

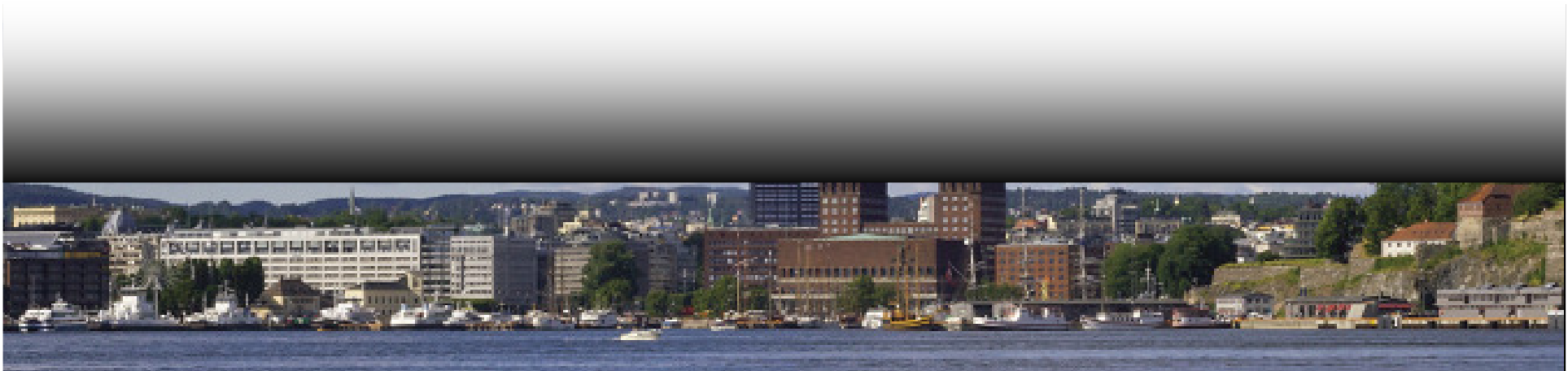
# Nordic Highlights

- a brief overview of status and activities

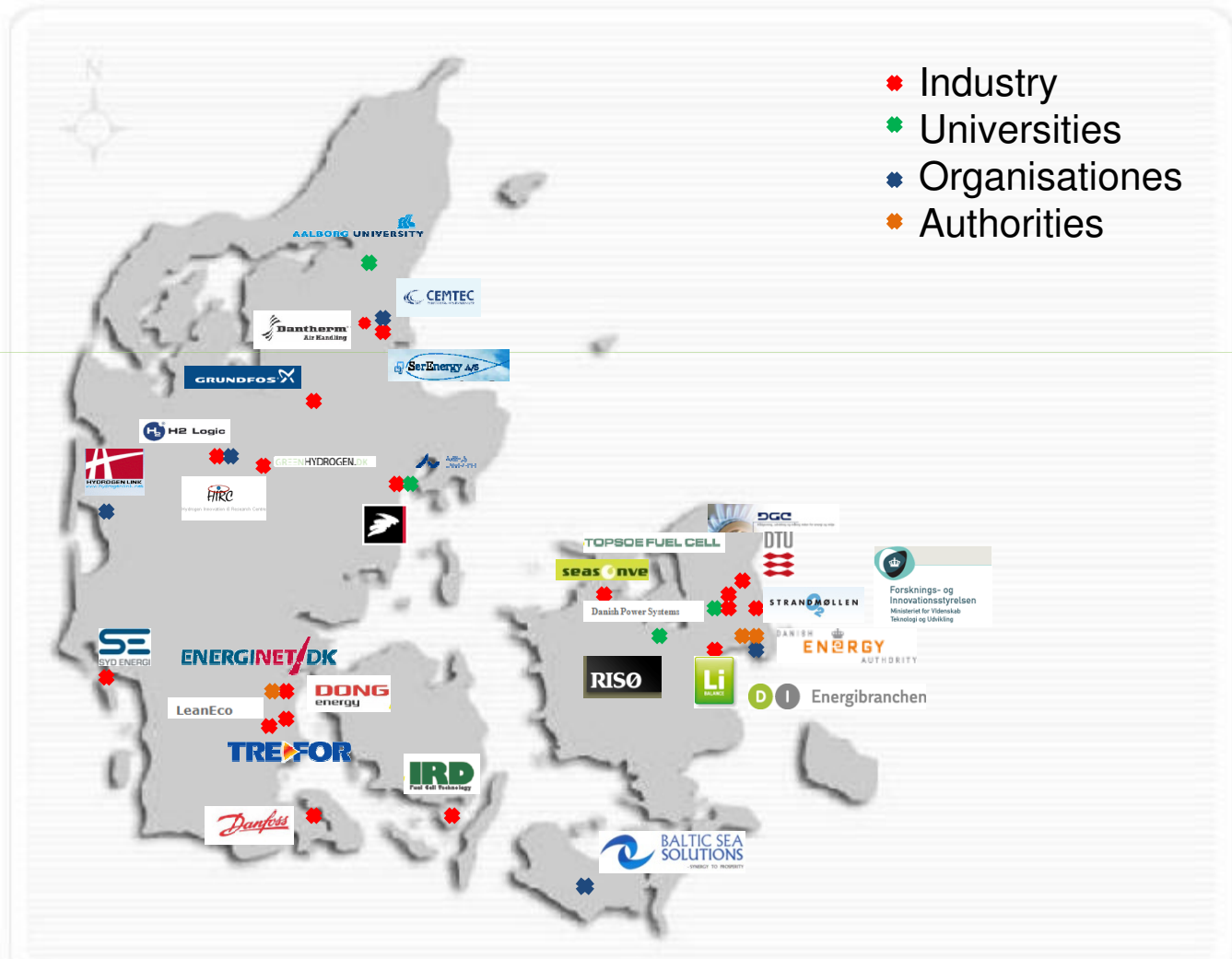
**Aksel Mortensgaard**

Director

Danish Partnership for Hydrogen and Fuel Cells



# Geographical Locations



# Hydrogen and Fuel Cell Technologies Part of Smart Grid

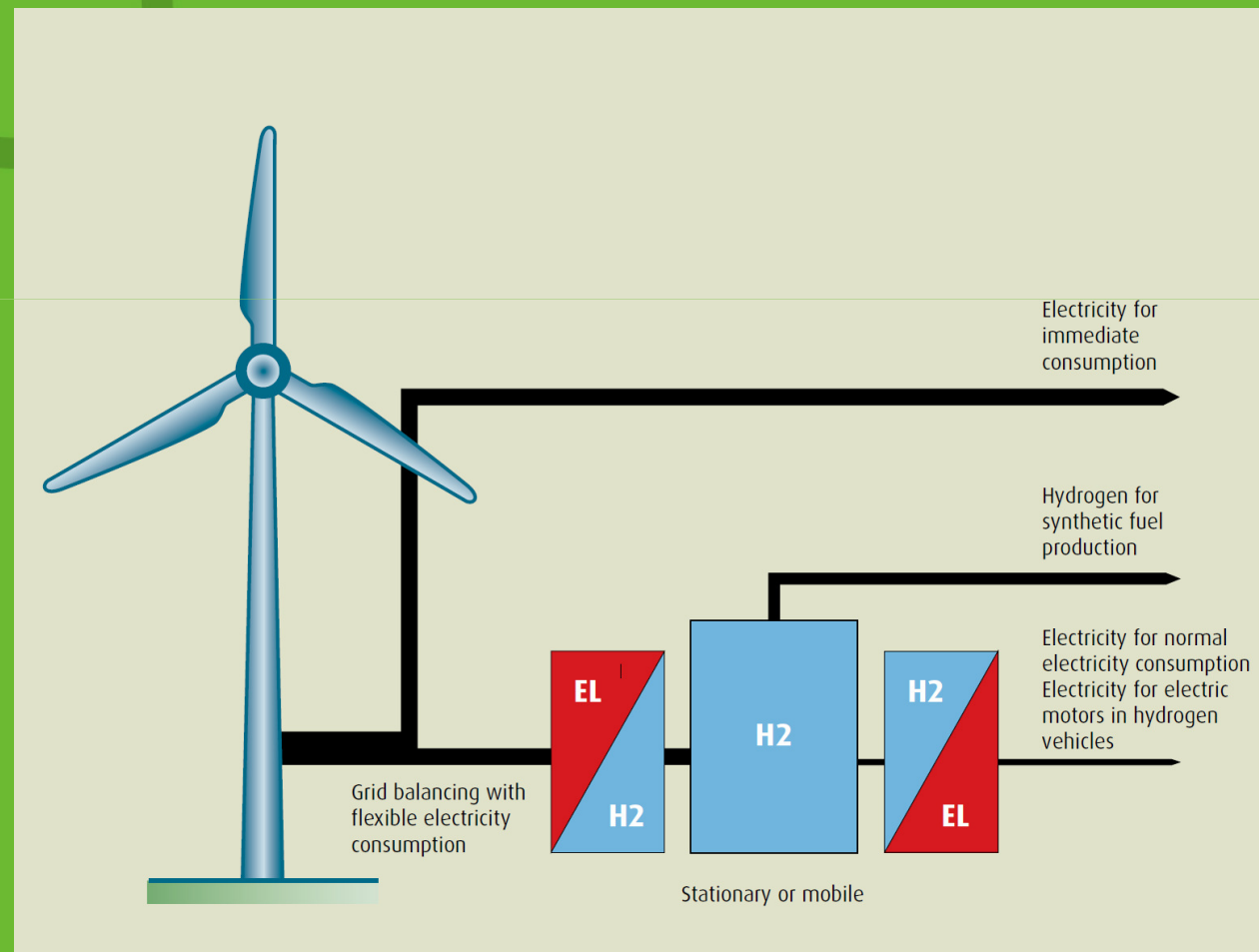
## Capable to:

- Integrate more and more renewable energy.
- Up- and down regulate (virtuel Power plant)
- Stabilize the electric grid
- Reduce CO<sub>2</sub>- emission
- Secure less dependency on external supply of electricity.



# Electrolysis in Denmark

## Strategy for R,D & D – 2010 - 2018





# The Municipality of Copenhagen



- Copenhagen is spending 3,3 mio. euros on hydrogen and fuel cells in 2011 & 2012
- 6 projects are considered for implementation – result of 3 workshops held with Danish HFC stakeholders
- The aim is future collaboration between the Municipality of Copenhagen, The region of Copenhagen and the region of Sealand.



# Green Lab for Fuel Cells and Hydrogen

Collaboration  
between the  
Region of North  
Jylland and the  
Region of  
Sealand

Green Lab for Fuel Cells and Hydrogen:  
"Risø FCH Test Center"



Risø DTU  
National Laboratory  
for Sustainable Energy



in cooperation with



and the companies



GREENHYDROGEN.DK




# Norwegian highlights:

## Hydrogen EU-projects:



### Projects from 1<sup>st</sup> & 2<sup>nd</sup> FCH JU calls

- National Co-funding  
Norges forskningsråd  
The Research Council of Norway
- **NEXPEL** (Coord. by SINTEF, Statoil ++ partners)
  - **PreparH<sub>2</sub>** (Coord. by INE, NTNU & SINTEF (+Statoil) partners)
  - **KeePEMalive** (Coord. by SINTEF, IRD Fuel Cells (DK), CNRS (Fr) ++)
  - **HyLift, Hydrogen & FC powered Forlifts** (Coord. by H<sub>2</sub>Logic, DK)
  - **STAYERS, Stationary Fuel Cells** (Coord. by NedStack, Netherland)
  - **RAMSES, High Temp. Fuel Cells** (Coord. by CEA, France)
  - **H<sub>2</sub>MovesScandinavia / H<sub>2</sub>MovesOslo** (Coord. by SINTEF)
- transnova
- H2moves.eu  
Scandinavia
- 



# Hydrogen infrastructure new stations:



Lighthouse project  
for hydrogen  
infrastructure in

Europe  
**1 of 5 sites for  
hydrogen buses**

**Innovative and  
renewable** hydrogen  
production



# Hydrogen vehicles



New



New



New



# ZERO RALLY 2011





# Electric vehicles

- About 4000 registered battery-electric vehicles in Norway
  - **2011: 1.4 % of new sales**
  - 2011: 1300 additional cars to Norwegian postal service
- Government grant:
  - 6 M€ for charging spots in 2009/2010
  - 0.5 M€ for fast charging in 2011
- Charging spot-parking opened in Oslo, June 2010
  - 50 dedicated spots with outlets
- Free charging (for now)
- Total ~3000 charging spots



# Finnish Fuel Cell Programme (2007-2013) - Towards demonstration and public awareness

- **A total volume of 140 million euros** of which 50 million euros from Tekes, Finnish Funding Agency for Technology and Innovation
  - **Totally 60 projects** of which 30 completed and 30 still running
  - Ten EU FCH JU projects running, more in the pipeline
  - More than **60 companies** are involved in the programme's projects
  - The programme has more than **400 active participants**
- **Targets** for the current period of the programme:
  - demonstrate the results and focus on the end-users and on public awareness
- **Political status:**
  - Co-operation and cross-cutting working group with Ministry of Employment and the Economy (Energy and Innovations) and Ministry of Transport and Communications formed and started with sharing information



Fuel Cell



**Tekes**

# Fuel Cell Finland Industry Group

- Part of The Federation of Finnish Technology Industries
- Accelerating the **utilisation of fuel cells** through networking
- The group works to **intensify co-operation** between Finnish technology industries and stakeholders in the field of fuel cells
- **16 industrial members** in 2011
- Members include both **fuel cell developers** and fuel cell **application developers**, accompanied by other fuel cell **value chain actors** and **stakeholders**
- The main objectives of the group are to:
  - Monitor **development trends** and identify **business opportunities**
  - Identify **development needs and build roadmaps**
  - Inform and contribute
  - Network both nationally and **internationally** and represent Finnish industry
- Demo2013 fuel cell demonstration is a joint project of Fuel Cell Finland and Tekes Fuel Cell Programme



Fuel Cell



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# Demo2013 – a groundbreaking fuel cell demonstration in a port facility in 2013

- The next phase in the Finish Fuel Cell programme will be Demo2013, a groundbreaking demonstration in a port facility
- Demo2013 will **present the results of the projects** funded by Tekes Fuel Cell Programme and FCH JU in the Port of Helsinki
- All kinds of applications will be in action: **50 kW power plant, smart grids, mobile working machines and material handling, backup power, hydrogen fueling station**
- Projects will show a solid approach for **Regulation, Codes and Standardisation** activities
- **Target** to raise public awareness, find partners and enusers, affect to the public and private decision makers



Fuel Cell



**Tekes**

# Demo2013 – a groundbreaking demonstration in a port facility

- A group of leading Finnish companies and research organizations have created an international fuel cell demonstration project
- Participants include companies like Wärtsilä, Cargotec, Woikoski, Gasum, Hydrocell, T Control, VTT
- Demo2013 will **present the results of the projects** funded by Tekes Fuel Cell Programme and FCH JU in the Port of Helsinki in 2013
- This unique demonstration in real environment will **increase public awareness** of the benefits of fuel cell technologies
- Provides evidence of the **safety, reliability** and **effectiveness** of fuel cells
- Kick-off meeting of Demo2013 will be held in August, 2011.
- **International partners, companies and organizations are invited to join Demo2013**



Fuel Cell



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# Hydrogen in Iceland

## Key current activities

### SMART-H<sub>2</sub> 2007-2011

- Goal:
  - Demonstration of a fleet of hydrogen cars
    - In total 27 cars have been in service 2007-2011
      - 12 H<sub>2</sub> vehicles currently in service
    - Various engine types and from different vehicle producers
      - Mostly retrofitted Toyota Prius vehicles (10) and Ford Focus FCEV (13)
  - Demonstration of an auxiliary boat engine 2008-2009
  - Testing of infrastructure for different users and increasing the availability of hydrogen within Reykjavik/Iceland
    - Commercial hydrogen refuelling station has been in operation since 2003 (worlds oldest commercial refuelling station)



# Hydrogen in Iceland

## Key current activities

- Various research element - follow-up from the bus demo (including including comparison studies - FCEV's, battery vehicles, plug-ins, etc.)
- Prepar-H2 (EU supported project) - recommendations of social and economic issues for future hydrogen lighthouse projects 
- INTELECT - (NER - funded project) - mapping of available incentives for electric transport
- Next steps needed (not funded):
  - Upgrade fuel station to 700 bars
  - Increase population of FCEV



Salmon fishing using an FCEV

## Swedish Highlights:

- In 2011-2012, a total of 6 000 BEVs are purchased for the use in Swedish major cities, subsidized by Swedish Energy Agency
- The Swedish government is aiming for electric vehicles to reach 10% market share by 2020 (Total market 4 million today)
- Every third car that is sold today is an environmental car

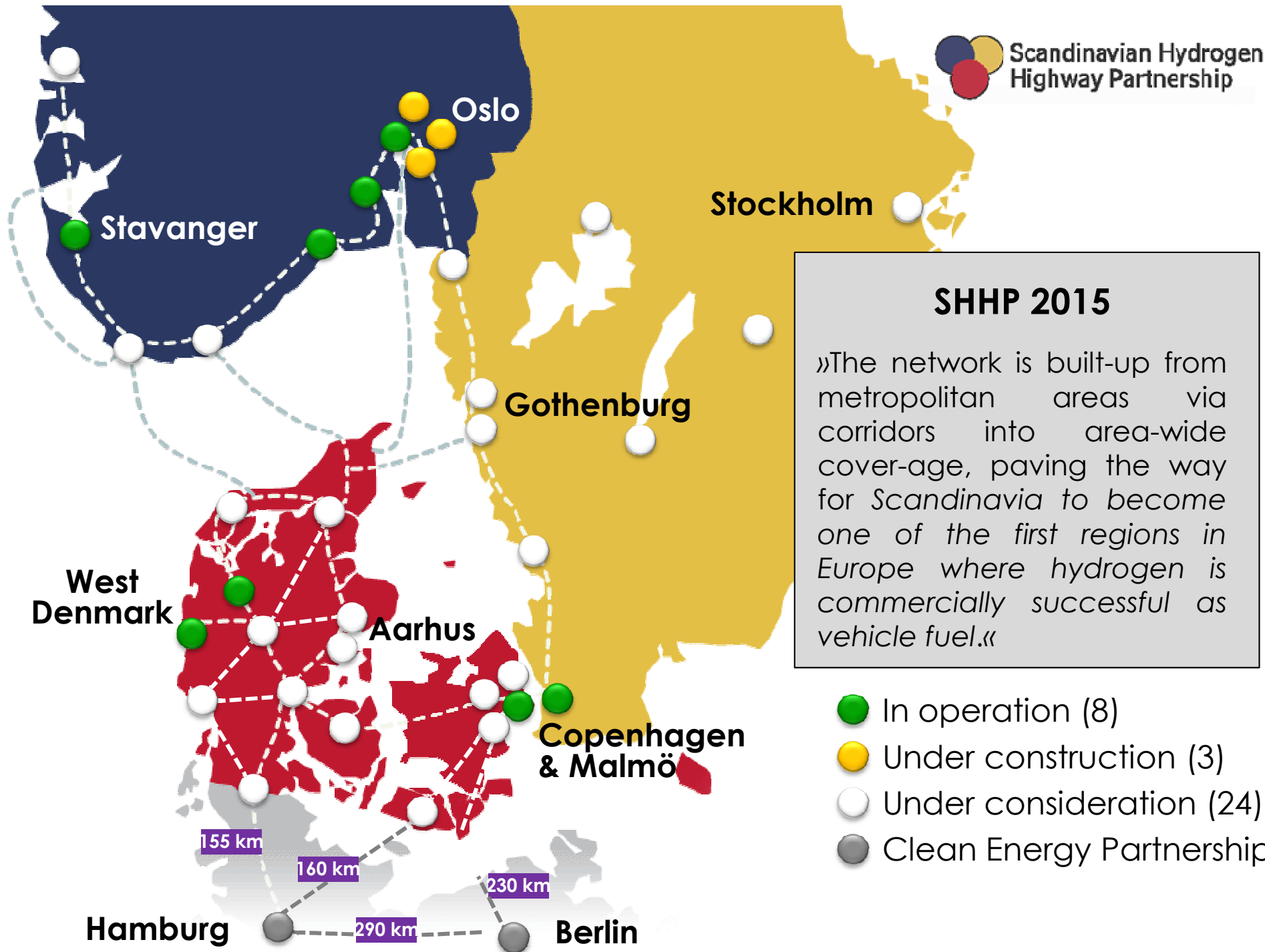




## Swedish Highlights:

- Major gasification plant GoBiGas – methane and hydrogen
- Volvo Cars engaging in fuel cell range extender concept
- NextMove Interreg project – collaboration of early users
- Four regional collaboration projects (one EU-funded)
- ComfortPower – MicroCHP + heat exchanger concept





### SHHP 2015

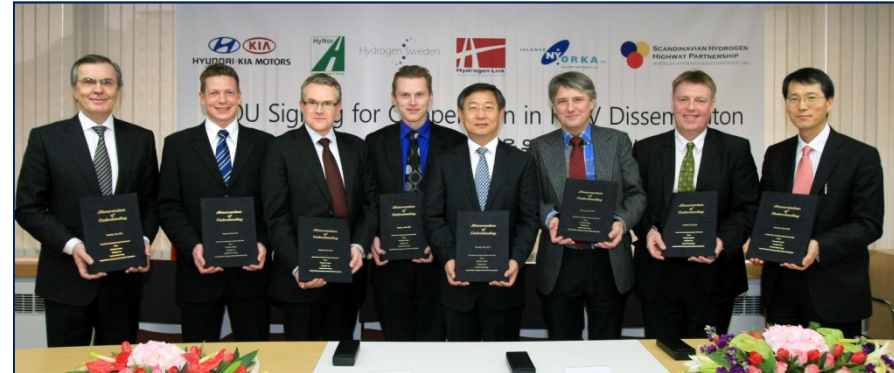
»The network is built-up from metropolitan areas via corridors into area-wide coverage, paving the way for Scandinavia to become one of the first regions in Europe where hydrogen is commercially successful as vehicle fuel.«

- In operation (8)
- Under construction (3)
- Under consideration (24)
- Clean Energy Partnership

## Latest news

### 3 February 2011

MoU between Hyundai/Kia Motors and stakeholders from the Nordic Countries on zero emission fuel cell vehicle deployment



### 20 June 2011

700bar hydrogen refueling station opened in the city of Holstebro in Denmark. The station enables a refueling of hydrogen in less than three minutes in accordance with the SAE J2601 standard

