



# Energy Pillar

## Topics in the 2017 call

H2 Production - N. Lympieropoulos  
Stationary FCs - D. Tsimis



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- **Main focus**

**Aim for breakthroughs in electrolysis to increase H<sub>2</sub> from RES:  
Novel concepts and upscaling**

- **What is New**

- **Innovative concepts: game changer & reversible electrolyzers; testing according to protocols of JRC for FCH JU**
- **Largest single electrolyser demo to date (10MW)**
- **Liquid Organic hydrogen carrier**

# Energy Pillar Hydrogen Production

Topic	Type of Action	Ind. Budget M EUR
CH-02-1-2017: Game changer Water Electrolysers	RIA	2
FCH-02-2-2017: Game changer High Temperature Steam Electrolysers	RIA	3
FCH-02-3-2017: Reversible Solid Oxide Electrolyser (rSOC) for resilient energy systems	RIA	3
CH-02-4-2017: Highly flexible electrolysers balancing the energy output inside the fence of a wind park	IA	5
FCH-02-5-2017: Demonstration of large electrolysers for bulk renewable hydrogen production	IA	10
FCH-02-6-2017: Liquid organic hydrogen carrier	RIA	2.5
FCH-02-12-2017: Demonstration of fuel cell-based energy storage solutions for isolated micro-grid or off-grid remote areas	IA	5

### FCH-02-1-2017: Game changer Water Electrolyzers

 Support promising laboratory-scale concepts to next stage of engineering

- Address  $\geq 1$  priorities (P, response T, current density, temp., etc.)
- 10-50 kW system but suitable for MW electrolyzers
- Include at least one electrolyser OEM, R&D institution

### FCH-02-2-2017: Game changer High Temperature Steam Electrolyzers

 Step change improvement to enable future commercial introduction

- 4 improvements, addressing  $\geq 1$  targets
- Include at least one electrolyser OEM, R&D institution


### FCH-02-3-2017: Reversible Solid Oxide Electrolyser (rSOC) for resilient energy systems

 Single device acting as SOFC or SOE, reduced investment, fewer start/stops

- 11 specific issues to be addressed
- Include at least one SOE OEM, R&D institution


### FCH-02-4-2017: Highly flexible electrolysers balancing the energy output inside the fence of a wind park

 Smooth power output of park, avoid T&D grid costs, integrated layout



-  Valorise H2 produced
- Include at least W/P developer, electrolyser OEM, grid operator
- International collaboration encouraged (IPHE)

### FCH-02-5-2017: Demonstration of large electrolysers for bulk renewable hydrogen production



 Develop & demonstrate 10MW electrolyser providing RES-H2 to industry (exclude. steel) or transport plus grid services

-  Feasible business cases – continued demo after project
- Include at least electrolyser OEM, H2 end-user, power services company
- Links to commercial & technical expertise plus market access
- Note eligibility of electricity costs before/after commissioning
- $\geq 1$  IG/RG membership

### FCH-02-6-2017: Liquid organic hydrogen carrier

-  Double the amount of H<sub>2</sub> transported by 550 bar delivery truck (>1ton) using cheaper trailer – need for hydrogenation / dehydrogenation steps
-  • International collaboration encouraged (IPHE)

### FCH-02-12-2017: Demonstration of fuel cell-based energy storage solutions for isolated micro-grid or off-grid remote areas

-  Demonstrate the techno-economic viability of RES-H<sub>2</sub>-FC solutions for P2P in remote locations
-  •  $\geq 2$  locations, 250kW min FCs in stand alone or back-up apps
- Electrolyser, H<sub>2</sub> storage and FCs eligible
- Consortium to include EU electrolyser and FC OEMS, BoP suppliers and R&D institutions
- International collaboration encouraged (IPHE)

- **Main focus**

To use innovative design and manufacturing in order to improve performance and lower the cost of fuel cells; to repeat the success story of residential fuel cell systems in the commercial segment.

- **What is New**

- Flexible fuel cell power plants for grid support
- Transportable FC gensets for urban applications
- Next generation SOFC stack

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## Stationary Fuel Cells

Topic	Type of Action	Ind. Budget M EUR
FCH-02-7-2017: Development of flexible large fuel cell power plants for grid support	RIA	4
FCH-02-8-2017: Step change in manufacturing of Fuel Cell Stack Components	RIA	3
FCH-02-9-2017: Development of next-generation SOFC stack for small stationary applications	RIA	3
CH-02-10-2017: Transportable FC gensets for temporary power supply in urban applications	IA	12.5
FCH-02-11-2017: Validation and demonstration of commercial scale fuel cell core systems within a power range of 10-100kW for selected markets/applications	IA	




### FCH-02-7-2017: Development of flexible large fuel cell power plants for grid support

 Development of key components and strengthening of EU supply chain for grid support applications

-  • Design improvements addressing performance, capex, grid requirements and scale-up
- Size of the fuel cell power plant should be 75-200kW
- Validation in and industrial relevant environment for at least 8 months

### FCH-02-8-2017: Step change in manufacturing of Fuel Cell Stack Components

 Development of a new process or adaptation of a high-volume method to FC

-  • Produce sufficient volume for two existing stack designs to be assembled and tested
- Included at least one stack manufacturer and details of their supply chain of EU companies


### FCH-02-9-2017: Development of next-generation SOFC stack for small stationary applications

 SOFC stack – Design improvements for performance, manufacturing, standardisation and IP development

-  • 1kWe stack to be developed and tested for more than 5000h
- Collaboration mechanism with JRC on harmonisation of testing protocols


### FCH-02-10-2017: Transportable FC gensets for temporary power supply in urban applications

 FC gensets to replace diesel generators in at least two different environments.

-  Individual gensets 25-400kW, at least 4 x 75kW and 4 x 25kW, sum >500kW
- Onsite operation of at least 24 months (or 8000h) per unit.
- Fuel should be H2 stored onsite.
- Demonstrate the commercial pathway to replace diesel gensets.
- Include at least two FC manufacturers

### FCH-02-11-2017: Validation and demonstration of commercial-scale fuel cell core systems within a power range of 10-100kW for selected markets/applications

 Validate and demonstrate CHP solutions for the commercial sector

-  10-20 installations of which the sum > 400kW (incl. monitoring)
- Include at least three core fuel cell component suppliers and at least two of the group of system integrators, BoP suppliers, maintenance providers or utilities
- Demonstrate customer advantages and viable business models.
- Strengthen EU value chain for key components e.g. stack, reformer, heat exchangers