

# Fuel cells and hydrogen

## Joint undertaking

**FITUP**

**(Grant Agreement 256766)**

**Fuel cell field test demonstration of economic and environmental viability for portable generators, backup and UPS power system applications**



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*VP IP Policy and Public Funding Programs*

<http://www.fch-ju.eu/>

# Project Description

**Starting Date:** 01/11/2010

**Duration:** 36 months

**Budget:** € 5.386.469

**Funding:** € 2.475.978

**Partners:** 11 consortium partners +  
2 additional final users

**Countries:** Italy, Switzerland, Turkey,  
Germany, Netherland, Austria

➤ FITUP will demonstrate the technical  
viability and economic maturity of backup  
power systems based on fuel cell  
technology

➤ 13 market ready systems from two  
suppliers will be installed in selected sites  
across Europe for field trials and 6 systems  
will be tested in R&D centres for  
benchmarking.

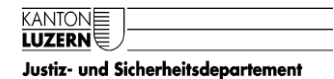
## UPS-Producers



## R&D Centres



## End Users



## Certification



# Project Objectives

- Technology will be demonstrated in various ambient conditions in real-life telecommunication applications while the data will be collected and analyzed.
- System performance will be compared against the laboratory benchmark results and the effects of real-life conditions will be assessed.
- Viability of these systems will be exhibited by reaching:
  - Reliability of greater than 95%
  - Durability of more than 1500 hours
  - More than 1000 cycles
- Uniform procedures for certification in selected EU countries, installation and testing of fuel cell backup power systems will be developed.
- Project will increase the visibility of fuel cells as a potential alternative to conventional backup power sources (batteries and diesel generators) and prove to potential telecommunication customers in real conditions their advantages.

# Manufacturing of the Systems



*The ElectroPS System*

- A total of 19 systems have to be produced: 11 by ElectroPS and 8 by FutureE.
- 6 systems for R&D centres have been manufactured.
- 14 of 15 systems for end-user sites have been manufactured.

- 5 of the 15 systems for end-user are with electrolyzers to produce hydrogen on-site

- ICHET as an independent party oversees the work being undertaken by both suppliers.



*The FutureE Solution*

# Installation of the Systems

- Installations in research centres are going to be completed.
- Installations at end-user sites are going to be completed.

		Location	End-user	FC UPS prov. by	Indoor	Outdoor	Application	Load max. [kW]	Date of Site Inspection	Date of delivery UPS	Installation and Startup
1	CH	Lucerne/Horw	Swisscom AG	EPS	x	/	Telecom	6	25/03/2011	Delivered	Ongoing
2	CH	Lucerne/Weinbergli	Swisscom AG	future-e	x	/	Telecom	6	25/05/2011	tbd	End of September
3	CH	Zizers	Swisscom AG	EPS	x	/	Telecom	6	25/03/2011	Delivered	Ongoing
4	CH	Davos	Swisscom AG	future-e	x	/	Telecom	6	26/05/2011	tbd	End of September
5	CH	Ennetbürgen	BKPNW	future-e	x	/	Polycorn	4	25/05/2011	tbd	until Oct 2011
6	CH	Dallenwil	BKPNW	EPS	/	x	Polycorn	3	25/03/2011	Delivered	End of September
7	CH	Alpnach, Loppertunnel	BKPNW	future-e	/	x	Polycorn	4	11/02/2011	tbd	until Oct 2011
8	CH	tbd	Swisscom AG	EPS	/	x	Telecom	6	tbd 2012	2012	tbd
9	I	Settimo Milanese	Wind	EPS	/	x	Telecom	12 +electrolyzer	31/03/2011	tbd	End of October
10	I	Milano (Nicolodi)	Wind	EPS	/	x	Telecom	6 +electrolyzer	31/03/2011	tbd	End of October
11	I	Milano (Lorenteggio)	Wind	EPS	/	x	Telecom	6 + electrolyzer	31/03/2011	tbd	End of October
12	TR	Istanbul	Turkcell	EPS	tbd	tbd	Telecom	6 + electrolyzer	24/05/2011	Delivered	October
13	TR	Duzce	Turkcell	future-e	tbd	tbd	Telecom	4+ electrolyzer	12/05/2011	Beginning 2012	tbd
14	TR	Istanbul	Unido-Ichet	EPS	x	/	Benchmark	6	25/05/2011	Delivered	October
15	TR	Istanbul	Unido-Ichet	future-e	x	/	Benchmark	6	tbd	Delivered	October
16	NL	Petten	JRC	EPS	x	/	Benchmark	6	30/03/2011	Delivered	Installed
17	NL	Petten	JRC	EPS	x	/	Benchmark	6	30/03/2011	Delivered	Installed
18	NL	Petten	JRC	future-e	x	/	Benchmark	6	08/03/2011	Delivered	Ongoing
19	NL	Petten	JRC	future-e	/	x	Benchmark	6	08/03/2011	Delivered	Ongoing



# Installation of the Systems at end users' sites

- Installations cover a wide range of geographical and weather conditions.
- End-user sites have different kinds of operating load characteristics.



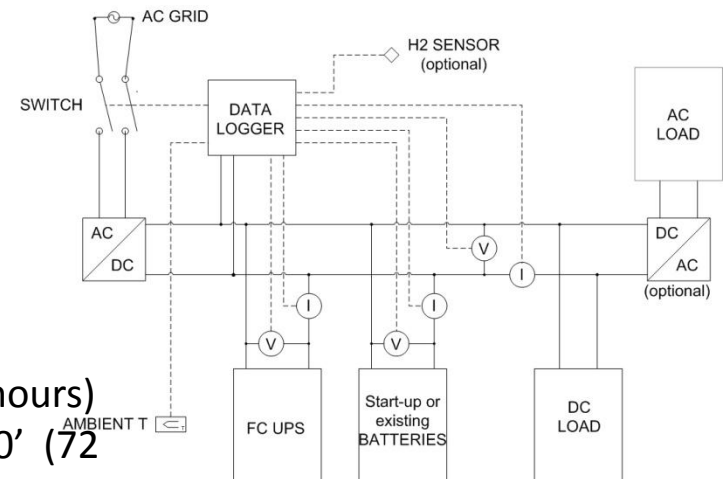
*The FuturE solution installed*



*The ElectroPS system installed at Swisscom*

# Field and Benchmarking Tests

- A standardized test architecture and a test protocol has been developed for field and laboratory tests.
- Benchmark tests include long-term durability tests with a total of 1500 hours operation and 1000 on-off cycles for each system.
- Stability of the system under stress conditions will be simulated.
- Additionally two systems will be tested in environmental chamber in JRC to expand benchmarking data set for wider operating range.
- Different test protocols for Telecom, Tetra sites, with or without electrolyser have been developed, considering a mix of grid failure simulations
  - **short term grid failures (A type)**, duration of 15'
  - **medium and long term grid failures (B type)**, 240' (4 hours)
  - **catastrophic grid failures (C type)**, duration of 4320' (72 hours).



- A standard remote data acquisition methodology is defined to ensure statistically relevant data will be obtained.
- Identical set of equipments will be used for testing in all installation sites.
- Comparisons will be drawn among different sites based on supplier and characteristics at each site (load, environmental conditions, etc...)
- Field test results will be compared with the benchmark data to address deviations in real-life applications.
- A life cycle analysis will be carried out to assess the fuel cell UPS technology thoroughly with its environmental impacts and economic viability. The results will be compared to conventional solutions already available in the market.



# Project Alignment with the MAIP 2008-2013

## Application Area: Early Markets

- Project will bring EU companies on par with those active in the US and at the forefront of fuel cell technology worldwide for these applications.
- RTD is supported to overcome market entry barriers in Europe.
- Sustainability and competitiveness of the technology will be assessed thoroughly with its environmental, social and economic impacts.
- Public awareness and acceptance of the technology will be promoted.
- Market penetration made possible by this project will help achieve FCH-JU targets of goals of 1000 UPS/backup power systems by 2015.

## **Early Markets / Portable generators, backup and UPS power systems**

**(SP1-JTI-FCH.2009.4.2)**

Project will meet following objectives of this call:

- Development and deployment of the technology
- Demonstration of commercially ready fuel cell products
- Assessment of fuelling infrastructure requirements
- Validation and product testing
- Benchmarking of technologies
- Dissemination of results to wider audience and potential customers
- Certification procedures and RC&S development
- Life cycle assessment

## **Early Markets / Portable generators, backup and UPS power systems**

**(SP1-JTI-FCH.2009.4.2)**

Specific outcomes related to the call:

- Response time of less than 5 ms is achieved
- Lifetime greater than 5 years is expected with at least 1500 hours of backup power
- Systems are expected to endure 1000 on-off cycles
- Reliability of 100% is a very high requirement for commercial products. Project goal is to prove operation with more than 95% reliability.
- It is expected to achieve cost targets of 5000 €/kW.

- Test architecture and test protocols developed in this project will be standardized.
- Certification procedures will be developed and/or amended for installation of fuel cell UPS systems. TUV Sud will supervise these activities.
- Potentially interested industries will be aware of the technology by disseminating project results in conferences, fairs and trade shows. ElectroPS presented the project at GSMA, FutureE at Hanover fair and LUASA at the European Fuel Cell Forum in 2011.
- Public awareness at large will be maintained with newsletters, internet and published material. Project website is already up and being improved.
- At the end of the project a report on non-technical barriers will be published.



## FCTESQA

- Fuel Cell Systems Testing, Safety & Quality Assurance (FCTESQA) led by JRC is a Specific Targeted Research project co-financed within FP6.
- Test protocol developed in FITUP will be shared and a common standardization procedure will be sought.

## IEC (International Electrotechnical Committee)

- Project partners work actively in IEC Fuel Cell Technologies technical committee (TC 105). Project outcomes will be discussed in IEC workgroups.

## FC-HyGuide

- Life Cycle Assessment Guidance for Fuel Cells and H<sub>2</sub>-Technologies is a project funded by FCH-JU.
- Outputs of FC-HyGuide will be used to carry out LCA in FITUP project.

- Follow-up projects should be supported for deployment of more units in other locations with different geographical and weather conditions.
- Systems with electrolyser may be more interesting in commercial means because it doesn't need hydrogen logistics.
- Off-grid power supply solutions should be considered in new call.
- Reliability of the grid in other parts of the world is much lower than that in Europe. This makes emerging countries more suitable markets for fuel cell backup power systems. Collaborations should be sought in Middle-East, Asia and Africa.



**Thank you for your attention!**

**For more information:** [www.fitup-project.eu](http://www.fitup-project.eu)

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