Prepar-H2

Preparing socio and economic evaluations of future H2 lighthouse projects

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ICELANDIC NEW ENERGY

OVERVIEW

- The goals of PreparH2
- The organisation
- The work procedures
- Outcomes
- Recommendations
- Food for thought

The goals of PreparH2

- To integrate findings from national H2 projects into HFC JTI‘s useful lessons and underpin their evaluation of lighthouse projects
- To find gaps in socio-economic reserach in EU projects
- To collect experiences from staff along the fuel chain in various applications
- To analyse the financial aspects of H2 useagae based on experience rather than theories
- To construct a list of recommendations (handbook) based on successess and failures in older projects.

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Partners:

- Icelandic New Energy - coordinator - using Icelandic experience from H2 demo´s specifically the ECTOS (HyFLEET:CUTE) and SMART H2
- SINTEF in Norway using info from HyNOR and SHHP
- TUB (Technological University in Berlin) in Germany using info from HyFLEET:CUTE and CEP
- Hydrogen Link in Denmark using info from Danish demos and SHHP
- ENEA in Italy using demonstrations taking place in Mantova

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The ongoing activity in the different regions include:

- A few hydrogen refuelling stations, trucked in, reformer station´s & electrolysis stations
- +30 cars, (thereof 15 Prius)
- APU system on a seagoing ship
- FC buses
- Stationary fuel cells

Salomon fishing using an FCEV

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- Collecting experiences:
  - Mapping representatives acording to sectors and role
  - Selecting target people for interviews, formimng questionairs
  - Interviewees: 38
- Overview of social surveys and social research according to key settings
- Economic aspects of using hydrogen
  - Studies
  - Prerequisits according to first experience
  - Forecasts

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Cross-cutting issues – Social aspects

- Already no. of studies have been performed
- The project collected an overview and created a social matrix
  - **Identifying key social issues to be addressed**
  - **With interviews the goal was to find gaps – if any**
- The outcome of the matrix identifies all key social issues addressed by former studies and those raised in the Prepar-H2 project

Author, Date and Geography	Size and description of sample	Goals	Integrated criteria	Vehicle criteria		HRS criteria	
			Environment	Safety	Performance	Practicality	Conclusions/ Comments
Dinse, G. - 2000 - Institut für Mobilitäts-forschung, Berlin - (Munich)	593 employees of the BMW (developing H2 cars) asked through a written questionnaire	opinion test in a H2 vehicle production plant		public opportunity to test h2 vehicles would be effecive to decrease the perception of risk.		Sufficient refuelling infrastructure is a precondition for positive attitude	The acceptance of the hydrogen technologies is high among the employees of the BMW group who has been developing H2 vehicles from 80s
Maack, M., Nielsen, K. et al. - 2004 - ECTOS (Reykjavik) bus drivers 2004 is (Reykjavik)	20 H2 bus drivers 2 years of driving experience Only 15 drivers responded to the survey	Opinion on their experience of driving FC vehicles	Very positive comments on cleanliness of hydrogen	Very reliable, fast filling, no detected leaks, no fears of explosions, no problems from cold start,	good stability, driving sensation, AND acceleration, compatible power, excellent comfort for drivers, happy passengers	Easy to fill, operation as usual, too short range	Drivers were happy with h2 buses, when compared to similar diesil buses. Drivers associate H2 future deployment with renewable energy and energy indipendence.
Chandler, K., Eudy, B. et. al. - 2009 - EERE-NREL, CTTRANSIT (Connecticut)	21 Bus drivers	Evaluate drivers' awareness on fuel cell bus performances respective to diesel buses	Some drivers showed a positive indication on the environmental features of FC bus.	Not addressed	Most considered better noise, vibration and acceleration respect to conventional buses while braking is considered similar	driving conditions similar to conventional buses, but some declared they would need adaptation time	The passenger showed a neutral attitude towards the new technology.
Saviko Consultants -2007-2009 - Zero Regio (Frankfurt am Main and Mantova)	Daily H2 vehicle drivers: 41 German and Italian ordinary citizens, 6 drivers working for the car makers (5 for Daimler, 1 for FIAT). Interviewed (face-to-face and written questionnaires) not less than 3 months after their first driving experience.	Opinion on technological maturity (safety, comfort, ease of handling,costs) and on environmental advantages.	Image of hydrogen as a clean technology. Significantly negative about H2 from coal or nuclear, neutral about gas.	89% of drivers have no problem with the high pressure storage. Vehicle safety is an important reason why hydrogen might succeed as a future fuel.	Short driving range.	Majority of drivers prefer H2 cars to remain quiet; minority are worried of traffic safety due to the low external noise level of the vehicles.	Hydrogen refuelling procedures score very well for safety, Easy for an experienced person and learning is quick. Refuelling must be more reliable (more associated with the hydrogen supply than with the dispensing mechanism).

Example how the matrix looks

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H2 stakeholders claimed:

- The public does not understand the key topics of new technologies – doesnt recognise difference between technologies and terminology and even doesnt care *(as long as it works*)– and therefore answears from the public do not always give the correct picture
- People working in the field are supprised why they are seldomly interviewed – they should have the best knowledge
  - **However sometimes when they were asked they did not want to reply – did not know if they had any authority to reply**
  - **Asking fur such permissions could take a very long time**
- However in most studies the "*public*" is the bases for analysis – and over 1/3rd from Germany

The majority of respondents are „The Public“

Stakeholders

Therefore PreparH2 group desided to collect views and suggestions from experienced staff and equipment users.

25 stakeholders in the 5 countires were interviewed according to set interview goals:

- Good House keeping
- Budget planning
- Partner selection
- Management
- Communication recommendations
- Confidentiality
- Dealing with media
- Dissemination

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- Collecting experiences:

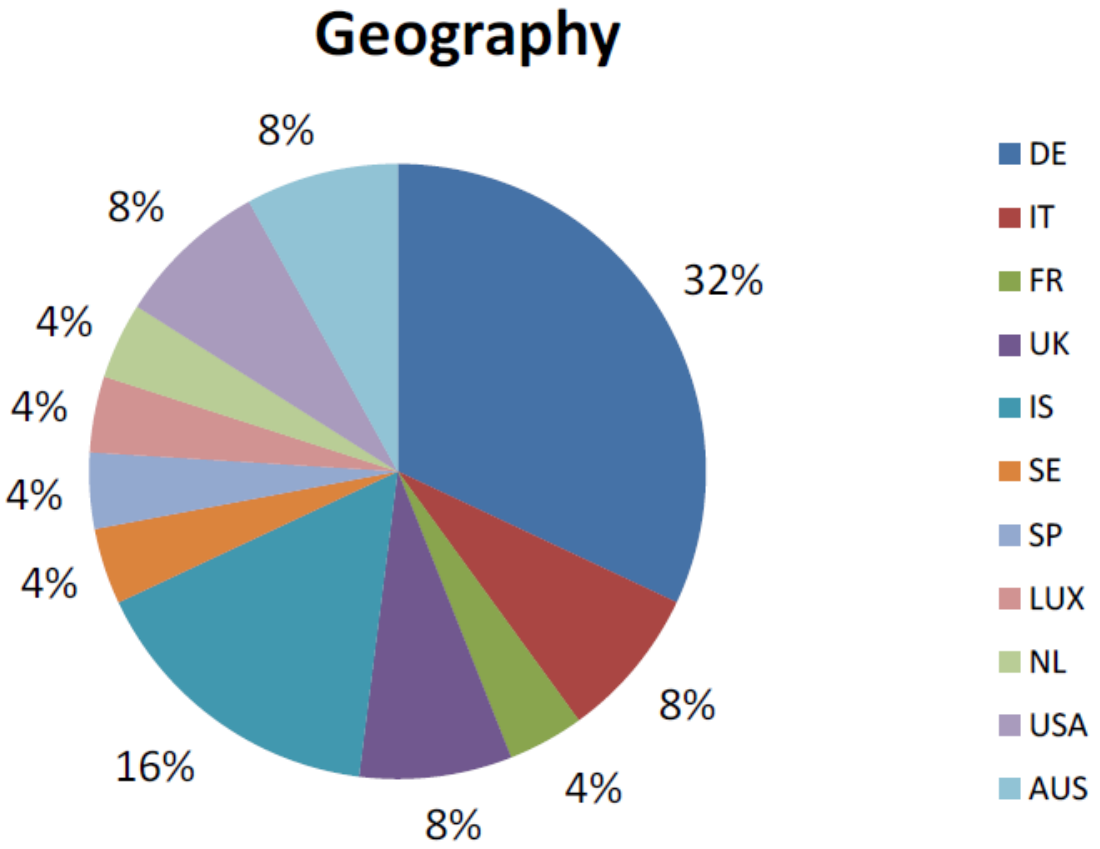

Figure 5: Analysis – Geography

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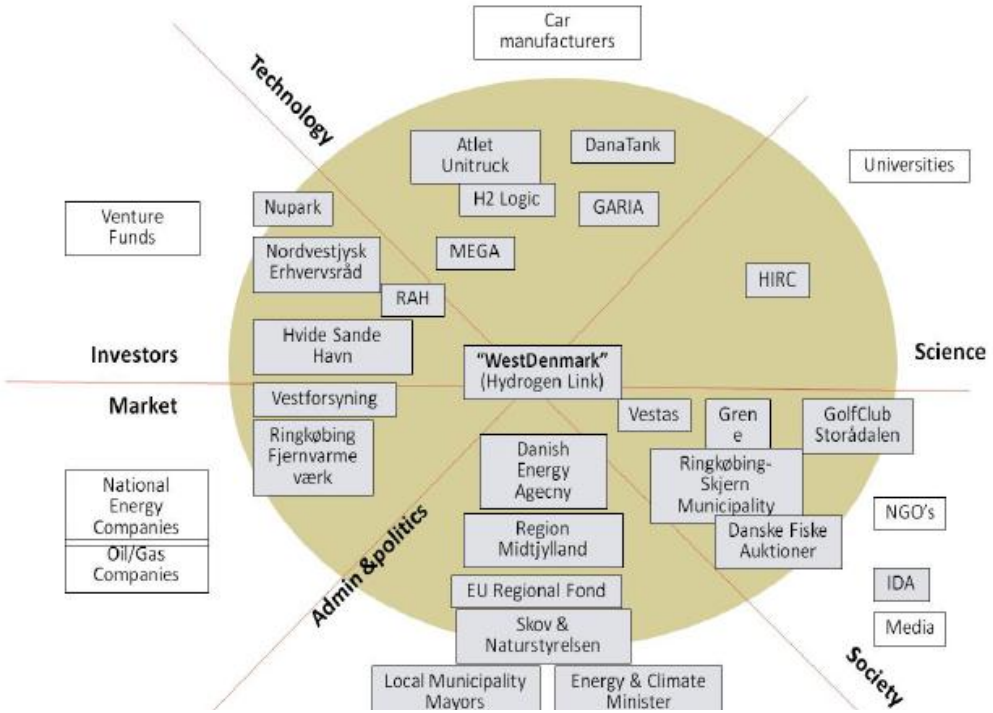
Identifying stakeholders – using sociograms



• Successful projects involve stakeholders from all relevant sectors. Information flow to peers give better dissemination. Media and internet are not informative but spin up hypes

Communication between all participating stakeholders has proven important for project successes

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Confusion

- The public & stakeholders do not seem to understand the difference between technologies
- Public awaits the "**silverbullet**"
- In media/conferences/reports there are the battery-or-fuel cell-or-methane-or…… Saying that their technology is the future
  - **People crave for comparisons studies between fuels and different technologies etc.**
- Dissemination has to be at a very simple level – even terminology creates increased confusion
- Education is lacking
- Stakeholders complained that they were not always informed about all project aspects and other stakeholder responsibilities "**lack of internal communication**"
- Headlines on future technology "messes up peoples minds"

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Regarding economics large efforts were put on "willingness to pay"

- The picture below shows back-calculating the acceptable hydrogen price by comparing with HEVs.

	Fuel sales price *Incl. tax & profit*	Consumption *km/L or kg/100 km*	Price/km *€/km*
GASOLINE	€1,61/liter* →	20 km/liter →	€0,081/km ↓
HYDROGEN	€9,69/kg ←	0,831 kg/100 km ← 30 km/Gasoline Equivalent (GE)	€0,081/km

** 95 octane gasoline sales price @ dispenser in Denmark. Calculated as an average of the actual day price in April 2011 and the average day price of the past 12 months, reflecting the upwards price trend*

Source: The Danish Petroleum Association www.eof.dk

- Many calculations have shown that selling hydrogen at € 9-10 will make good economic sense for H2 infrastructure build up

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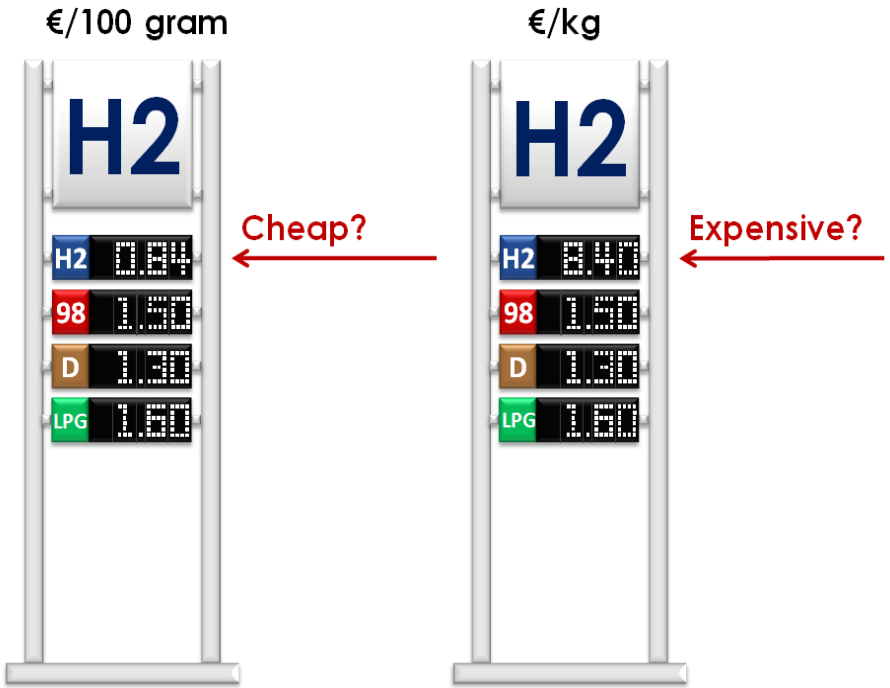
Research has shown that people are willing to pay the same for fuel – given that the fuel gives same performance as gasoline

- Range, refuelling time, comfort, size, etc.
- Pricing might be important – kg., Nm3, grams, etc.



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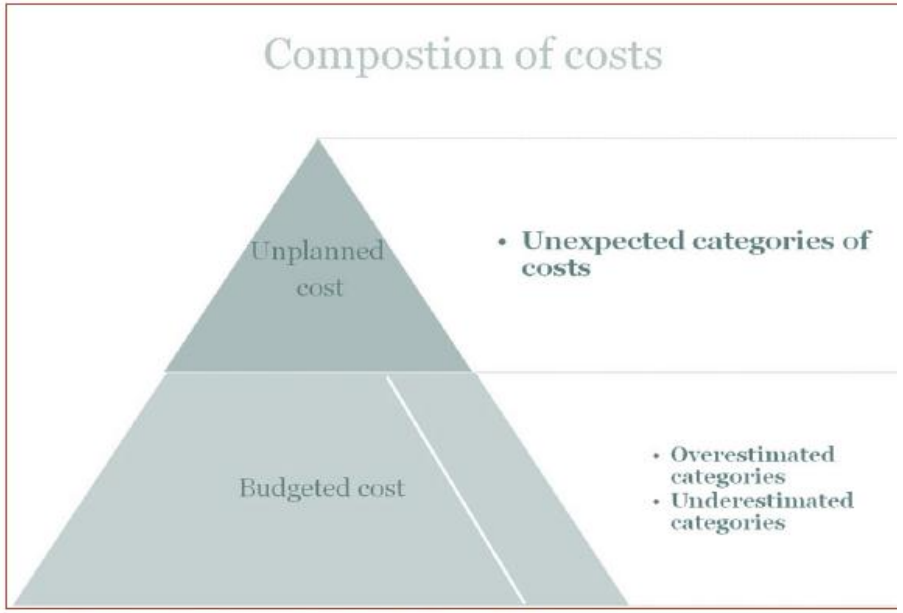
Unexpected cost and hidden cost

- These are difficult to address but seems to have influenced most H2 demo´s
- SME´s are encouraged to participate but are badly hit by such cost´s (delays, failures, spare parts).
- A lot of information was collected on unexpected cost – but stakeholders were very reluctant to discuss hidden cost though everyone agreed they were there
  - Not more for hydrogen than other technologies
  - Are budgets made so that they will be accepted – not to reflect real costs



Recommen-dations

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New Energy World JU
fuel cells & hydrogen for sustainability

Food for thought

Comparison is needed between the alternative fuels in terms of:

Accessability of rawmaterials

Efficiency througout the fuel chain

Material use, recyclability,

Cost of technological solutions

Where do the various solutions fit best??

Local resources for fuel production will affect future fuel type and availability

The project team is conviced that the documentation and recommendation from the project can support which socio-economic studies should accompany new lighthouse projects. All reports are available and public
www.newenergy.is/en/preparh2/