

HyNor and the Scandinavian Hydrogen Highway Partnership
Brussels, June 25, 2008

Ulf Hafsel, Head of Business Development Hydrogen, StatoilHydro

Chairman SHHP, Board member HyNor

Agenda

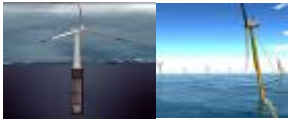
- StatoilHydro and Hydrogen
- HyNor – The Hydrogen Road of Norway
- Scandinavian Hydrogen Highway Partnership (SHHP)



StatoilHydro Hydrogen

StatoilHydro

New energy portfolio



Wind



CCS



Biofuel



Hydrogen



Tidal



Energy systems



Wave



Kyoto CDM/JI



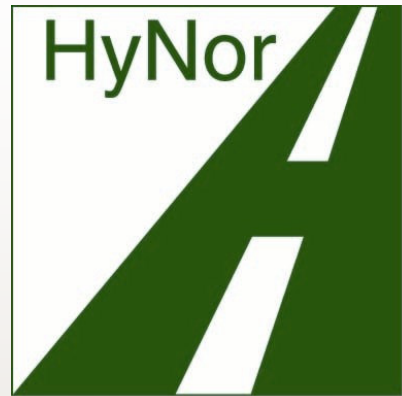
Developing Hydrogen as an energy carrier

- Participating in market preparation activities
- Developing Hydrogen as a vehicle fuel
- Developing Renewable Hydrogen Systems
- Developing technology for Hydrogen production and supply

StatoilHydro delivers hydrogen solutions for Europe

- **ECTOS/HyFLEET:CUTE** –
Hydrogen station Reykjavik
- **CUTE/HyFLEET:CUTE** –
Hydrogen station Hamburg
- **CEP Berlin**
Hydrogen production Messedam
- **Utsira Wind-Hydrogen plant**
- **HyNor** –
Grenland Hydrogen station
Oslo, Drammen, Stavanger II





The Hydrogen Road of Norway

HyNor
Norway

HyNor Objective

- The HyNor project was established in 2003 with the objective of a broad market demonstration of hydrogen for transportation in Norway, described by the following vision:

“In 2009 it shall be possible to drive hydrogen fuelled vehicles between Stavanger and Oslo ”

- This is to be achieved by establishing local nodes along the 580 km long road –
“The hydrogen road of Norway”



The Hydrogen Road of Norway

HyNor: Public Private Partnership at work

- Introducing a new fuel requires a major co-operation effort
 - HyNor has more than 50 partners organised in the various nodes
- PPPs are needed in the early development phase
 - HyNor is a good example of successful implementation of PPPs
- Example Grenland:
 - Partners in HyNor Grenland are:
Høgskolen i Telemark, Zero, TelTek, Miljøbil Grenland, Ineos (Hydro Polymers), Telemark Fylkeskommune and StatoilHydro
 - with car partners: Quantum Technologies, Porsgrunn Kommune, Vekst i Grenland, Skagerak Energi, HiT, Choice Hotels, Hydro and StatoilHydro
 - and funding from Department of Transport via Norwegian Research Council

The HyNor nodes





HyNor Stavanger – Norway's 1st Hydrogen Station

- Opened August 2006 as an integrated part of a petrol station
- Hydrogen, NaturalHy (8% H₂ in Natural Gas) and Natural Gas
- Start-up with trucked in hydrogen, dispensers for 350 and 700 bar hydrogen
- Stage II with production of H₂ from Natural gas with CO₂ handling or from biogas + second filling station



HyNor Grenland – A World class hydrogen station

- Several technology innovations
- Directly linked to large scale hydrogen production, scalable solution
- Possibility for supply and back-up for other HyNor stations
- 10 hydrogen cars in operation at the station
- Upgrading to 700 bar technology



HyNor Oslo – Hydrogen in Public Transport

- Plan for 4 buses, 5 taxis and 15 cars
- Production of hydrogen from water with electrolysis
 - demonstrating new world-class electrolyser technology
- Car station will be in operation in 2009 (350/700 bar), bus station in 2009/2010

Vehicle fleet in HyNor



Hydrogen Prius:
converted to
hydrogen operation
by Quantum US, 15
cars in Norway



Think Hydrogen:
A hydrogen/electric
hybrid, 5 cars to
HyNor in 2008/2009



Mazda RX8:
Hydrogen/petrol,
dual fuel, 30-40 cars
to HyNor/SHHP in
2008/2009



Buses:
Plans for 8
buses in HyNor
2009-2010

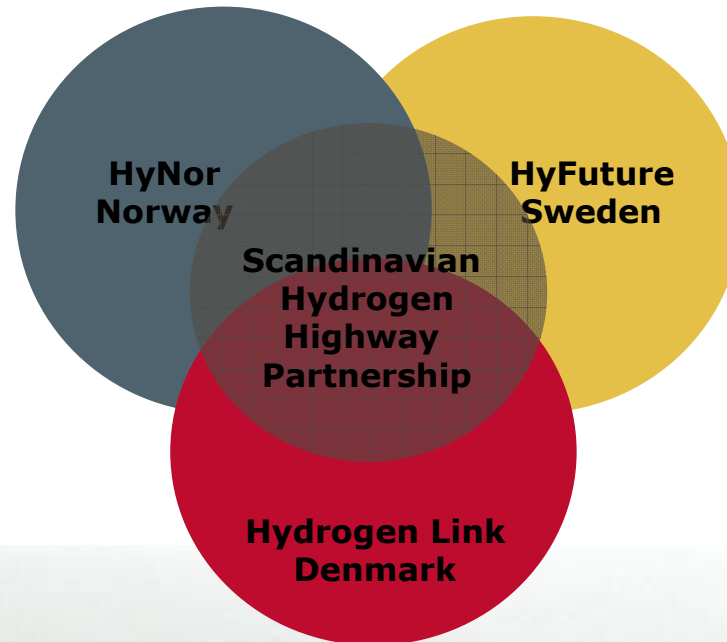


More cars:
Dialogue
ongoing with
several car
manufacturers
for larger series
of cars to
HyNor and
SHHP

The Scandinavian Hydrogen Highway Partnership



Joining forces

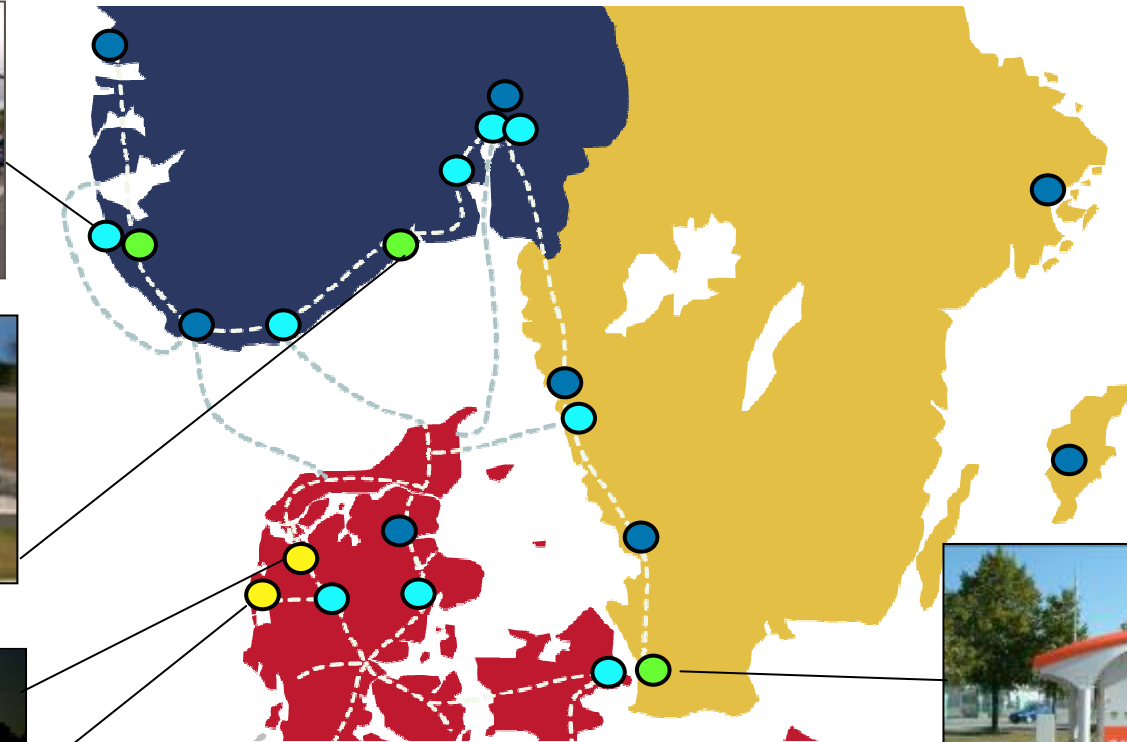


Making the Scandinavian Region one of the first regions in Europe where hydrogen is commercially available and used in a network of refuelling stations





Building a network of hydrogen stations



- 3 stations are opened
- 2 will open in 2008
- 9 planned for 2009
- 8 sites under evaluation





Raising our ambitions

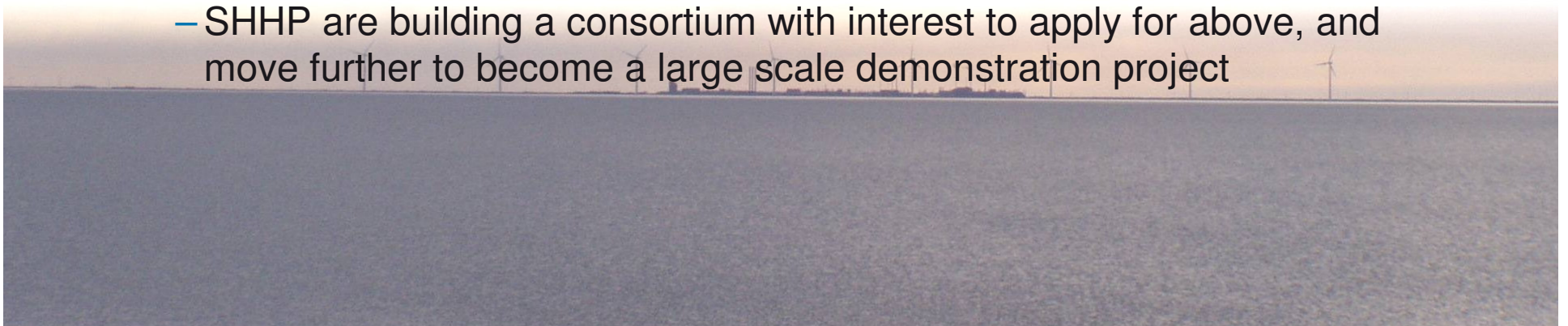
- We are looking at the next level of development for 2008 – 2015
 - SHHP aims to become a Lighthouse Project in EU
- A network of Hydrogen stations
 - 20 stations
 - 15 satellite stations
- A large fleet of vehicles
 - 100 buses
 - 500 cars
 - 500 speciality vehicles





EU and the JTI

- 5 Nordic members in the industry grouping
 - *Iceland*: Icelandic New Energy
 - *Norway*: StatoilHydro
 - *Sweden*: E.ON, Volvo
 - *Denmark*: H2Logic (DK)
- 1. call from JTI planned for September -08:
 - “Large-scale demonstration of road vehicles and refuelling infrastructure, **study and preparation activities**”
 - SHHP are building a consortium with interest to apply for above, and move further to become a large scale demonstration project



Nordic collaboration in the transport sector

- SHHP links with Iceland and Finland in network project funded by NIC
- “Hydrogen bonds” formed between Iceland, Norway and Denmark
 - StatoilHydro (NO) technology in Electrolyser based hydrogen station in Reykjavik (IS)
 - H2Logic (DK) partner in the Fuel cell ship project in Iceland and Think (NO)
 - Close cooperation on the fleet of Hydrogen Prius (NO+IS) and other cars
- The Nordic countries are playing an important role in hydrogen development
 - Today there are 4 hydrogen stations in operation, 5 by summer this year, by end of 2009 the plan is to have 13 stations in operation
 - Current car fleet counts 28 hydrogen cars, concrete plans for 70 – 80 vehicles by end 2009



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