

Finnish Fuel Cell and Hydrogen Activities 2011

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Tekes Fuel Cell Programme



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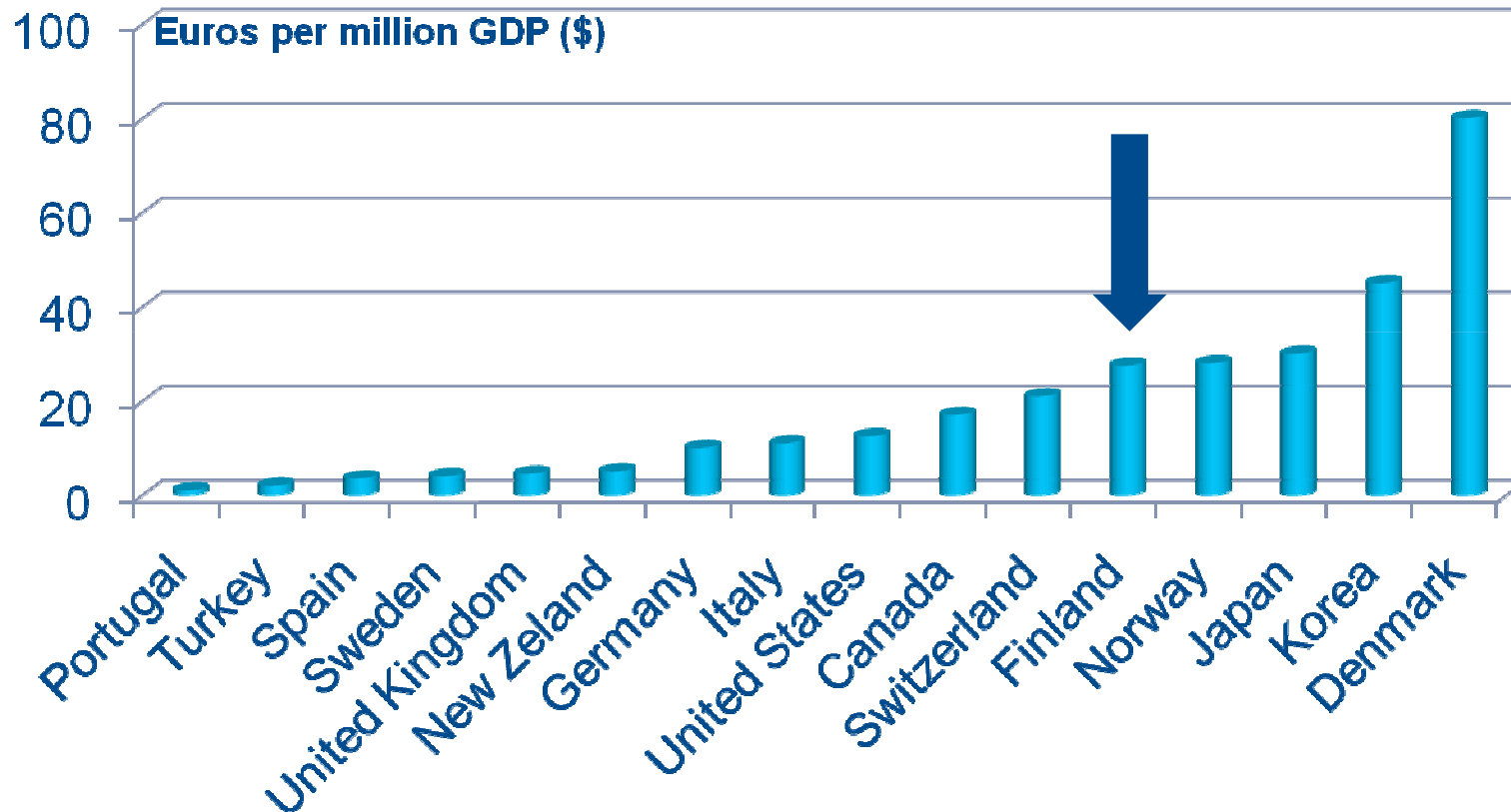


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Public funding for R, D&D budgets for Hydrogen and Fuel Cells per million GDP worldwide in 2008



Source: Akseli Mortensgaard presentation in Finnish Annual Seminar 14.9.2010. Figures based on International Energy Agency R,D&D budgets, Energy Information Administration – EIA (Population), International Monetary Fund – IMF (GDP information). **Table modified by Tekes Fuel Cell Programme, Finnish figures added** .-source Tekes FC Programme



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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



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Company Partners



The first results has been achieved

- First results of the Programme include :
- a 20 kW SOFC power plant in Vaasa by **Wärtsilä** exceeding successfully since 2009 time using landfill gas
- VTT has run a 10 kW SOFC system since autumn 2010 successfully
- PEMFC systems up to 16kWe scale have been constructed as part of a hybrid system **field demonstration and research platform on forklift application** by **VTT**.
- Heavy working machines follow a roadmap from hybridized electric versions towards fuel cell powered versions at the end of the decade. A hybridized electric straddle carrier by **Cargotec Finland** is one example.



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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
- FCF may be ready to apply EHA membership later this year



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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



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FinHydrogen NEW Äetsä hydrogen Village Project 2009 – 2011

HyRAMP project member Pirkanmaa

DEMO'S:

- **a MW size fuel cell power plant**
- **H2 refuelling stations and pilot users:**
 - cars, working machines, buses, taxis
- **H2 energy storage / production by wind generators or solar panels**

FinHydroCenter

- Public presentations of Hydrogen Technology
- Hydrogen Work shops
- News Block



FinHydrogen/Jouko Koivula, Prizztech

DM

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Fuel Cell CHP Plant to Äetsä

Äetsä Sodium Chlorate Plant produces a considerable amount of sideproduct H₂

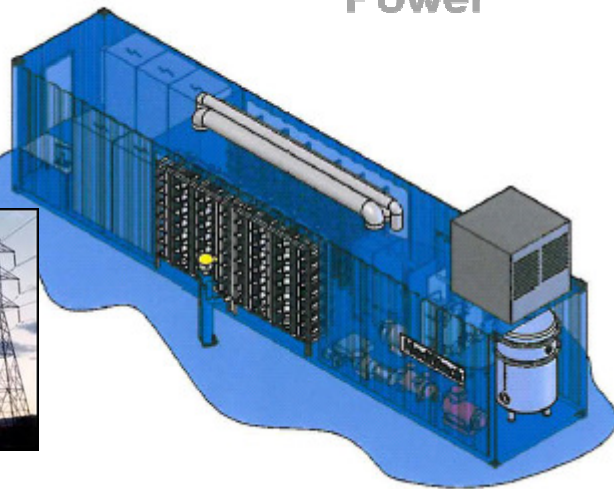
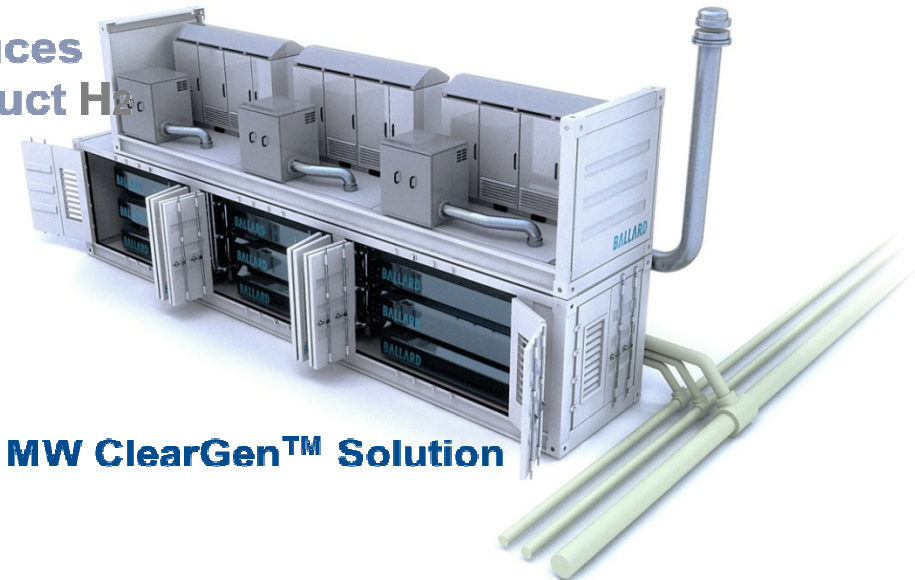
→ PEMFC

Partners:

Leppäkosken Sähkö
Kemira Chemicals

FC
Energy
&
FC
Power

1MW ClearGen™ Solution



PEM-Power Plant Lillo
1 MW



FIN HY HIGH WAY PROJECT Still at start block



A transformed fuel cell car to Pori town

Tampere town ECO 2 project:



A transformed fuel cell car parallelly to electric transformed vehicles



A fuel cell fork lift truck to Kemira Chemicals Äetsä Plant

(part of EU HyLIFT initiative)

Kokemäki town



A transformed fuel cell car nearly finished



Woikoski Oy building a H2 refuelling system



Refuelling stations to show hy production alternatives

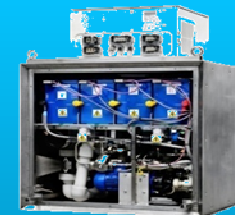
- Pori, SAMK, solar panels
- Jyväskylä, JU, solar panels
- Tampere, ECO2, biogases



HyTruck – 16 kW net rated power H2/E drive line



FC Boat – 2 x 30 kW net rated power H2/E generator



Germanischer Lloyd certified

H2 refuelling stations

Starting point:

Woikoski Oy

- **160 delivery stations around Finland**
- **distribution fleet,**
container /bottle batteries, liquified transport vessels
- **compression system**

What to be done:

- **concept- and design planning**
- **technology for the delivery stations,**
filling to 350 bar, alternatively to 700 bar
- **updating safety rules**

Where to be built:

- **according to demand,**
Rovaniemi, Äetsä, Pori, Ikaalinen, Tampere, ...



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