LDES NODE

Long Duration Energy Storage for Network Optimisation, Decarbonisation, and Efficiency

Discovery Phase – Show & Tell

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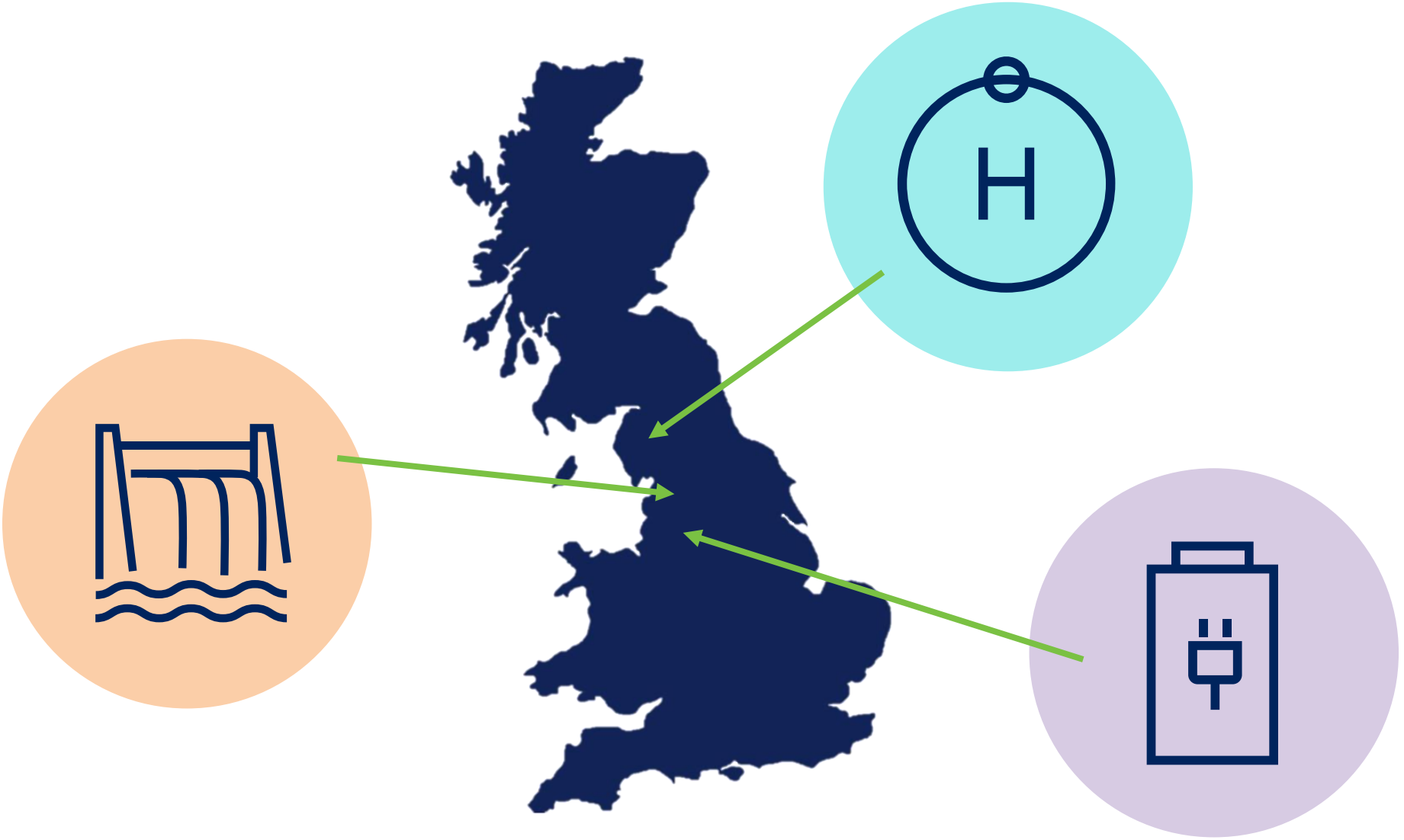
Where is the best place for long duration storage?

?



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Regional Use Cases & LDES Future Outcomes

Local Authorities
Feeds into Local Area Energy Plans (LAEPs)

LDES Technology Developers
Highlights optimal locations for LDES technology deployment

DNOs
Demand forecasting and load-balance modelling.

Future Outcomes

Assisting with alleviating local constraints

Maximising the output of renewable generation

Performing valuable stability and resilience grid services

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What do LDES technologies excel at?

Levelised Cost of Storage used to compare 9 different technologies - assess which was most cost effective for different use cases

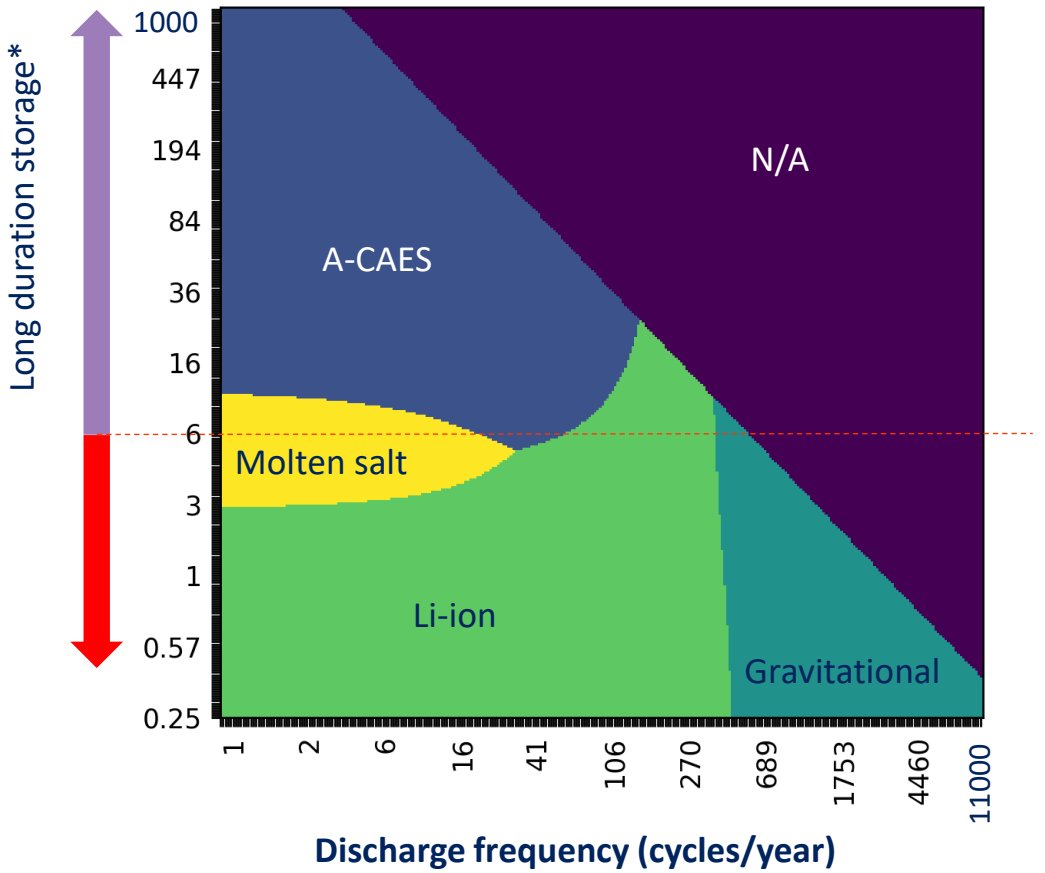
- **Lithium-Ion batteries** performed well for short duration storage and some longer duration use cases.
- **A-CAES** and **molten salt** performed best for longer duration, lower cycling frequency use cases.
- **Gravitational storage** technologies performed well for very high cycling use cases.

A-CAES requires suitable geology, so not suitable in all areas.

Where A-CAES cannot be deployed, **Hydrogen stored in a pressure vessel with a fuel cell** becomes competitive for longest duration storage use cases if no significant constraints on above ground storage

Thermal storage for **District Heating (DH)** also considered - energy storage cost compared to LDES technologies - can be an effective option where it can address storage need

N/A where duration * cycles > 4380 = half the hours in a year



* Although no strict definition on what constitutes long duration, DESNZ propose 6 hrs as the cutoff point in their latest consultation. In this analysis we have not used any cutoff point.

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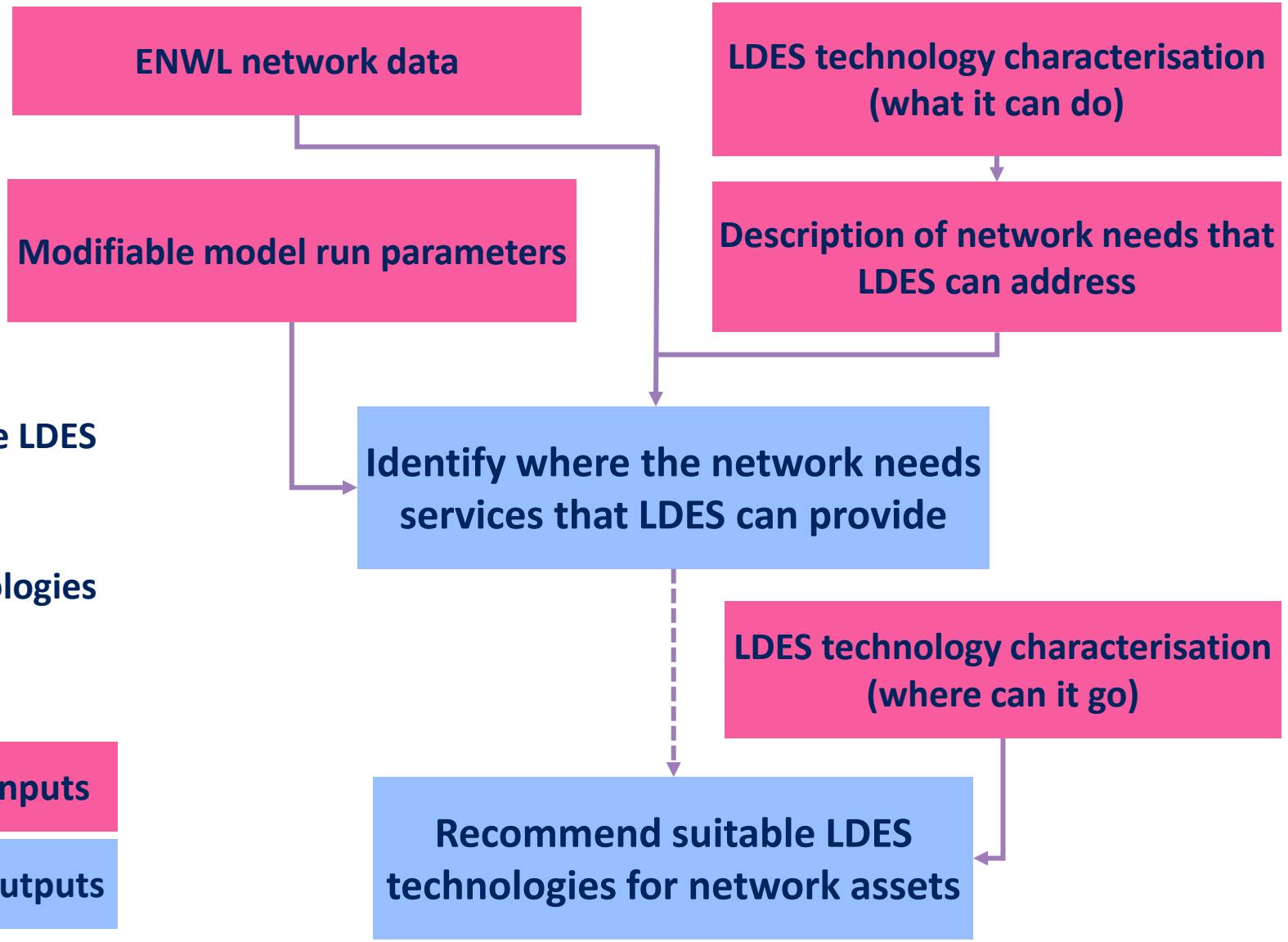
How do we know where to locate energy storage?

Characterised useful services that LDES can provide – highlighted technologies best place to deliver these services.

ENWL network data identified **which parts of network would benefit**.

Created model to **match most cost effective LDES technologies to network**

Provided **recommendations of LDES technologies tailored to individual network assets**.



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Results: Table and Map of which technologies and where

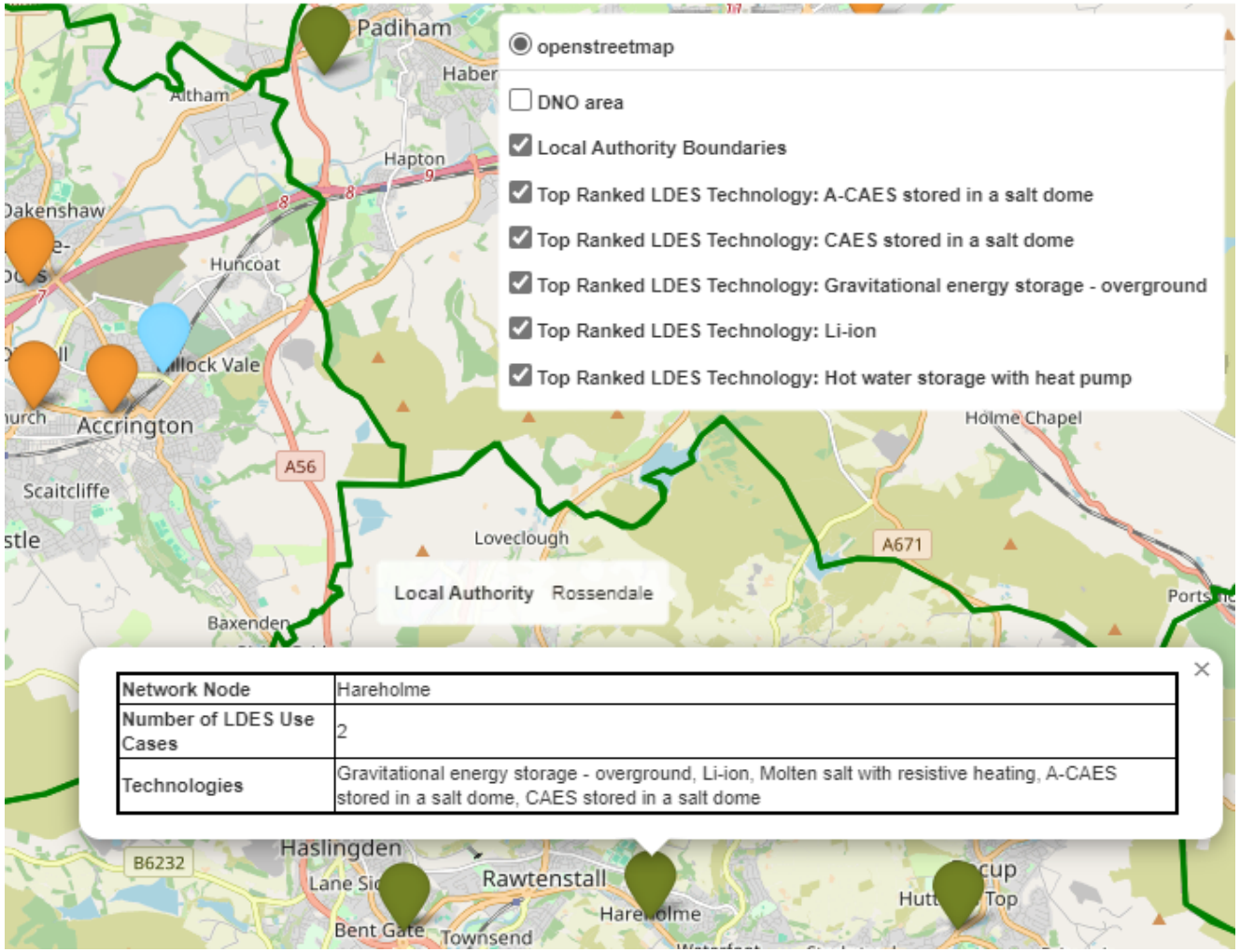
Outputs are available in table and map format:

- **Top-ranked LDES technology**
- Other relevant LDES technologies
- ENWL network use cases addressed
- Earliest year network requirements become “significant”
- Number of different network requirements (higher number means more need for LDES)

Map shows **ENWL nodes relative to Local Authority boundaries**, and allows analysis by most recommended technology and level of need.

Example screen shot of visual output

Network Nodes Filtered By Top Ranked LDES Technology



Key Learning

Levelised Cost of Storage can be used to compare LDES technologies.

LDES can offer some services more effectively than Li-ion batteries

Framework to use LDES data with a model of a DNO network

Methodology to identify where LDES can meet network needs.

Collated data needed for analysis and, using the model, produced locational LDES recommendations

Created outputs in a range of formats to make them accessible to a range of users, regardless of prior knowledge of LDES.

Visual outputs show how results relate to local authorities

Examined use cases with direct benefit to the local community
e.g. district heating

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Next Steps

Enhance characterisation of LDES technologies and use cases

Model more complexity in the network

Stakeholder Engagement

Incorporate forecasts of technology information

Increase sophistication of model optimisation method

Project outputs on ENWL website and Smarter Networks portal

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QUESTIONS & ANSWERS

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