

The PURE Project

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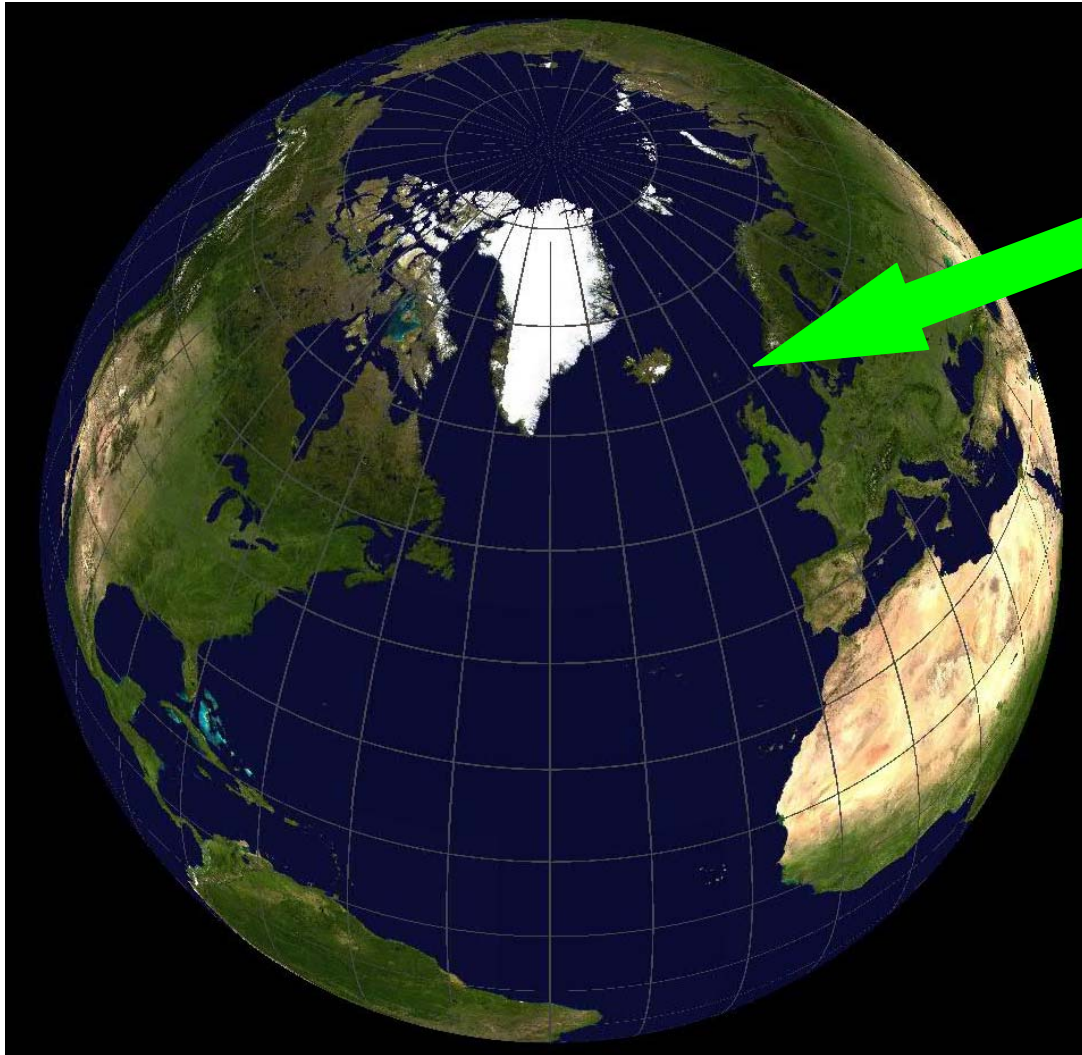
NAHA Annual Meeting
Wednesday 23rd April 2008



Content

- Where is the Project?
- What is the problem?
- The solution
- The Pure project
- Commercialisation & economics
- Conclusions

Where is the PURE Project located?

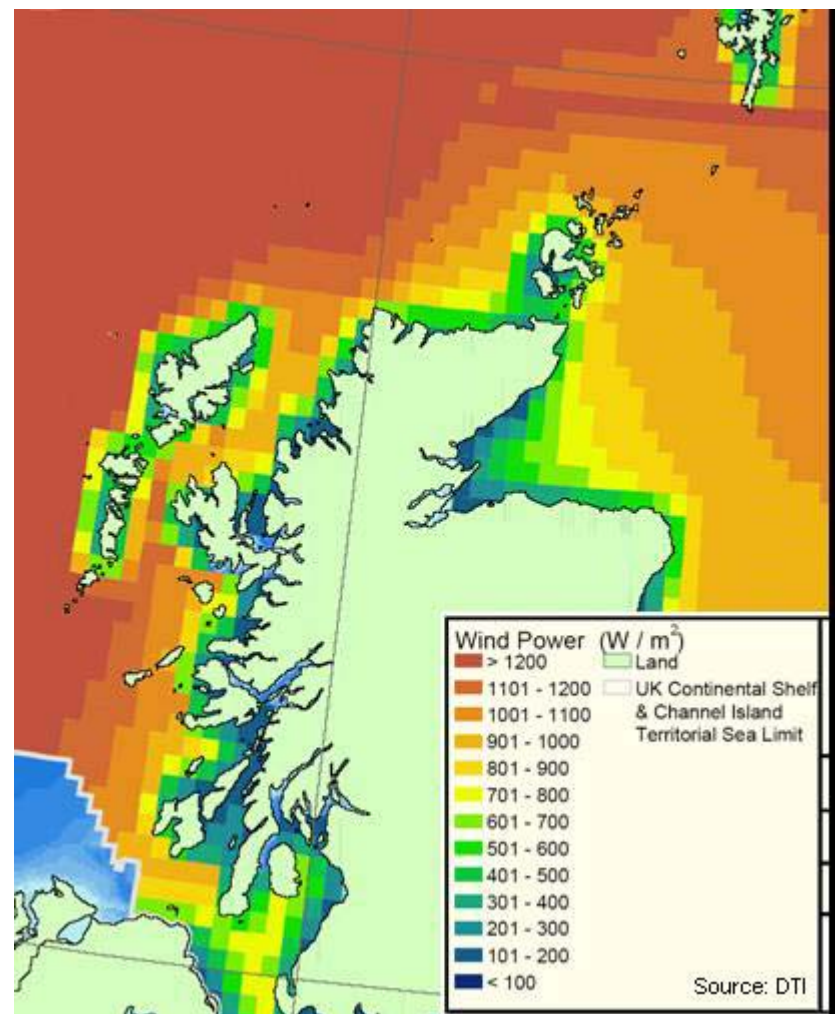


Shetland Islands



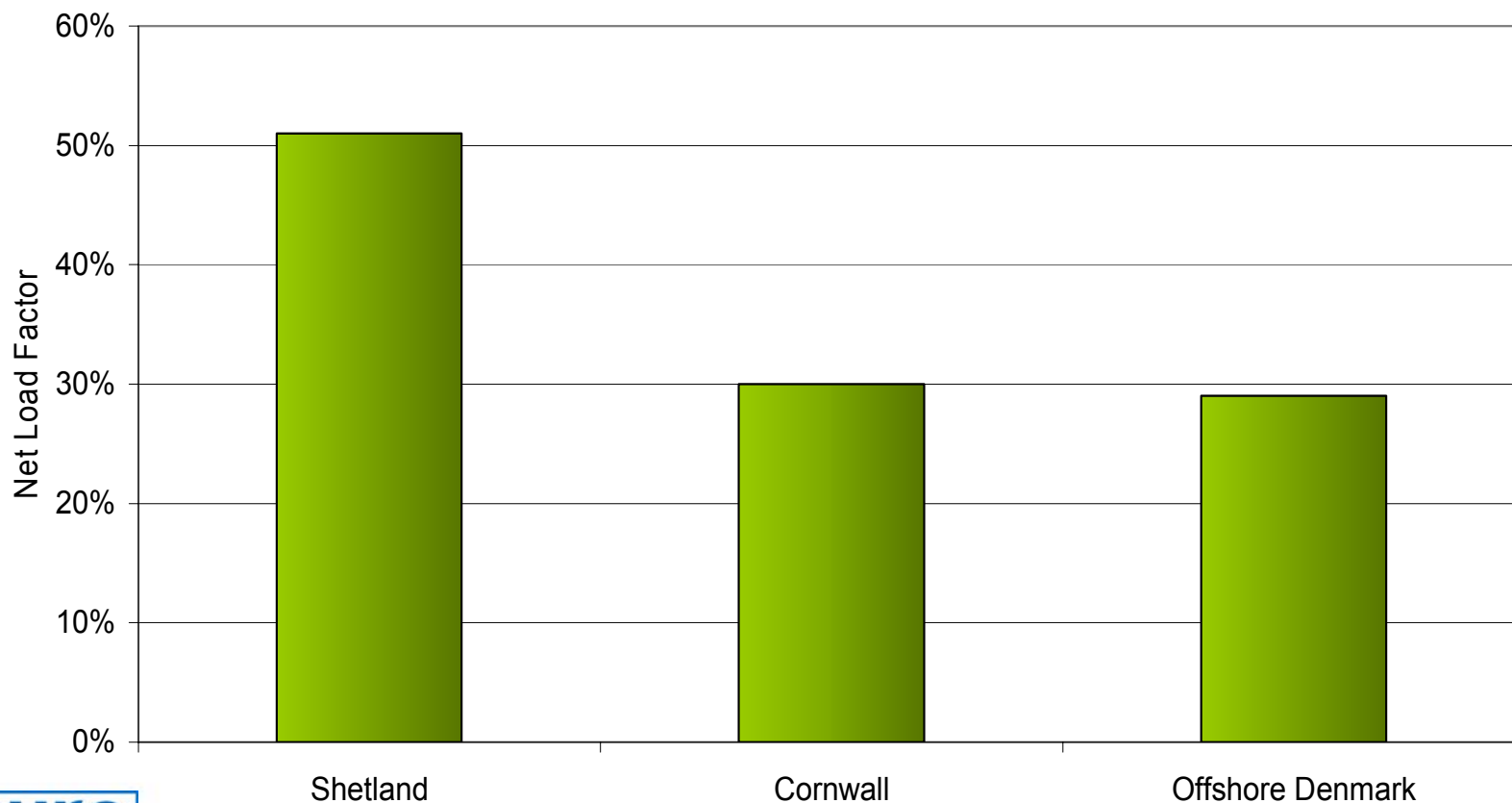
What is the problem?

Large wind energy resources



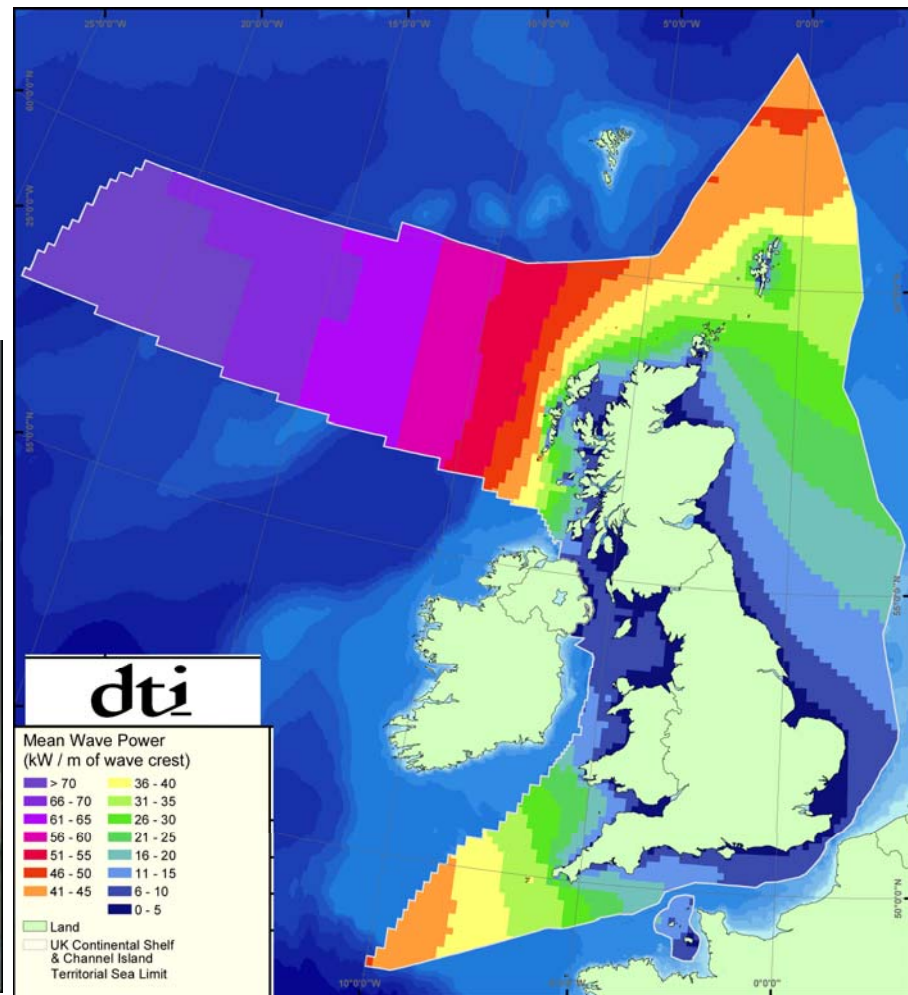
Wind resources in Shetland

Garrad Hassan and Partners Ltd.
Wind Farm Net Load Factor Comparison



What is the problem?

Large wave energy resources



The problem

- Weak grid infrastructure
- Grid-locked Island Energy Network
- Lack of availability of grid connections
- High cost of new grid connections
- Cannot connect renewable energy
- Intermittency of renewable energy
- High transmission & distribution charges
- Low efficiency of transmission & distribution
- 93% of power imported
- \$2.4 per litre of petrol
- No way we can plant sugar cane or other crops
- Fuel poverty

The solution?

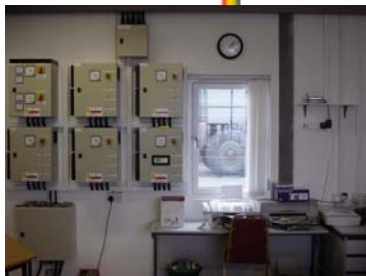
- Local production of energy for local consumption
- How?
 - By using wind & wave resources
 - By storing the excess energy as H2 to cancel intermittency & unlock the grid
 - By using H2 in local applications including:
 - Combined Heat & Power (CHP)
 - H2 vehicles

What is the PURE Project?

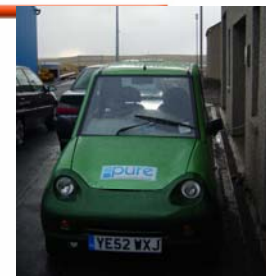


**Electric
Heating**

**DC
AC**



Heating



Commercialisation & economics

Challenges

- There is still too much risk for the customers as the technology is not yet mature
- The current legislation and standards are lacking to cope with the development of the hydrogen industry
- There is not enough incentive when compared to the other sustainable technologies
- The high technical and financial risk lead to inaction.

Commercialisation & economics

Opportunities

- There are more and more customers
 - More demand means stronger supply chain
- Codes & standards are being developed
- There is no need for a 'hydrogen economy' in order to make a significant contribution to sustainable energy
- There is a need for more focus on projects that have mass manufacture potential.

Commercialisation & economics

Economical benefits for Unst/Pure community

- H2 has helped to unlock Shetland's grid problem
- Shetland has now the tools to become a non energy imported island
 - Local production for local consumption concept being implemented
 - Best EE Policy
- Implications for Shetland
 - Fuel budget can be used for further developing H2 projects
 - More budget means more H2 commercialisation opportunities

PURE Project Social & Economic development

- The PURE project has contributed to the development of the renewable energy economy of the Shetland Islands & UK
- Community organisation identified a need for the island to become involved in Energy
- Based on the lessons learnt, the PURE project team formed the Pure Energy™ Centre

How does the PURE Project share the lessons learned?

- Created the World only dedicated Renewable Hydrogen training courses
- Provides consultancy services - based on experience
- Supplies Renewable Hydrogen Systems
- Contracts R&D Renewable Hydrogen technology





The Pure Energy™ Centre in action

- Top expert visitors to the Shetland's Isles
- Inward migration (1 French, 2 Greeks, 1 Italian)
- The PEC Team have published several technical and academic papers – 7 this year

International Energy Agency - 2006



QinetiQ Chairman & Brunel University Director - 2006



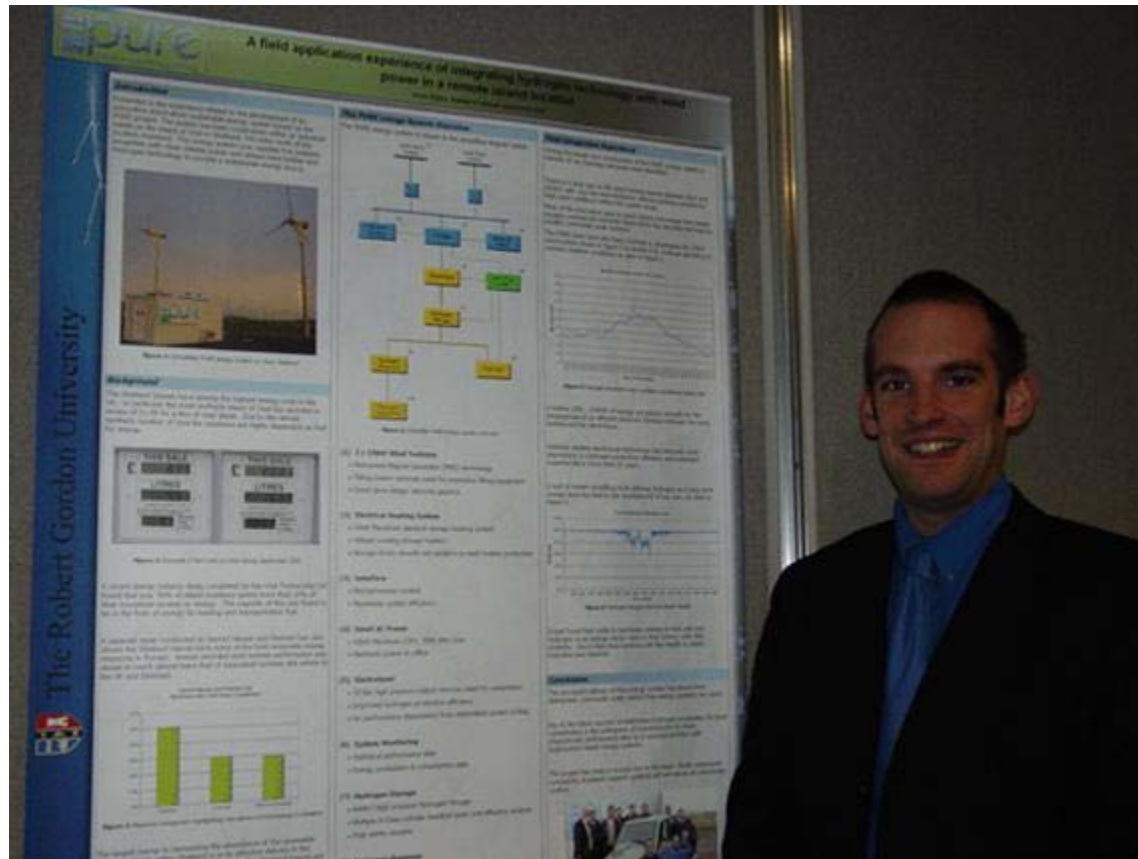
Pure achievements - 2003



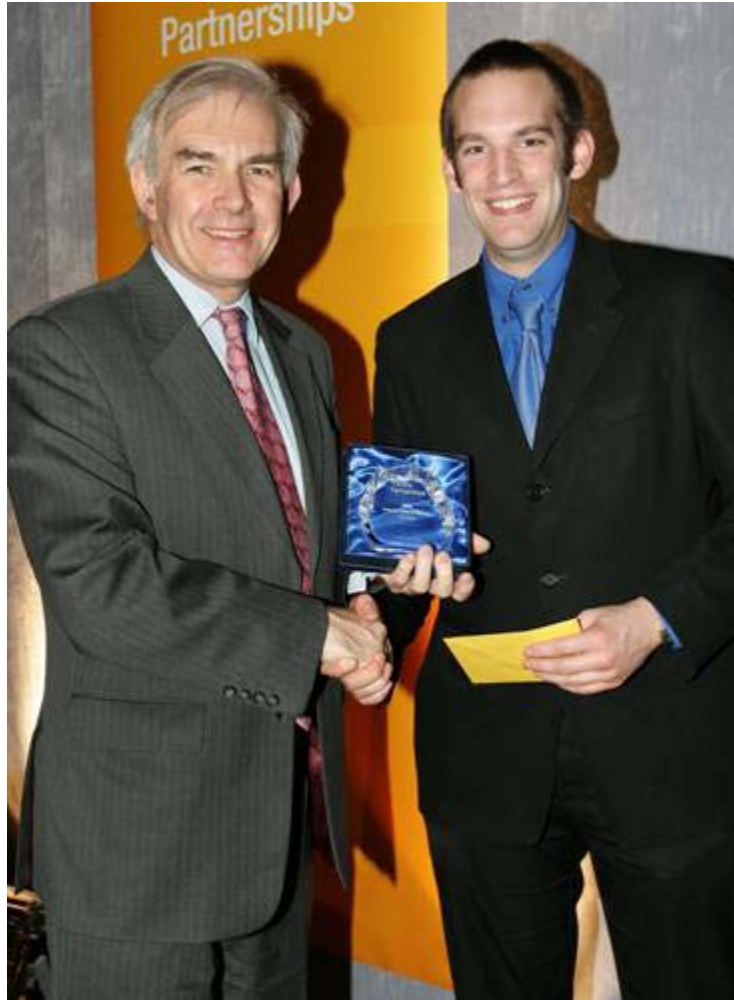
Pure achievements - 2004



Pure achievements - 2005



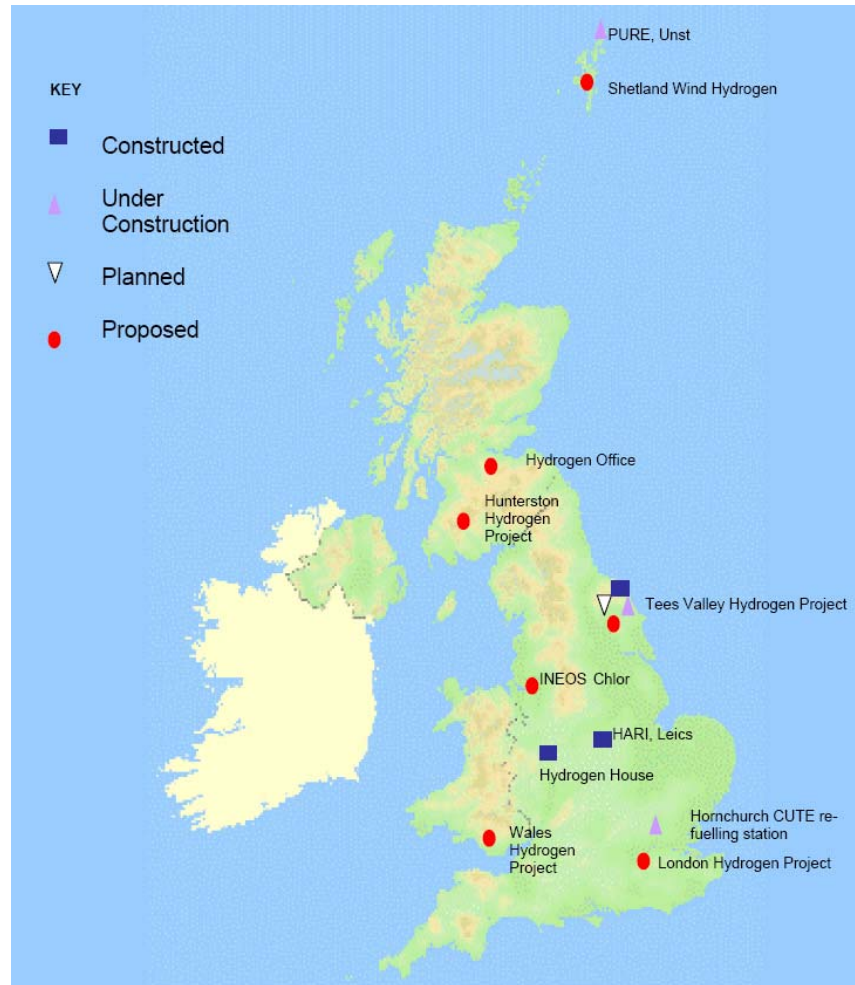
Pure achievements - 2006



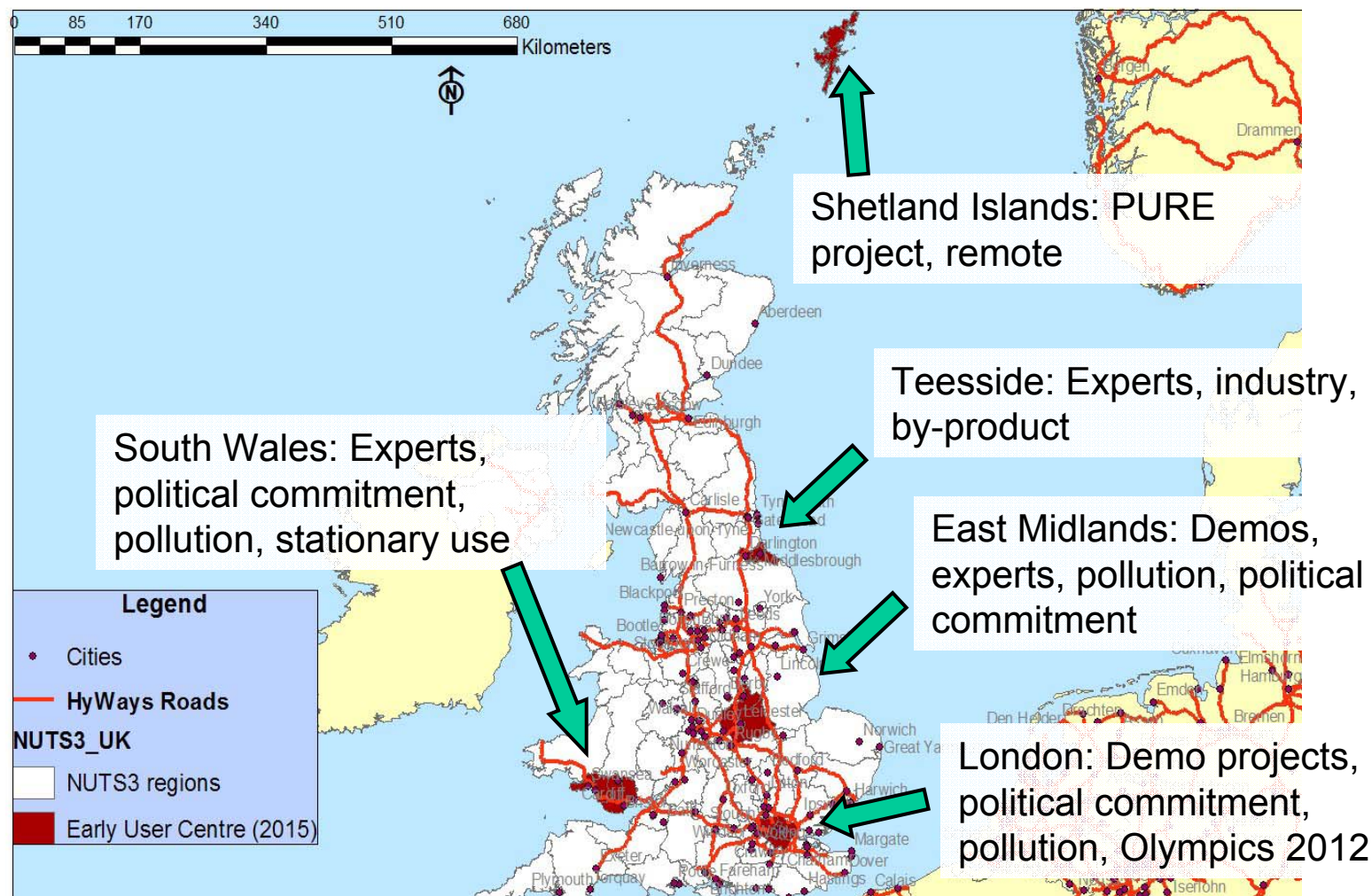
How much did the PURE project cost?

£500,000 ~ \$1m

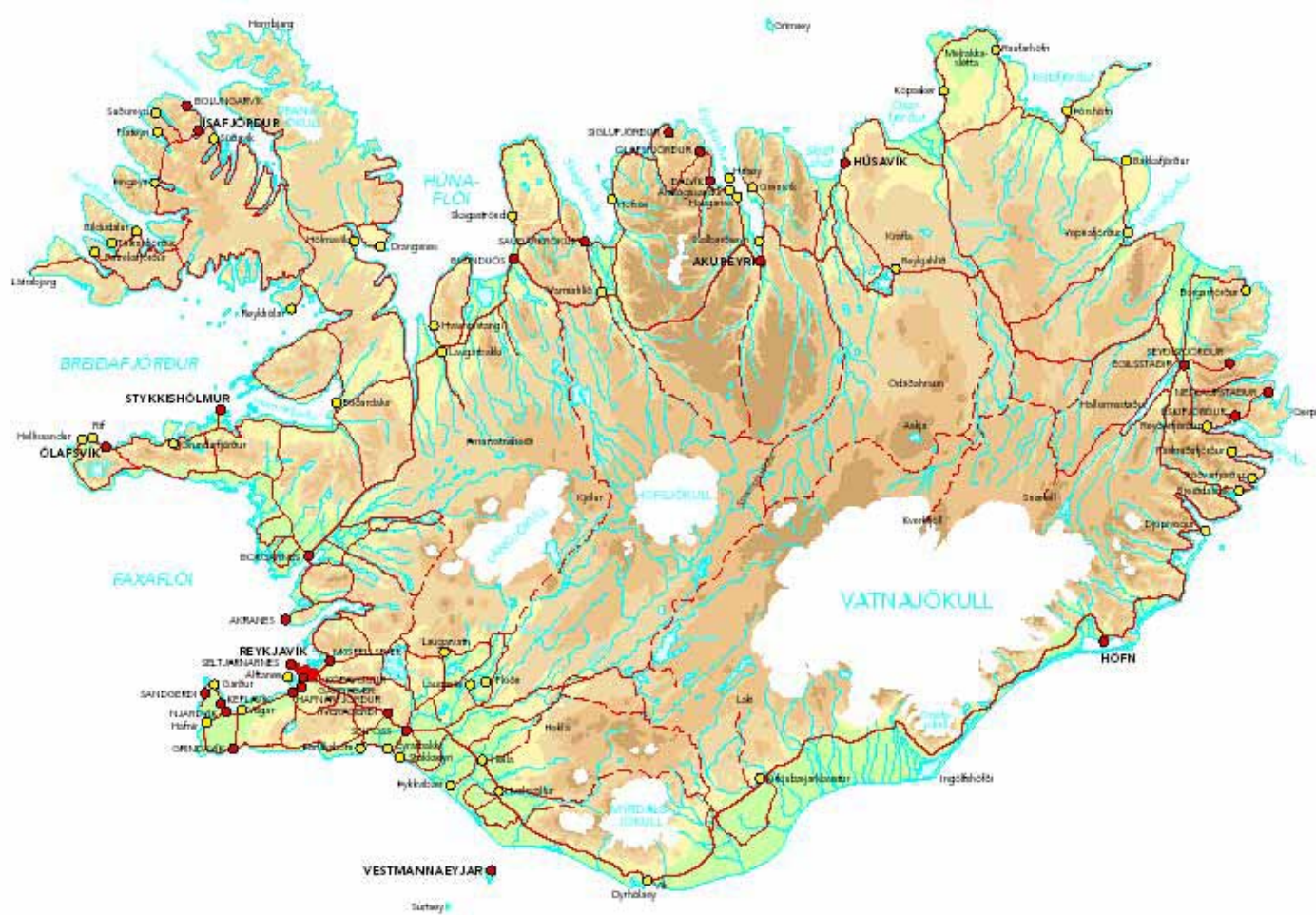
What can \$1m can do for you?



What can \$1m do for you?



What can H2 do for you?



Pure Energy™ Centre Involvements

- H₂ ICE
- Yorkshire Forward Hydrogen Mini-Grid
- H₂ SEED
- H₂ FC CHP
- H₂ LCC
- H₂ BBQ
- Off-grid houses, etc.

So why H2?



So why H2?



So why H2?



Conclusions

- H2 technologies can benefit remote & dense communities
- H2 can unlock the grid
- H2 can provide a part of the answer to fuel poverty
- H2 commercialisation will take place if we develop project with mass manufacture potential

Acknowledgements

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- Sue Kearns (Scottish Government)
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- UKHA
- Comhairle Nan Eilan (CnEs)

Questions?

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Let's do itTM!

Pedda reddast

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