

Project no. EIE/05/217/SI2.420237

RES-FC MARKET

Regional markets of RES-fuel cell systems for households

Intelligent Energy – Europe (EIE)
Type of action: Type 1

Technical implementation report

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Coordinator name/ organisation/ e-mail/ telephone number:

Mr. Jens-Chr. Moeller

Hydrogen Innovation & Research Centre

HIRC

Birk Centerpark 40

DK-7400 Herning

jcm@hirc.dk

+45 7025 1114

Project website: www.resfc-market.eu

1. Project objectives and major achievements during the reporting period

1.1. Project objectives

The aim of the project is to support the development of early niche market for renewable energy sources fuel cell micro-CHP (combined heat and power) systems for households and thus firstly contribute to commercialisation of fuel cell technologies, and secondly – to the increase of the share of renewable sources in the energy consumption.

The renewable energy sources identified as relevant at the project description were in particular wind power, biogas and methanol (and hydrogen-from-wind, biogas and methanol fuel cells respectively). However, other sources like e.g. solar energy might be included if they prove to be relevant for some potential regions.

The key part of the project is identification and description of the potential regional markets for at least 3.000 units of RES-FC systems – a catalogue of min. 10 regions, describing the technology to be used there, local conditions, barriers and ways to overcome them.

While the technology is already in place, the major barriers for the commercialisation are at present absence of regulations and the price. In particular driving the prices down is a critical element for the success of the development of market. The cost of RES-FC systems is expected to be cut down to the level of less than EUR 5.000 / kWe through the aggregation of regional market and getting benefits of the effect of scale. Additional price decreases are expected from sharing experience between the regions and implementing best practices, as well as further technical improvements.

1.2 Summary of activities and results for the reporting period

The key activity and task in the reporting period was to identify and describe the relevant technologies and potential early markets (WP2). The other work packages will then built on that input.

The technology part of WP2 comprises:

- description of an entire RES-FC system, from prime energy, through storage and distribution and a fuel cell CHP system at the end user; a separate system analysis had to be prepared for various energy sources: biogas, pure hydrogen with wind and methanol. A report with scenarios for all identified systems (biogas to CHP, biogas and wind to CHP and only wind to CHP) has been made.
- determining the size of a fuel cell system (FCHS) for a single household, taking into account different requirement for regions, resulting from differences in climate and the residential market characteristics (e.g. the Portuguese housing market is dominated by apartment houses, with marginal share of detached houses). At the same time, for the reasons given below, it should ideally be the same size of a system for all regions and technologies.

The important consideration was unification of components whenever possible, so that the same components could be used in possibly many places, enabling us to benefit from economies of scale (a vital part of WP4). Standard or common components should be used – whenever possible – not only in various regions, but also for different systems.

It was mutually decided that the fuel cell system would be a PEM fuel cell operating on pure hydrogen with a power level of 0.5 to 1 kW. The RES supply would be generating pure hydrogen in

a pipeline system for a new residential area. The houses in these areas would be well insulated because of the low thermal output of the fuel cell system. In this way the system is more focused than all the systems that the individual partners had in mind.

The technical status and the system layout were described in general.

Special attention has been paid to electrolysis. Integration of wind energy on a bigger scale without cheap electrolysis is not possible, thus finding alternative and cheaper way to produce hydrogen using electrolyzers is among the key issues for success of the project. As a part of WP2 representatives of BIC and HIRC visited a Russian manufacturer of alkaline electrolyzers.

Progress of work as at 30-06-2006

The description of the technical status of RES-FCHS systems is ready in 65%, whereas 100% was anticipated. The advancement of description of the regional markets is 20% where 40% was anticipated.

1.3 Identified problems and corrective actions taken

- The feed-back on the questionnaire sheet was low and at the second project meeting a redefined fact sheet was prepared and sent around.
- Not all cost aspects could be covered in the technical description; suppliers are not easily providing future cost projections or cost/price information in general.
- Some regions pointed out in proposal as potential markets do not have the characteristics described in the proposal, e.g. in Germany the existing conditions favour centralised CHP plants. As a result new regions were proposed.

2. Consortium management in the period

2.1 Project meetings

In the reporting period two project meetings were held:

a. The kick-off meeting in Herning, DK

The kick off meeting was held on 6-7 March 2006 in Herning, DK. Setting an earlier date was not possible due to other appointments of the partners. To avoid such situation in future, dates for all remaining coordination meetings have been proposed in the minutes from KO meeting and accepted by partners.

The agenda for the meeting, list of participants and presentations have been published on Coordinator's website www.hirc.dk. The minutes were taken and sent to partners, and afterwards put on project's website www.resfc-market.eu in the "Member area".

b. Coordination meeting at ECN, NL

The meeting was held on 27-28 June 2006 at ECN. Representatives of all partners were present. Minutes from the meeting have been taken and are available the project website along with agenda and presentation.

2.2 Cooperation with other projects – Roads2HyCom

The scope of RES-FC Market covers much of the same as Roads2HyCom, a project funded under FP6 and cooperation between the two projects in order to exchange information and experience and avoid duplication of activities was recommended by IEEA in the negotiations phase. The contacts

with representatives of Roads2HyCom – the informal contacts between HIRC and Risø, who is a partner to Roads2HyCom and internal contacts within ECN – did not result in establishment of the closer cooperation. The reason is that the contacts took place in the first half of 2006 when the Roads2HyCom team were at the beginning of the process of working out the methodology and could not propose terms of closer cooperation before that task has been completed. Contact to the coordinator of Roads2HyCom, Mr Keenan (personal at the workshop in Turin, on 15-16 March 2006) brought about similar results (i.e. a kind proposal to come back to the matter later).

After Roads2HyCom opened registration of interests from potential Hydrogen Communities, we considered at the first using that tool to share our findings, but found out that that framework is not suitable for delivering the results of RES-FC Market, (it is addressed directly to and tailored for representatives of communities). In this situation it was decided at the coordination meeting in June that RES-FC Market coordinator will prepare a report for Roads2HyCom informing about our activities and findings and send it to Roads2HyCom coordinator in order to inform about our activities, the scope and objectives of the project, the actions started, methodology and results and on that on that basis we will try to prepare a common format for both projects.

2.3 Other

One of the partners changed their legal name from Dantherm A/S to Dantherm Air Handling A/S. IEEA has been informed and acknowledged the changed. The reason for the change was related to new market strategy and did not entail any further substantial organisational or functional changes.

A set of publishable slides has been prepared and forwarded to EIE. We expected it to be published on EIE website together with the Fact Sheet, but that has not happened.

2.5 Communication

The communication between partners in the reporting period has been made mostly via e-mail and telephone, with few examples of direct / personal contacts except from at the two coordination meetings. This situation was discussed at the coordination meeting at ECN and partners agreed that more direct contacts between partners, as well personal contacts, including travels when necessary, are needed.

3. Progress of each work package in the period

3.1. Progress of work plan against initial objectives

- WPI: management and coordination

In the reporting period the management activities planned included the standard coordination activities: organising of the two meetings and establishing of cooperation with Roads2HyCom. The kick-off meeting could not be held in the same month as official start of the project, but was organised on the earliest possible date. The minutes have been prepared, sent to partners and commented, and presentations from the meeting are available on www.hirc.dk. The second coordination meeting was organised and held at ECN according to plan, and minutes have also been prepared and sent to all partners. Also the dates for the remaining coordination meetings have been settled and included in the minutes, as it turned out that with so big number of partners it is very difficult to set a date convenient for all unless it is done long time in advance.

The third task – that of establishing the cooperation with Roads2HyCom – has been less successful until now, as presented in point 2.

- WP2: Status on RES-FCHS technology and regional market development

The WP firstly had to focus on identifying the technology relevant for the purpose of the project: if we want to benefit from economies of scale, we have to focus on a limited number of solutions, which could be ordered in bigger quantities. The second task was to place the short listed technologies in the system context and analyse the feasibility of the whole RES-based system. That task proved to be more challenging than expected at the moment of project description, but as a result lists of technologies as well as 3 technological scenarios describing the possible systems based on renewable energy sources were prepared.

The regional part of WP2 is being prepared on the basis of the short listed technologies, using uniform questionnaires, which enable the partners to compare the results. Preparing the questionnaires took rather long and the last version, incorporating factors relevant from the point of view of commercial companies was sent to all partners in the middle July. The partners responsible for regions are expected to return completed questionnaires by the end of July.

As part of WP2 a trip to a Russian manufacturer of electrolysers was made, after selecting the manufacturer from the list of all potential producers in the East European markets. As the effect of the trip it was found that the manufacturer can produce the requested electrolysis equipment at a fraction of the price asked by Western suppliers, but introducing even minor changes to the design in order to get CE-certificate for the equipment meets serious obstacles due to old and bureaucratic organisation.

-WP3: Market development plans

The WP leader presented working plan, methodology and organisation for the WP3. At the second coordination meeting a “boundary” between WP2 and WP3 was also discussed to avoid confusion in task distribution, because some issues could be attributed to either of the WPs. It was agreed that:

- WP2: provides technical description of state-of-the art technology and regions, gives only description of barriers
- WP3: provides means of overcoming the barriers described in WP3 and verifies if market conditions exists in a given region using system analysis

-WP4: not started, scheduled to begin in August 2006.

-WP5: not started, scheduled to begin in August 2006.

-WP6: Dissemination

Dissemination activities planned in the period covered creating a website with presentation of the proposed activity. The task has been accomplished and website is available on www.resfc-market.eu

-WP7: Common dissemination activities

A set of publishable slides was prepared after official start up of the project and forwarded to IEEA in February 2006.

3.2 Deviations from the project work plan

The kick-off meeting for the project was delayed by 2 months, which also delayed the work in WP2. Potential interesting regions are redefined because of the general system description above and the type of fuel cell system envisaged.

As a consequence we must expect that deliverables from WP2, esp. the catalogue of regions and report to Road2HyCom might be delayed by 2-4 weeks.

3.3 Up-date of schedule

Up-date of schedule (item 4.3.2 in Annex 1) was necessary to eliminate inconsistencies between the schedule and description of work packages. At the kick off meeting it was agreed that schedule should be updated according to WP description. The new schedule has been sent to all partners.

3.4 List of deliverables

See Annex 1

The remaining deliverables are due in months 24 – 32.

4. Progress regarding performance indicators

The performance indicators for activities planned for the reporting period are :

- Technology part of WP2 – description of technical reliability, cost, manufacturers and EU need for integration of RES – are the overall conditions in place?
- Regional part of WP2 – description of the need of RES integration, end users, infrastructure, feed-in tariffs and suppliers – are the regional market conditions in place for 10 regions?

On the basis of preliminary results of WP2 we can say that reliable technology is available already today, but its cost remains high.

As regards the need of RES integration, it can be considered to be a market-creating factor only in some regions (esp. in Jutland, perhaps also is Navarra). In other regions different market drivers must identified: financial incentives (subsidies) which lower the cost of technology or the strong will to have “green image”.

5. Other issues

N/A

Annex 1

Overview of the current status of deliverables, based on the List of Deliverables

Del. N°	Deliverable name	Related work package N°	Date due	Actual/Forecast submission deadline
D.2.1	Catalogue of RES FCHS technologies	2	Month 8	Month 8
D.2.2	Report with status of 10 regional markets	2	Month 8	Month 8-9
D.2.3	Report with WP2 inputs for R2HC	2	Month 8	Month 9
D.6.1.A	Presentation of project on the website	6	Month 6	Month 6 (delivered)

Annex 2 to the progress report: Overview table on the state of advancement (in %) of the budget expenditure per partner and per work package

Work package	Actual/Planned Achievement	Total Partners	Partner 1 HIRC	Partner 2 UoI	Partner 3 ISR	Partner 4 AAU	Partner 5 CENER	Partner 6 ECN	Partner 7 IBBK	Partner 8 Elsam	Partner 9 IRD	Partner 10 DT	Partner 11 KIBZ	Partner 12 BIC
WP 1: Coordination	Actual	40.0%	40%											
	Planned	20.0%	20%											
WP 2: Status	Actual	60.7%	50%		70%	75%		70%	90%	80%	11%		10%	90%
	Planned	80.7%	80%			75%		80%	90%	90%			60%	90%
WP 3: Market dev. plans	Actual	7.5%	0%		10%	10%			10%					
	Planned	7.7%	3%			10%			10%					
WP 4: 3.000 units	Actual	0.0%	0%						5%					
	Planned	0.0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
WP 5: tech. impr.	Actual	0.8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%
	Planned	0.0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
WP 6: dissemin.	Actual	3.8%	0%		45%									
	Planned	0.4%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
WP 7: common diss.	Actual	0.0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Planned	0.0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total Project	Actual	18.8%	13%	0%	25%	21%	0%	23%	21%	27%	4%	0%	3%	33%
	Planned	18.1%	15%	0%	1%	14%	0%	16%	18%	18%	0%	0%	12%	18%