

Tekes Fuel Cell Programme and Demo2013 – a Demonstration area in Port of Helsinki, Vuosaari Harbour

FCHJU Maritime WS, Venice 14.6.2013

Anneli Ojapalo

Tekes Fuel Cell Programme 2007 -2013

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

- The Finnish Fuel Cell programme facilitates the development of successful fuel cell technologies and services
- A total volume of the Programme will be **more than 100 million euros** of which 35 million euros from Tekes, Finnish Funding Agency for Technology and Innovation
- **Totally 71 projects** of which 49 completed and **22 still running**
- Additionally, Finnish organizations are in 16 European FCH JU funded projects
- More than **60 companies** are involved in the programme's projects
- **Next step will be Demo2013** at Helsinki new port facility



The Core Areas of the Programme

Stationary	Portable	Specialty vehicles
SOFC PEMFC	PEMFC-PBI-FC AFC BioFC Micro-FC, Mikroreformer	PEMFC/ PBI-FC
<ul style="list-style-type: none"> ● Small residential ● DG: Industrial & utilities ● Industrial & agriculture ● UPS & emergency ● Remote: Off-grid, telecom etc. ● Ship APUs 	<ul style="list-style-type: none"> ● Consumer electronics devices ● Chargers ● Portable power packs ● Generators ● Niche-markets ● Intelligence clothes ● Military applications 	<ul style="list-style-type: none"> ● Industrial vehicles ● Mining vehicles ● Military vehicles ● Light duty vehicles ● Industrial transport APUs

Infrastruktur, fuels and refuelling: Hydrogen, Biogas, NG



Demo2013 – a groundbreaking demonstration of energy efficient solutions in a port facility in 2013

- Demo2013 will present the results of the projects funded by **Tekes Fuel Cell Programme and FCH JU**
- Projects will show a solid approach for **handling necessary Regulation, Codes and Standardisation** activities
- Provides evidence of **safety, reliability and effectiveness** of fuel cells and hydrogen
- The long term field tests will take place in the second half of 2013



Vuosaari Harbour

- Port of Helsinki and its new Vuosaari Harbour offer a modern service for container and trailer traffic
- Also passenger transportation is needed
- It is an **ideal location for pioneering clean energy technologies**
- Its location within the city means that **noise pollution** should be minimised, and there are also **strict controls on all polluting emissions**
- Fuel cell powered applications provide effective solutions to these challenges
- By clearly demonstrating its commitment to innovation and environmental sustainability, the harbour aims to gain a competitive advantage



DM 11-2009

All kinds of applications in action based on energy efficient solutions

- Demonstrations will feature power and electricity, cargo handling, logistics and back-up power for communications
- Low-power applications include **back-up power for telecom base stations and light vehicles**
- Infrastructure will include a **hydrogen refueling station**
- Other energy infrastructure as a possibility: natural gas/biogas/electricity
- The transportation section will feature mobile working machines including hybridized **straddle carriers and forklifts**
- Planned activities in later phase will include stationary applications, such as a **50 kW Solid Oxide Fuel Cell system** based power plant



Polttokennot

Back-up power is needed in the harbour area – modular systems by Finnish companies T Control Oy and Fitelnet Oy

T Control

- Low noise, low service cost, long lifetime, back-up power for 8 hours
- First unit operational since September 2012
- Suitable for indoor and outdoor conditions, No time lag in the use of the power unit
- UPS power for teleoperator TeliaSonera's base station in harbour

Fitelnet Oy

- Modular transportable fuel cell unit based on direct methanol PEFC to a UPS in a critical data transfer and communication interface



Refuelling infrastructure is progressing. First hydrogen refuelling station opened at Rovaniemi in January 2012, next will be in Vuosaari harbour

- Hydrogen for transport, auxiliary power unit (APU) and back-up power
- Refuelling of cars
- Safety regulations, requirements and safety standards will be reviewed in a separate project
- Hydrogen in Finland comes from chemical industry. New electrolysis technology is under construction
- The refuelling station concept will be a mobile unit



The Federation of Finnish
**Technology
Industries**

Tekes

Polttokennot

Applications that will come later: Material handling opportunities are electric and hybrid systems towards future fuel cell systems

- Materials handling: fork lifts, straddle carriers, vans, lorries etc
- Electric drives **increase efficiency** with decreased fuel consumption
- Electric drives **decreases local pollutant emissions and noise**
- Fuel cells gives all the above benefits with an additional one: **fast fuelling enables 24/7 use.**
- A fuel cell fork-lift was demonstrated by VTT 2011



Stationary Power by Convion Oy, a spin-off from Wärtsilä. Power production on site may be possible in a later phase 2015

The Convion Team is among the leading SOFC system developers.

- Convion people have extensive know-how in SOFC system development and operation.
- Four 20 kW and three 50 kW units have been developed and validated with over 15000 h cumulative operating hours on NG, BG and methanol
- sustainable and secure fuel cell solutions for customers in distributed power generation markets, including back-up power applications, by commercializing 50 - 300 kW products based on SOFC technology
- High product reliability combined with grid flexibility increases customers power security
- Convion products are suitable for various applications fuelled by natural gas and/or biogas.
- Power for the harbour or **land power for ships in the harbour** may be future opportunities for cleaner harbour



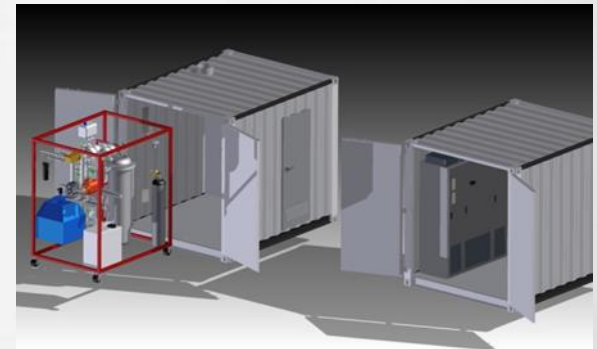
An optional application for integrated SOFC system is APU for ships

- Auxillary power units for ships is one option to cleaner power on-board
 - Clean fuel cell power using natural gas or methanol as fuel
 - High electrical efficiency-up to 50%
 - No emission of SO₂, NO_x or particles
 - Low noise
-
- Methapu sea trial project was successfully completed in 2010 (Wärtsilä/Wallenius)
 - Sea conditions are demanding: vibration, salt, moisture, temperature -25..+45 C



DuraDemo by VTT, a 50 kW stationary PEMFC pilot may be applicable also to mobile working machines in future

- DuraDemo-project is the 50kW stationary PEMFC pilot plant utilizing by-product hydrogen from process industry.
- The system concept has been designed and its performance will be confirmed by a 5000 hour field experiment at Kemira Chemicals site in Äetsä during the project. Online monitoring will be in Vuosaari harbour
- The pilot plant offers a platform for experimental studying the PEMFC technology, produces valuable data about system performance and allows testing different system level solutions from component and layout design to diagnosis and control.



Source: VTT

DemoSafety -project supports companies with the legislation and licensing and general safety issues

- In a VTT coordinated research project, **safe introduction of fuel cell applications and related fueling infrastructure** is being studied
- Other members of the project include companies, Finnish Safety and Chemicals Agency (Tukes) and Helsinki City Rescue Department
- Aim is to study **legislation, standards and licencing in order to remove obstacles hindering commercialization of the applications**

Demo2013 in Vuosaari Harbour 1.9.-31.12.2013

- Demo2013 seminar in Gatehouse 10.9.2013
 - Opening of the infodesk in the Harbour
 - Bulletins for decision makers and media
 - Discussion on energy efficient solutions and their potential
 - Demonstration tour in the Harbour
- Guided tours for targeted groups in Vuosaari Harbour – information for each target group's needs. Transportation by biogas bus from the Helsinki Centre
 - Professional groups
 - Public sector and decision makers from companies, media
 - Students, School groups
 - General public

Contact

- [Anneli Ojapalo](#), Programme Coordinator, Tekes Fuel Cell Programme, Project Manager of Demo2013 Project

+358 40 558 8205

anneli.ojapalo@spinverse.com

