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Emerging Niches and H2 Futures

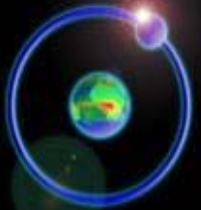
***Perspectives from the work of the UK Sustainable
Hydrogen Energy Consortium***

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www.psi.org.uk

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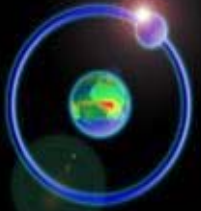
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UK Sustainable Hydrogen Energy Consortium (UKSHEC)

- **UKSHEC is a 4 year (2003-07) £3.5M UK Research Council funded initiative**
- **8 leading research centres and the GLA**
- **Focus on science and engineering of H₂ generation and storage**
- **Plus programme of socio-economic and policy research undertaken by PSI and University of Salford**



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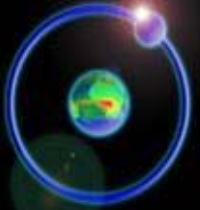
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Objectives of Socio-Economic and Policy Research

- Delineate alternative configurations of a **Sustainable Hydrogen Energy Economy**, within a wider global context and realistic timescale
- Identify plausible **pathways and route-maps** to these possible futures, whilst identifying interim technological solutions and milestones
- Identify the **economic, institutional and wider social conditions** under which these transitions might take place
- Identify **barriers** to a hydrogen future, and **policy measures** which might overcome these



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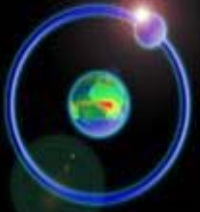
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Focus of Presentation

- **Initial findings from three regional UK case studies of emerging niches**
(Hodson/Marvin)
 - **Teeside (N.E. England)**
 - **London**
 - **Wales**

- **Insights from extensive review of H2 futures literature** (McDowall/Eames)



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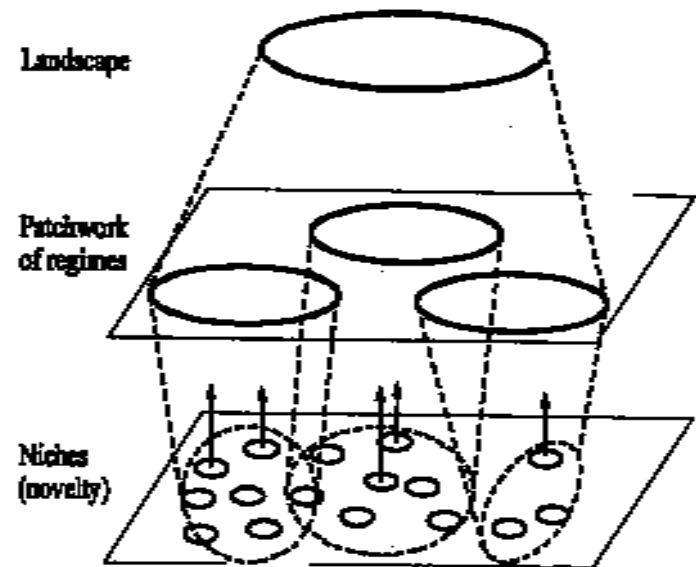
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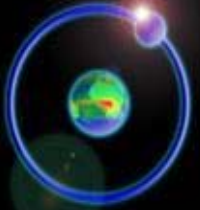


Socio-Technical Niches

Three aspects of niches (Geels, 2002)

- Promises and expectations
- Learning processes
- Network formation





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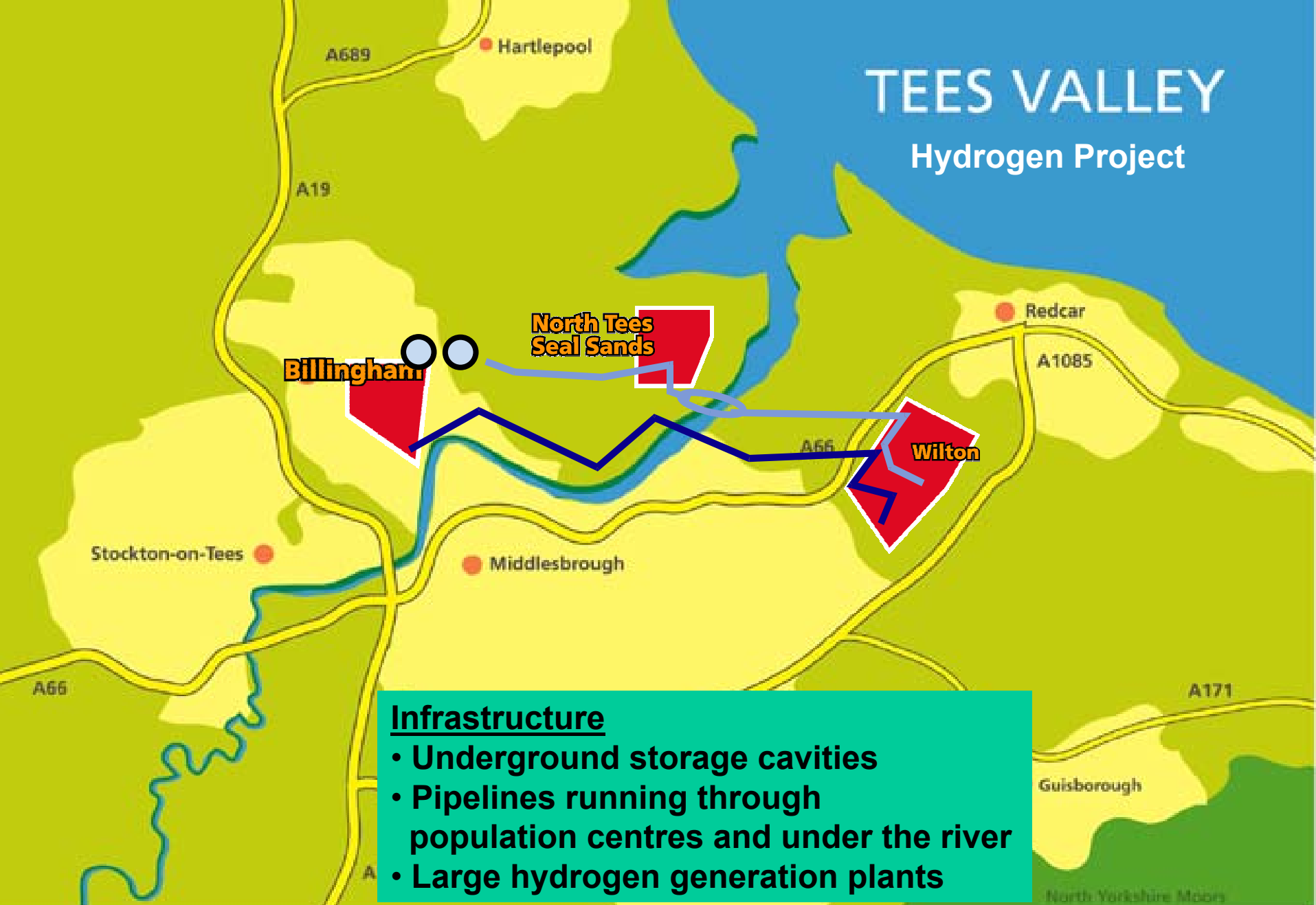


Case Study Questions

- What expectations are there of the hydrogen economy in each context?
- How are these expectations ‘realised’ and how are relationships between the system and niches understood?
- What is ‘generalisable’ from the regional and sub-regional contexts (to where and on what basis)?

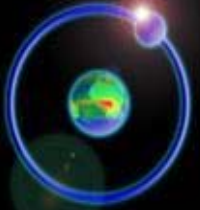
TEES VALLEY

Hydrogen Project



Infrastructure

- Underground storage cavities
- Pipelines running through population centres and under the river
- Large hydrogen generation plants



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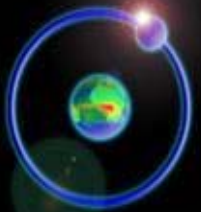
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The Teesside Context

- Tees Valley Hydrogen Partnership established with local government funding for industrial regeneration
- Network ‘controller’ (Huntsman) functions as industrial concern not a utility
- The importance of both ‘know-how’ and local ‘know who’ (the ‘village fete’).
- ‘Transferability’ of hydrogen technologies - hardware and software - (e.g. from chemical sector to school)
- Historical processes of ‘conditioning’ local population



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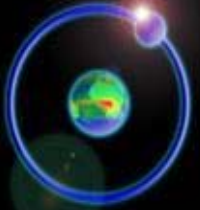
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Teesside - The 'Experimental Platform'

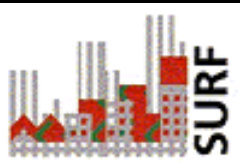
- 'We have been saying to DTI...Teesside can provide a national scale experimental platform. So come and play around and do it here ...we have the perfect Chemistry and Meccanno set to play around with until we decide what we want'.



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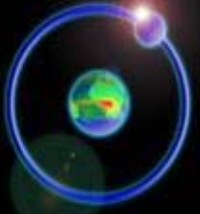
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Initial Case Study Findings (1)

- **Hydrogen economy looks different in a variety of spatial contexts:**
 - Teesside – Job creation and economic competitiveness in post-industrial sub-region
 - London – World city, international competitiveness, ‘race’, first mover
 - Wales – Post-devolution display of entrepreneurialism ‘rolling out’ Wales-wide?

- **Aspects that are seen as particular to each context:**
 - Teesside – Historically contingent processes for reengineering technologies, village fete, public acceptability, Meccanno Set
 - London – Historically contingent processes are missing from niche development.
 - Wales – The ‘Journey’ – drawing together and aligning a wide array of interests across the whole of Wales



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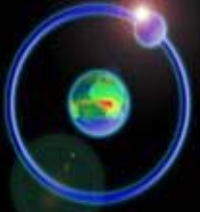
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Initial Case Study Findings (2)

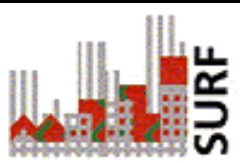
- Aspects that are seen as ‘generalisable’ from contexts:
 - Teesside – ‘Experimental Platform’
 - London – Lessons from ‘real world’ experiences of pathways
 - Wales – Representation of Wales’ new confidence; entrepreneurial Wales?



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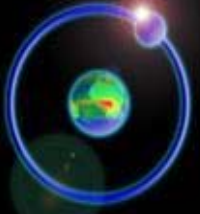
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Hydrogen Futures

- **Over 40 - mostly European and US Hydrogen futures studies reviewed - with aim of informing UKSHEC's own scenario building work**

- **Major drivers**
 - **Climate change**
 - **Air pollution**
 - **Energy security**
 - **Competitiveness**



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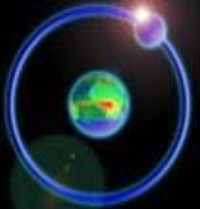
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Hydrogen Futures

- Many studies have strong focus on improving performance and costs of individual H₂ technologies
- Others see environmental awareness and political will as critical
- Hydrogen economy emerges only slowly or not at all under BAU scenarios
- Importance of establishing niches and demonstration projects recognised



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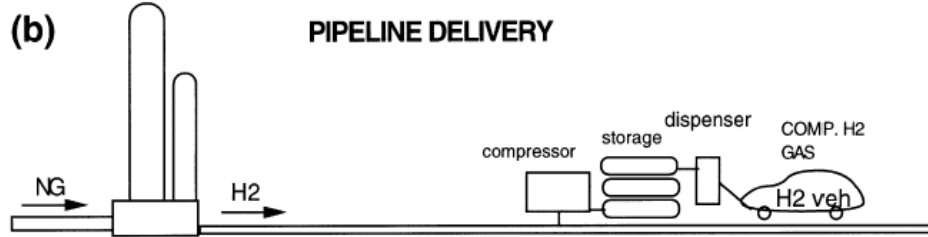
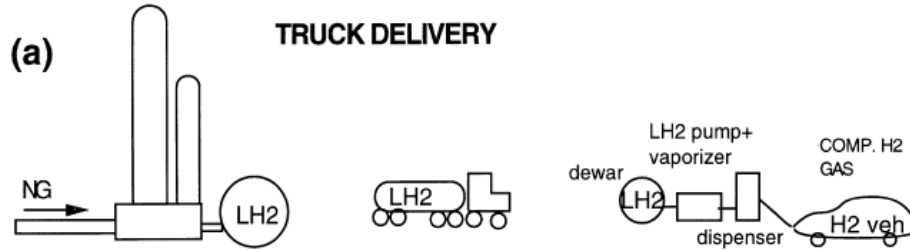
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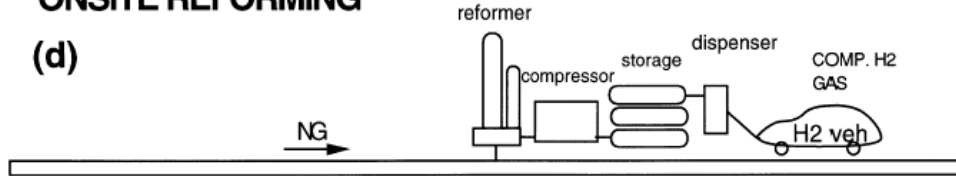
Insights from H2 futures literature

There are multiple and contested hydrogen futures

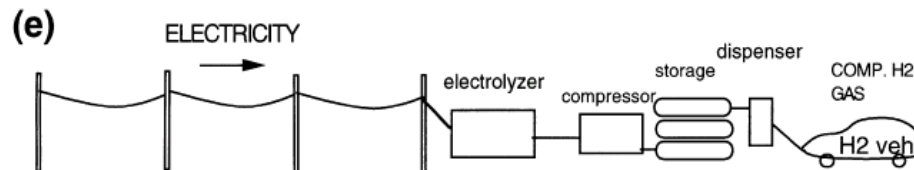
CENTRALIZED REFORMING

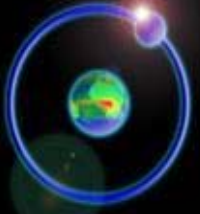


ONSITE REFORMING



ONSITE ELECTROLYSIS





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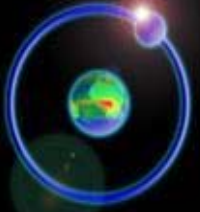
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Insights from H2 futures literature

- Within narrative of ‘a sustainable hydrogen economy’ many futures are possible - everyone from Greenpeace to General Motors can sign up
- Literature largely a-theoretical
- Often rather uncritically pro-hydrogen
- Top-down ‘landscape’ view of major drivers predominates (*c.f.* importance of local drivers in case studies)
- Few studies provide comparison of hydrogen with other possible energy futures



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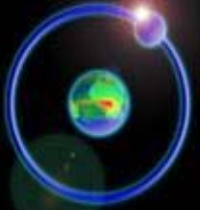
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Insights for Regional Strategies...

- **Meta-narrative of Hydrogen economy offers universal appeal**
- **But attempts to make visions concrete may result in (re-)emergence of conflicts**
- **Need for greater attention to importance of local contingencies and circumstances**
- **Focus on learning processes and what it is that is transferable from early regional developments**



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Next steps for UK-SHEC Scenarios

- Normative ‘backcasting’ approach
- Stakeholder ‘visioning’ workshop (September 04)
- Scenario writing - drawing upon insights from STS and technological transitions literature
- Multi-criteria sustainability appraisal of scenarios
- Pathway analysis and road-mapping