



Energy Pillar Topics in 2015 call



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Topic	Type of Action	Ind. Budget M EUR
FCH-02.1-2015: Improved electrolysis for Off-grid Hydrogen production	Research & Innovation (RIA)	20
FCH-02.2-2015: Improved electrolysis for Distributed Hydrogen production		
FCH-02.3-2015: Development of co-electrolysis using CO ₂ and water		
FCH-02.4-2015: Proof of concept of HT electrolyser at a scale >70 kW		
FCH-02.5-2015: Development of technology to separate hydrogen from low-concentration hydrogen streams		
FCH-02.6-2015: Development of cost effective manufacturing technologies for key components or fuel cell systems		
FCH-02.7-2015: MW or multi-MW demonstration of stationary fuel cells	Innovation (IA)	34
FCH-02.8-2015: Sub-MW demonstration of stationary fuel cells fuelled with biogas from biowaste treatment		
FCH-02.9-2015: Large scale demonstration μ CHP fuel cells		

Topic 2.1: Improved electrolysis for Off-grid Hydrogen production

Challenge

- Hydrogen potentially a solution for powering off-grid remote areas (islands, mountain refuges) coupled to renewables.
- 50-100kW electrolyzers operating on DC-DC bus (PV-Electrolyser systems) capable for dynamic operation, high η , low cost

Scope

- Develop Off-grid PEME or AE integrated to PV or small wind - 6M€/tpd, <55kWh/kg, dynamic operation
- Develop power conversion & BoP H/W for DC-DC, AC-DC, grid constraints
- Develop control systems
- In-field testing (TRL 6) in combination with existing PV or wind @ 50-100 kW
- Explore uses of H₂

Topic 2.1: Improved electrolysis for Off-grid Hydrogen production

Impact

- Solar/wind electricity $\rightarrow H_2 \eta < 55 \text{ kWh/kg (LHV)}$
- Identify specific business cases where off-grid H_2 could have an impact

Indicative Funding; No. of projects

- EU contribution of 2.5 Meuro; 1 project; 3 years

Other information

- TRL 4-6
- Eligibility criterion: >1 member of IG or RG

Topic 2.2: Improved electrolysis for Distributed H₂ production

Challenge

- Electricity grid bottlenecks due to increased penetration of RES (65% by 2050)
- Deferral of T&D grid investments possible through energy storage solutions
- H₂ can play a role in peak shaving and demand response – provision of energy services
- Electrolysers with Start-stop, dynamic operation, high η across load curve

Scope

- 100-500kW electrolysers for provision of grid services
- <2sec to go from 20-100% of nominal power
- Warm, cold start-up, stand-by <5% of nominal power
- Costs down to 3.7 M€/tpd, system simplification, material use min.

Topic 2.2: Improved electrolysis for Distributed H2 production

Impact

- 52 kWh/kg H2 for AE and 48 kWh/kg H2 for PEME
- 630 EUR/kW for AE and 1,000 EUR/kW for PEME
- Identification of business cases
- Involvement of policy makers / regulatory authorities

Indicative Funding; No. of projects

- EU contribution of 2.5 Meuro; 1 project; 3 years

Other information

- TRL 4-6
- Eligibility criterion: >1 member of IG or RG

Topic 2.3: Development of co-electrolysis using CO₂ and water

Challenge

- Co-electrolysis of H₂O and CO₂ to produce H₂ and CO for converting e⁻ to syngas (P2G, P2chemichals)
- SOE co-electrolysis advantageous to electrolysis+methenation for synthetic fuels – acts as CO₂ sink
- Design of improved components, system optimisation to increase η and integration of SOEC in energy system

Scope

- Novel cells, electrolytes, electrodes
- Design of process for direct synthetic fuel production (materials, reactor)
- Validation of operation for different composition of synthetic fuel, <1% degradation of η after 1,000 hours
- Techno-economic assessment

Impact

- ~ 50% e⁻ to syngas η
- Prove concept in representative conditions
- Increased durability > 1,000 hours
- Decrease cost of syngas production

Indicative Funding; No. of projects

- EU contribution of 2.5 Meuro; 1 project; 3 years

Other information

- TRL 3-5

Challenge

- Prove the high performance potential of HT electrolysis at the system level and at a scale above 70 kW
- Power capacity to be achieved through single or multiple modules

Scope

- Design & construct HT electrolyser, min 70kW, $\eta > 68\%$, lifetime >2,000 hr
- In-field tests for >6months
- Techno-economic assessment vs AE or PEME

Impact

- Contribution in achieving <40kWh/kg H₂
- In-field testing for validation of targeted performance
- Identification of business cases

Indicative Funding; No. of projects

- EU contribution of 4 Meuro; 1 project; 3 years

Other information

- TRL 4-5
- Eligibility criterion: >1 member of IG or RG

Challenge

- Recovery of H₂ from streams with low (<10%vol) concentration of hydrogen is currently expensive and inefficient
- Separation of H₂ from NG grid or from mixtures of chemical / biological processes
- <5kWh/kg H₂ separated

Scope

- Develop technology for separating H₂ from mixtures <10% H₂
- Testing on site (residential, HRS) > 25kg/d, ISO14687 quality, > 800 h operation
- €1.50/kg H₂ separated expected for full scale operations
- Cost assessment

Impact

- Feasibility of cost $<1.5\text{€}/\text{kg}$ and $\eta < 5 \text{ kWh}/\text{kg}$
- Increase use of dilute H₂ in energy and transport apps

Indicative Funding; No. of projects

- EU contribution of 2.5 Meuro for $>25\text{kg}/\text{d}$; 1 project; 3 years

Other information

- TRL 3-5

Topic 2.6: Development of cost effective manufacturing technologies for key components or fuel cell systems

Challenge

- Step-up from small scale production towards higher volumes
- Develop/apply novel manufacturing technologies, e.g. laser welding, coating, 3D printing, molding and casting of materials that are used for fuel cell system components and /or fuel cell stacks

Scope

- Use best in class manufacturing technologies, production processes, equipment and tooling with cost impact
- Develop industry-wide agreements for standard BoP components for FCs, including heat exchangers, reformers, converters, inverters, post-combustors, actuators and sensors

Impact

- Potential cost reduction of key components for system CAPEX of max 12.000 €/kW (residential), less than 7,500 €/kW (commercial) and less than 3,000 €/kW (industrial)
- Min 97% availability due to implemented quality systems

Indicative Funding; No. of projects

- EU contribution of 2 M €; max 3 projects

Other information

- TRL 4/5→6/8 (segment dependent), Eligibility criterion: >1 member of IG or RG

Topic 2.7: MW or multi-MW demonstration of stationary fuel cells

Challenge

- Achieve market entry of FCs in commercial/industrial segments through realisation of large demos to demonstrate feasibility, confidence building & ↓ TCO

Scope

- 1 MW up to several MW CHP from NG or H₂
- Integration and validation of FC power plant in commercial/industrial applications
- Business plans and service strategies; create partnerships; end-users experience

Impact

- Reduce the overall energy costs; build trust among stakeholders, create jobs
- Reduce use of primary energy by electrical $\eta > 45\%$, total $\eta > 70\%$
- Reduce CAPEX < 4,000 €/kW for systems ≥ 1 MW; 3,000-3,500 €/kW for systems ≥ 2 MW
- Demonstrate technical and financial viable solution: H₂ sources, maintenance costs, FC lifetime

Indicative Funding; No. of projects

- EU contribution of 9M € for 1 MW (+ 1.5 M € for additional MW), max 10-12 M €; 1 prj.

Other information

- TRL 7-> 8, Eligibility criterion: >1 member of IG or RG; 5 years

Topic 2.8: Sub-MW demonstration of stationary fuel cells fuelled with biogas from biowaste treatment

Challenge

- Demonstrate the technical and commercial feasibility of sub-MW stationary FC's directly fuelled by biogas

Scope

- Develop business plan and service strategies; create partnerships
- Validate units in representative applications; Full, steady-state process integration of the FC system with the biogas producing process
- 100 kW-1 MW capacity production of power and heat from bio gas

Impact

- Demonstrate a viable solution and a replicable business case, efficiency and sustainability of processing organic waste streams
- Reduce use of primary energy by electrical $\eta > 45\%$, total $\eta > 70\%$
- Reduce CAPEX: 3,000-3,500 €/kW (near 1 MW); 6000-6,500 €/kW (near 100 kW)
- FC system lifetime towards 20 years of operation

Indicative Funding; No. of projects

- EU contribution of 5M € for 1 MW (at the level of 12.5 k€/kW); 1 project

Other information

- TRL 6 -> 7; 5 years

Topic 2.9: Large scale demonstration μ CHP fuel cells

Challenge

- Second generation large scale demonstration of μ CHP fuel cells destined for the residential and small commercial applications (0.3-5 kW)
- Larger volumes (min 500 units per manf.) to support automation, bundled sourcing strategies, increase standardisation within and across technology lines; increase and further optimisation of running modes and operating models

Scope

- Demonstrate 2,500 μ CHP units with at least 500 units (or kWel) per manufacturer; develop μ CHP business models
- Min. of 3 manufacturers with successful operation of min. 250,000 kWh produced and fleet availability of at least 90% for at least 100 units or 100kWel
- Demonstrate and optimize new solutions/products at components and system level
- Double stack lifetime during the project as compared to the state-of-art figures
- Test and demonstration of new models to minimize installation efforts and installation failures
- A pathway for European SMEs in the development, manufacture and supply chain of fuel cell μ CHP components; Increase awareness
- Min 99% availability in the FC fleet; Establish a “technical label”

Topic 2.9: Large scale demonstration μ CHP fuel cells (cont)

Impact

- Reduction of the FC stack production cost with at least 30%
- Application of innovative production methods (min 30% increased automation)
- Reduce CAPEX: less than 10.000 €/kW; Increased system lifetime > 15 yrs
- Reinforce European supply chain of critical key components
- Generate cost decreases on core components

Indicative Funding; No. of projects

- EU contribution of 30 M €; 1 project

Other information

- TRL 7-> 8/9, Eligibility criterion: min 3 manufacturers; >1 member of IG or RG; 5-6 years

Call Material

<http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-jti-fch-2015-1.html>

FCH JU official website:

www.fch.europa.eu



European Industry Grouping

for a FCH-JTI (NEW-IG):

<http://www.fchindustry-jti.eu>



New European Research Grouping

on FCH (N.ERGHY):

<http://www.nerghy.eu>

