

**What are the expected
deliverables?**

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EIE Project Kick-Off in Herning March 06

- Background
- In work package 4 there were works on synergies between the 10 regional RES-FCHS markets through European trans-regional cooperation. Parallel to this is in work package 5 partners will work to achieve technical and thereby economic improvements of RES-FCHS systems through involvement of leading European expertise in RES-FCHS and through utilization of experiences from similar technologies, e.g. as wind energy to achieve good results. Work packages 4 and 5 are working in parallel to improve the potential for establishing the 10 regional RES-FCHS markets.
- Objectives
- The objectives are to obtain technical and thereby economic improvements of RES-FCHS systems through involvement of leading European expertise in RES-FCHS and through utilization of experiences with similar technologies, e.g. as wind energy, where good results have been achieved.
- The activities of work package 5 are supplementary to the activities of work package 4, whereas in 4 will be worked with RES-FCHS technologies on a status quo basis, and 5 on improvements of status quo as it is performing in technologies presented from suppliers.
- It is the aim to obtain a minimum 10% improvement of economic performance.

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- Description of the work and contributions from the partners
- Improving technical performance
- This effect is achieved through the involvement of European leading experts in the field of marketable RES-FCHS systems, with work package leader, University of Iceland, having first hand experience from implementing fuel cell systems in Iceland. Also experts in practical technology improvements will be involved, especially with experience from the renewable energy sector, e.g. as wind energy, which has been very successful on technical improvements.
- The activities include technical improvements of:
- Specific RES-FCHS solutions of biogas, methanol and wind/H₂ also seen through our experience of geothermal and hydroelectric in Iceland.
- Fuel cell technologies, including systems of converters etc. and **electrolyser**
- Through this activity the RES-FCHS technologies will come from a regional level to a "**best European level**" through combining the best regional solutions and improving these with experiences from similar sectors and with expertise from the involved partners.
- The partners involved in trans-regional activities on RES-FCHS technologies will do these activities - with the work package leader as coordinator and defining the overall strategies.

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- The regional element
- The other main activity is to integrate the effects of technical improvements into the regional activities and thereby contributing to overcoming the regional barriers, e.g. of too high costs on RES-FCHS systems etc. The partners involved in the regional activities will do this. There is a direct effect of synergies between the regional activities of work package 4 and 5, leading to reduced contribution of man hours in this activity of work package 5.
- Methodology
- The methodology for obtaining cost reductions due to technical improvements has the following main elements:
 - Taking the best out of each of the regional technological solutions registered in WP 2 and combining the best solutions to improved RES-FCHS
 - Each component of the "improved" RES-FCHS systems is analyzed, if there are better/more cost efficient solutions on the market. Experience from the development of the wind technology shows that this can be an efficient strategy, choosing standardised and mass produced components
 - The whole RES-FCHS system is analyzed, if improvements on a system level can be identified, especially on simplifying the systems, e.g. based on an overall strategy of simple but more reliable and cost efficient solutions.

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- The WP-leader will coordinate the effort of identifying potential technical improvements and costs reductions with inputs from the technical expertise partners of the project, including the WP-leader. In this dialogue it is expected to achieve the results of improvements of minimum 10%. The contributions from each of the partners are listed below.
- The activities and tasks will be focused on a trans-regional level of improving the technologies.
- As an example it can be mentioned that the cost of electrolyzers are very high. One of the reasons is that the market seems to be dominated by only a few suppliers, creating a situation of monopoly. In Russia and Ukraine there is much more cost efficient electrolyser technology, but it has to be adapted to Western standards, and this is seen as being possible. The technical expert-partner in electrolyzers, BIC, will contribute with the technical expertise. Especially for electrolyzers there is a strong need for technical and economic improvements; therefore the efforts here are relatively strong. It is expected that substantial cost reductions on electrolyzers can be achieved through this project.
- The results of cost improvements shall be implemented into the regional level together with implementing the results of cost reductions from WP2. Due to the synergy effect of the regional implementation activities between WP 4 and 5, a smaller man hour contribution is dedicated to this activity in WP 5.

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<u>Tasks (T) of each of the partners</u>						
Partner activity	Trans-regional activity MH	MH	Regional activity	MH	MH	Other
HIRC			Wind/H2, DK	30		30
UoI leader	Fuel cells, IC (T.5.1)	100	Methanol, IC	100		WP
370	570					
ISR-UC			PT, Wind/H2	77		
77						
AAU			DK, Biogas	80		80
CENER	Wind/H2 (T.5.2)	70	ES, Wind/H2	70		
	140					
ECN			NL Wind/H2	30		30
IBBK	Biogas (T.5.3)	100	DE, Biogas	30		
130						
Elsam	Methanol (T.5.4)	40	DK, Methanol	30		
70						
IRD	Fuel cells (T.5.5)	90				90
DT	Fuel cells-systems (T.5.6)	150				150
KIBZ			DE, meth. wind/H2	100		100
BIC	Electrolyser (T.5.7)	50				50
Totally	600	Totally	547	Totally	370	1.517

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- **Outcome of this work package:**
 - The outcome of work package 5 will be a report of proposed improvements of RES-FCHS technology leading to minimum 10% reduction of costs.
 - The overall outcome of work package 4 and 5 together is to reduce costs for RES-FCHS to a level < 5,000 EURO/kWe.
- **Deliverables of this work package**
- **List of deliverables**
- **5.1 Report on the overall improvements of technical/economic performance, including improvement at the regional level - made by the WP-leader**
- **5.2 Reports on technical improvements of technology for each field of RES-FCHS technology:**
- **Wind/H₂-fuel cells - Cener**
- **Biogas-fuel cells - IBBK**
- **Methanol-fuel cells - Elsam**
- **Fuel cell systems - University of Iceland UoI and Dantherm**
- **Fuel cell technology - IRD**
- **Electrolysers - BIC**

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- Work package leader is University of Iceland, including tasks of:
- The overall coordination of the activities
- Providing expertise and experience from Iceland on technical improvements on RES-FCHS systems
- Making a catalogue of technical/economic improvements
- Reporting from work package 5
- The technical-economic partners of the project will contribute with their expertise on RES-FCHS and fuel cells:
- CENER - wind/H₂
- IBBK - biogas
- Elsam - methanol
- IRD - fuel cells
- Dantherm - fuel cell systems
- BIC - electrolyser
- Integration of synergies into the regional market development plans will be made by the partners involved in these activities and will include reporting on the regional improvements:
- HIRC - wind/H₂, Jutland, DK
- UoI - methanol, Reykjavik, IC
- ISR-UC - wind/H₂, Coimbra-region, PT
- AAU - biogas, Jutland, DK
- CENER - wind/H₂, Navarra-Basque, ES
- ECN - wind/H₂, North Friesland, NL
- IBBK - biogas, Baden-Württemberg, DE
- Elsam - methanol, Jutland, DK
- KIBZ - wind/H₂, Schleswig-Holstein, DE
- KIBZ - methanol, Baden-Württemberg, DE

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- **Wishing ourselves all the best of luck!**