

Hydrogen and Fuel cells RD&D in Sweden

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Outline of presentation

- Introduction: Funding of RD&D in Sweden
- Hydrogen
- Fuel cells
- International cooperation

New energy research programme 2005-2011 in Sweden

- End of the 7-year programme 1998-2004
- Programme reviewed
- FOKUS – prioritise research
- A new 7-year energy programme

Swedish governmental R&D funding

- 5,5 billion SEK (600 million Euro) 1998-04
- 3.06 billion SEK for the 2005-2011 period
- From 2005: 56 % of the previous period

Hydrogen

- Artificial photosynthesis
- Photobiological hydrogen production by cyanobacteria (blue-green algae)
- The Värnamo gasification plant:
Chrisgas
- Demo initiatives

Artificial photosynthesis

- The aim of this work is to design and synthesize molecular complexes, capable of producing hydrogen and oxygen from water utilizing sun light
- Some 40 people engaged in the work, at Uppsala university.
2003-2006, 50 million SEK (5,5 MEuro)

Photobiological hydrogen production

- The aim is to develop a bioreactor, where cyanobacteria efficiently produces hydrogen utilizing sun light.
- Optimizing the bacterium by genetical means to Swedish conditions.

Växjö Värnamo Biomass Gasification Centre



Växjö Värnamo Biomass Gasification Centre, VVBGC

- IGCC demo plant 1991-1999
18 MW, 8500 hours of operation
- VVBGC will be used for several projects:
 - production of H₂-rich syngas, "Chrisgas"
 - IGCC application for refuse-derived fuel
 - rebuild pilot plant for alternative motor fuels production

The CHRISGAS project

- EU support: 9.5 million Euro
- Swedish gov. support: 8.3 million Euro
- 15 Partners: Sweden, Denmark, Finland, Germany, the Netherlands, Italy, Spain
- Duration: 2004-2008

CHRISGAS, cont

- The plant will be rebuilt from airblown to oxygen and steam blown process
- Research will focus on gasification and gas cleaning
- Syngas production 2003-2008, Gas-to-liquid (GTL) facility 2005-2010
- Production of liquid fuels for fleet tests, 2009

Other demonstration activities (use of hydrogen)

- Hythane (Hydrogen in NG/Biogas) as motor fuel
- A group of stakeholders plan for activities to utilize hydrogen from refinery to promote " the hydrogen economy"

Swedish R&D on Fuel cells

- Fuel cells in transportation
- Stationary fuel cells

Fuel cells for transportation

- FC research is financed within the programme Energy system in road vehicles and the "Green car" programme (car manuf + gov).
- Green car: Fuel cell and hybrid electric vehicles has a budget of 11 MEuro

Programme: Stationary fuel cells

- 4-year programme: 2002-2005
- Research: 26 MSEK (2.9 MEuro)
Development: 4 MSEK (0.4 MEuro)
- Research: Mainly SOFC, MCFC (1 project)
Development: 3 FC installations in
Stockholm (heat and power in buildings)

International cooperation

- IEA Hydrogen production and utilization
 - Photobiological and photochemical H₂ production, hydrogen storage, system
- CUTE, Clean Urban Transport for Europe
- HY-CO

End of presentation

Thank you for your attention!