Green hydrogen production from thermal constraints

ENA Innovation Summit 2023

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Presenters

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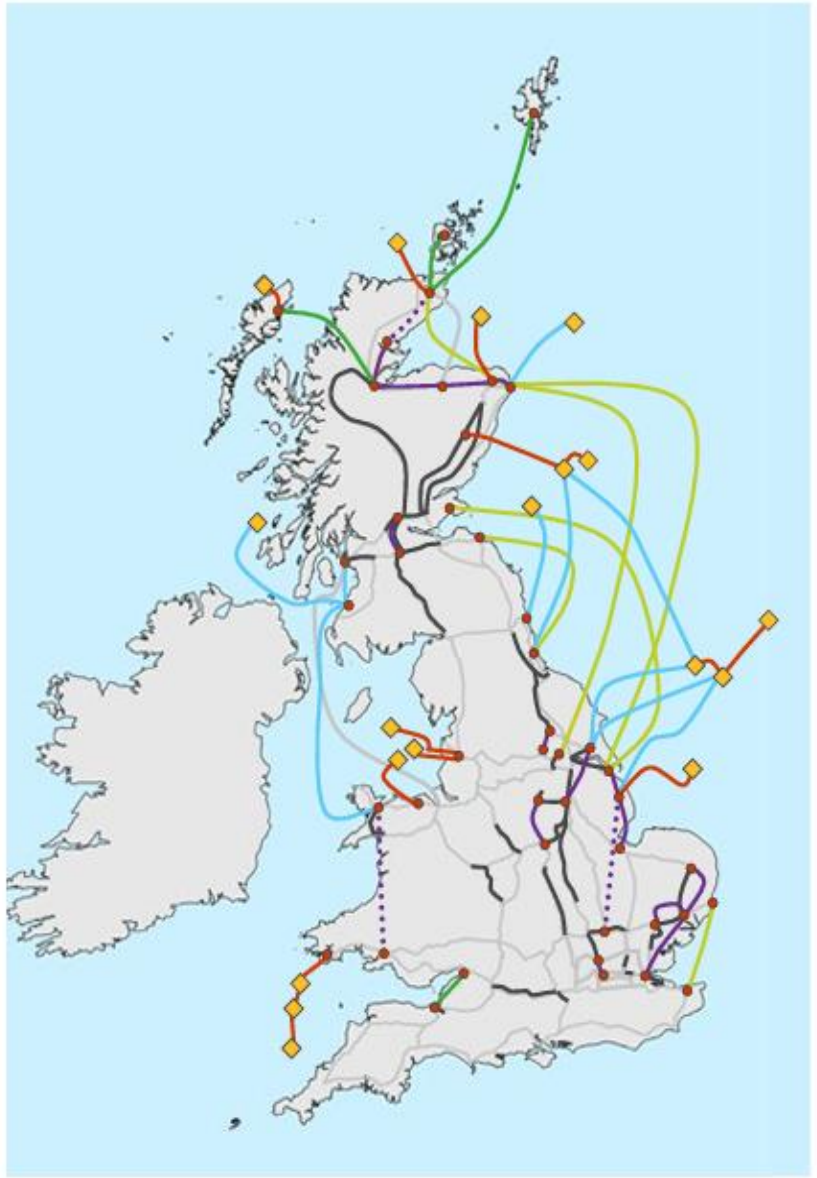
What is the Opportunity?

- GB thermal constraint costs forecasted to reach between **£500m to £3bn annually by 2030**

- Even after transmission reinforcements **substantial constraint costs still expected** in the future

- **Green hydrogen** production has potential to reduce these by using renewable sources that would otherwise be constrained off



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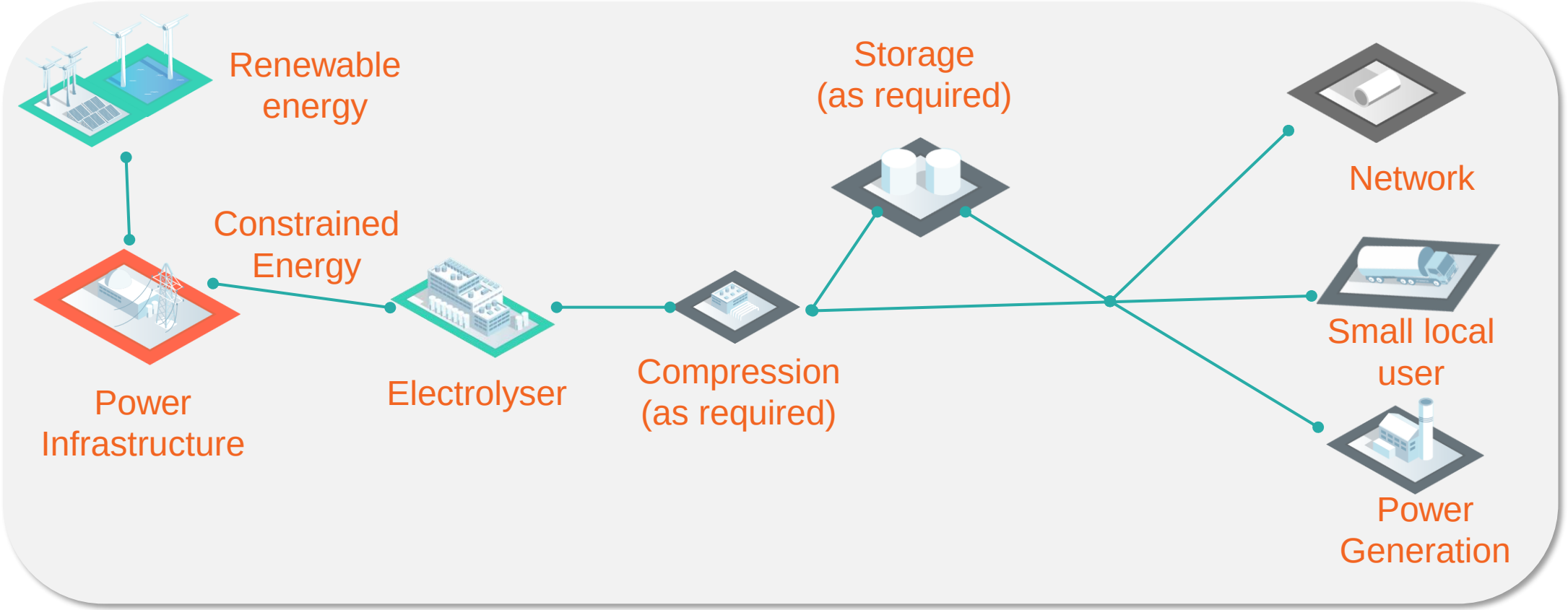
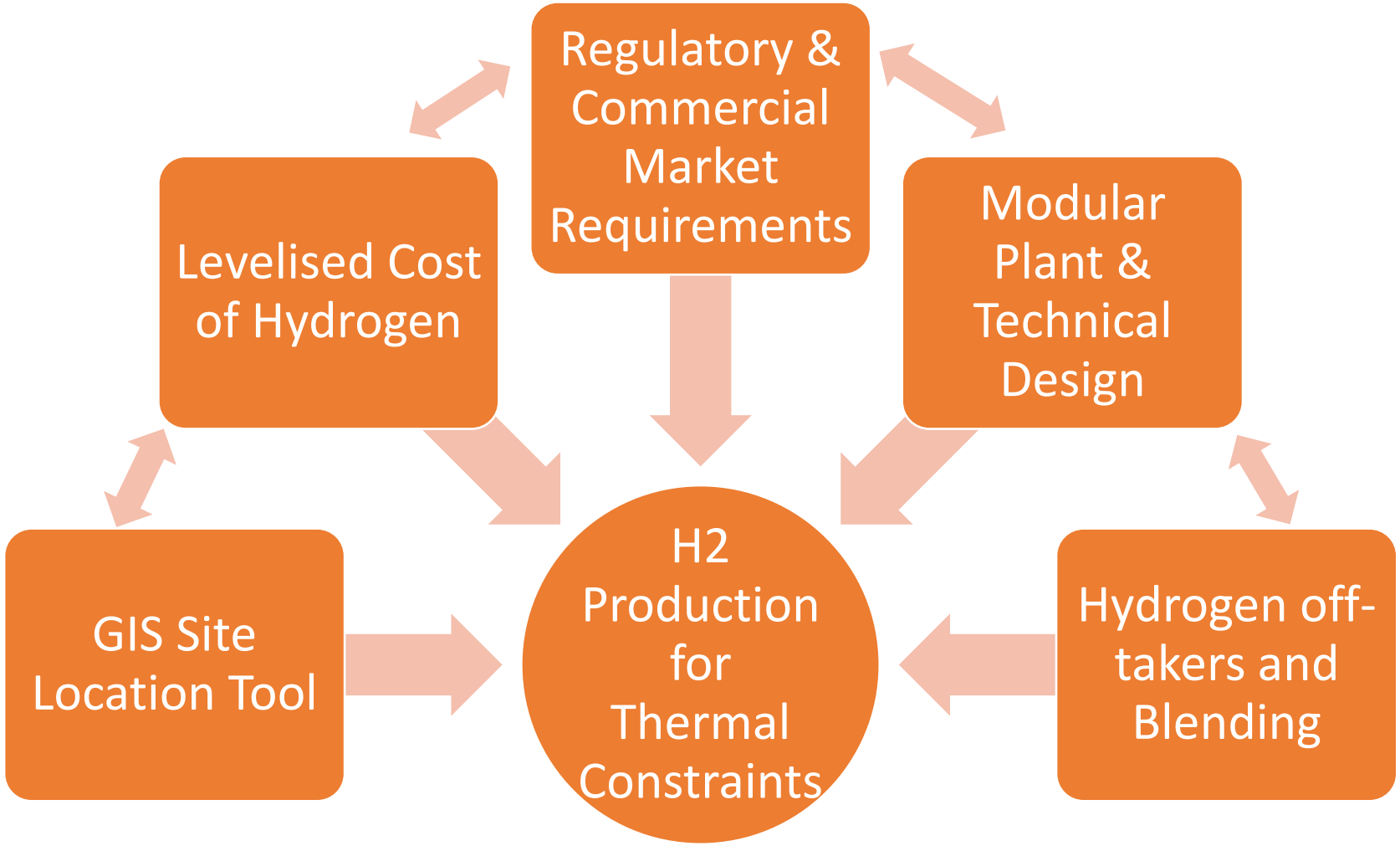
Interconnected Electricity and Gas Networks

How can green hydrogen use electricity from thermal constraints for the benefit of both networks?



What the project has looked at



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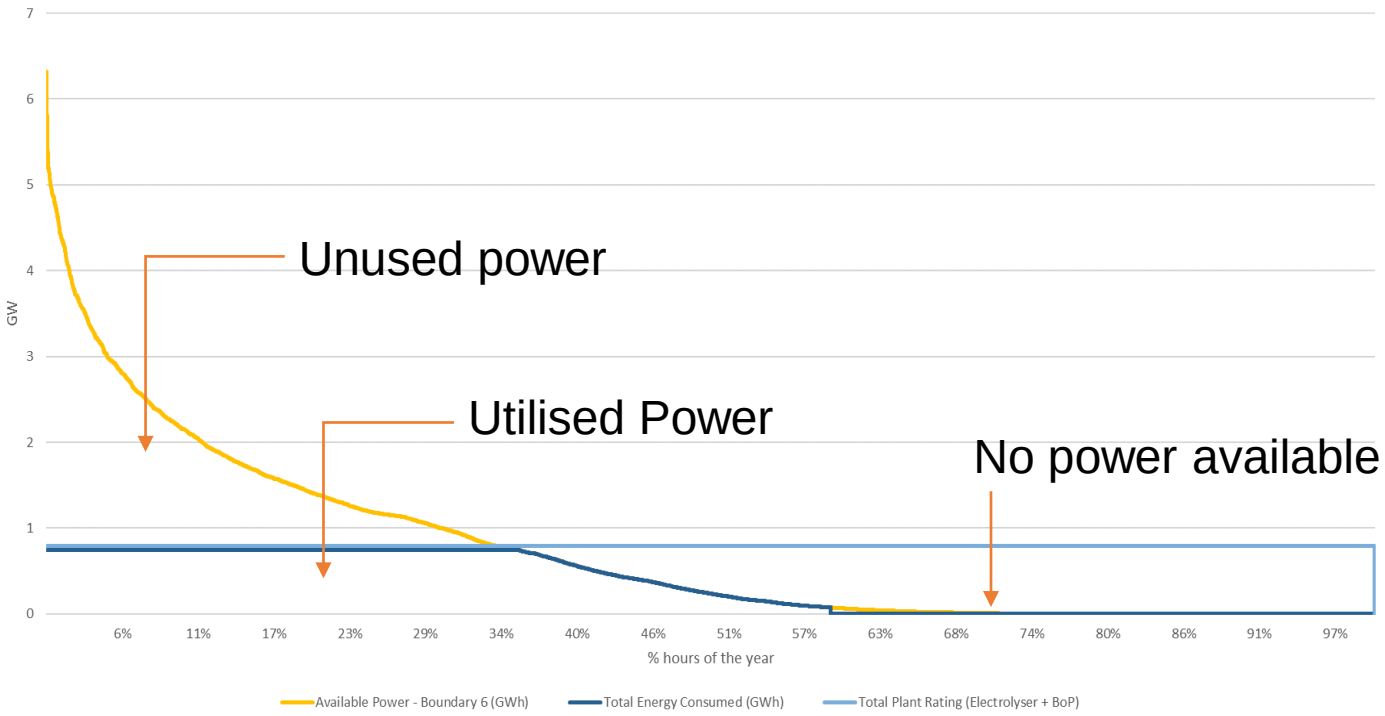
Findings - Economic Viability

Larger electrolyser can use **more constrained electricity**

but at the cost of a **lower utilisation** - the facility would be sat idle for a large period of the year

There is a **trade-off** between the benefit to the hydrogen producer and to the ESO

Boundary Flow 6 Load Duration Curve



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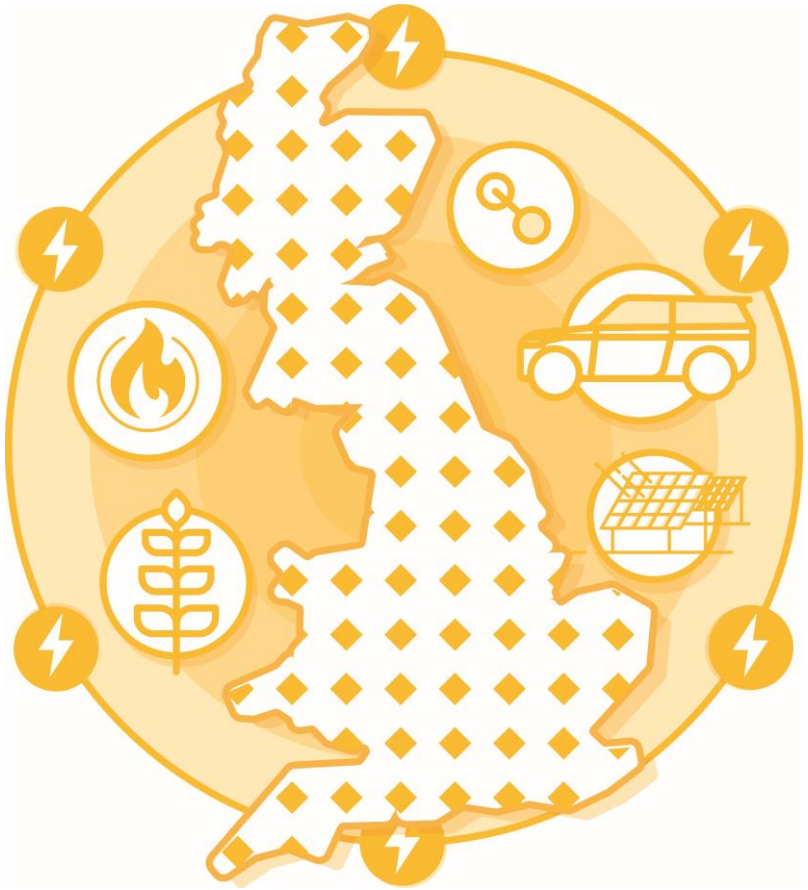
Findings - Downstream / Off-takers

- H2 production **profiles could be highly intermittent**
- May be **difficult for off-takers** who need a steady supply
- Storage needed to give a steady supply could come at a **significant cost**



Solutions:

- a flexible off-taker; and/or
- Alternative source of electricity allowing the electrolyser to be operational for longer

Findings - Hydrogen into the Gas Network

- **Preferable** to avoid need for storage
- **Injecting hydrogen** into the grid is a good option with the potentially varying production profile
- **Blending hydrogen** into the existing grid is a feasible option – dependent on location
- Blending percentage will **need to be managed**, at higher pressures (NTS and LTS) the blend percentage should be manageable

- In the longer-term **access to a 100% hydrogen network** where hydrogen can be injected as and when produced would be ideal

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Initial Conclusions and Next Steps

A large hydrogen facility running off *just* constrained electricity may struggle to be economically viable

Smaller units would have a higher utilisation rate when using only thermal constrained energy

Energy System Benefits - a benefit to offering constrained electricity to HPFs within constrained areas

Any HPF would benefit from constrained electricity as part of their energy supply mix

Next Steps:

Development of market mechanism that encourages HPF developers to locate in areas where there are high areas of constrained electricity

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Thank you for listening

Find out more on the ENA Smarter Networks portal, search:
‘Hydrogen Production
Thermal Constraints Management’

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Visit the ESO stand to find out more