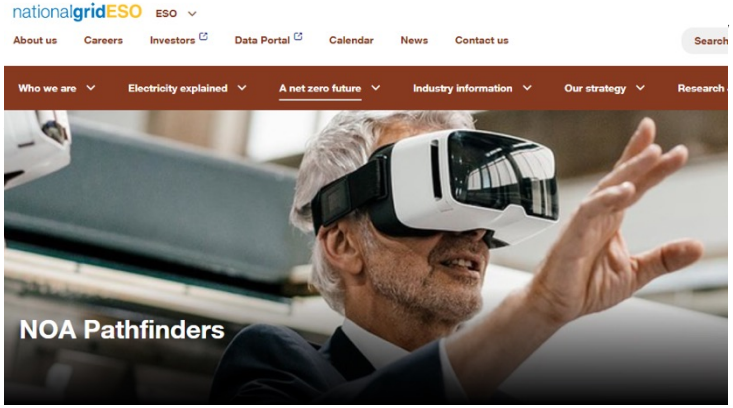
G-PST looking for reliability and resilience, new paradigms for system operation and planning

Power system operator focused view on challenges

- enough services to ensure reliability and resilience
- Research question 39: methods and tools necessary to incorporate resilience concepts and the ability to recover from adverse conditions in uncertain future states into planning



Current chicken and egg problem for IBR Grid forming: Which comes first, the requirement for a capability or the capability itself?

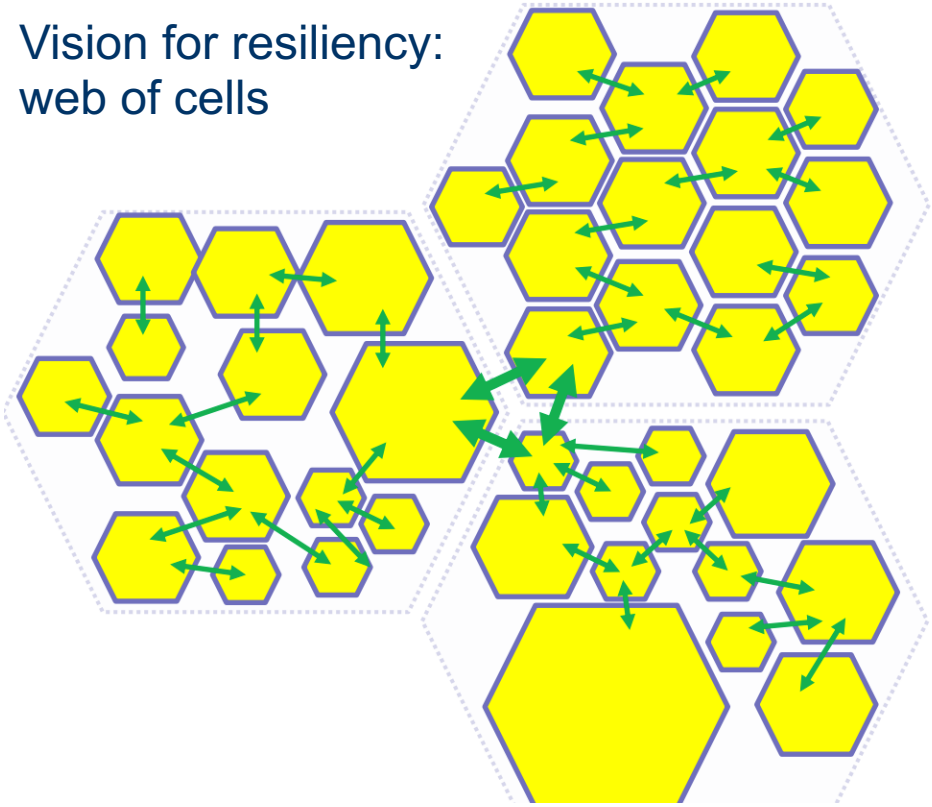


A tender process for new services needed in high-IBR power system, to gain experience and understanding of new technologies available to provide these services

Demand Response: energy transition is also load transition

- Smart grids and digitalization for short term flex: enabling distributed resources, prosumers. AI, HEMS, BEMS responding to local and system wide price signals
- P2X can offer also longer term flexibility: changing the fixed load paradigm LOLP

Vision for resiliency: web of cells



Vision: dispatch loads for available generation

Thank you!

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Operating Agent of IEA Wind Task 25 ”Design and operation of energy systems with large amounts of variable generation”

https://iea-wind.org/task25/

G-PST Pillar 5 lead “Open Source Tools and Data”

https://globalpst.org/