



MefCO₂ - Methanol fuel from CO₂

Synthesis of methanol from captured carbon dioxide using surplus electricity

Horizon 2020 Call: H2020-SPIRE-2014 Topic: SPIRE-02-2014

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TPG Thermochemical Power Group

Established in 1998 (26 people)

Permanent Staff (6)

Ph.D. Students (12)

Ass. Researchers (8)

Scientific activities

2004-2015 per-year average

- 10-12 International Papers
- 6-7 Journal Publications
- 1-2 International Awards
- 1-2 Patents



Research Activities



Theoretical Analysis

Experimental Activities

Gas Turbine Plant

Innovative Cycles

Distributed Generation

Thermoeconomics and Environomics

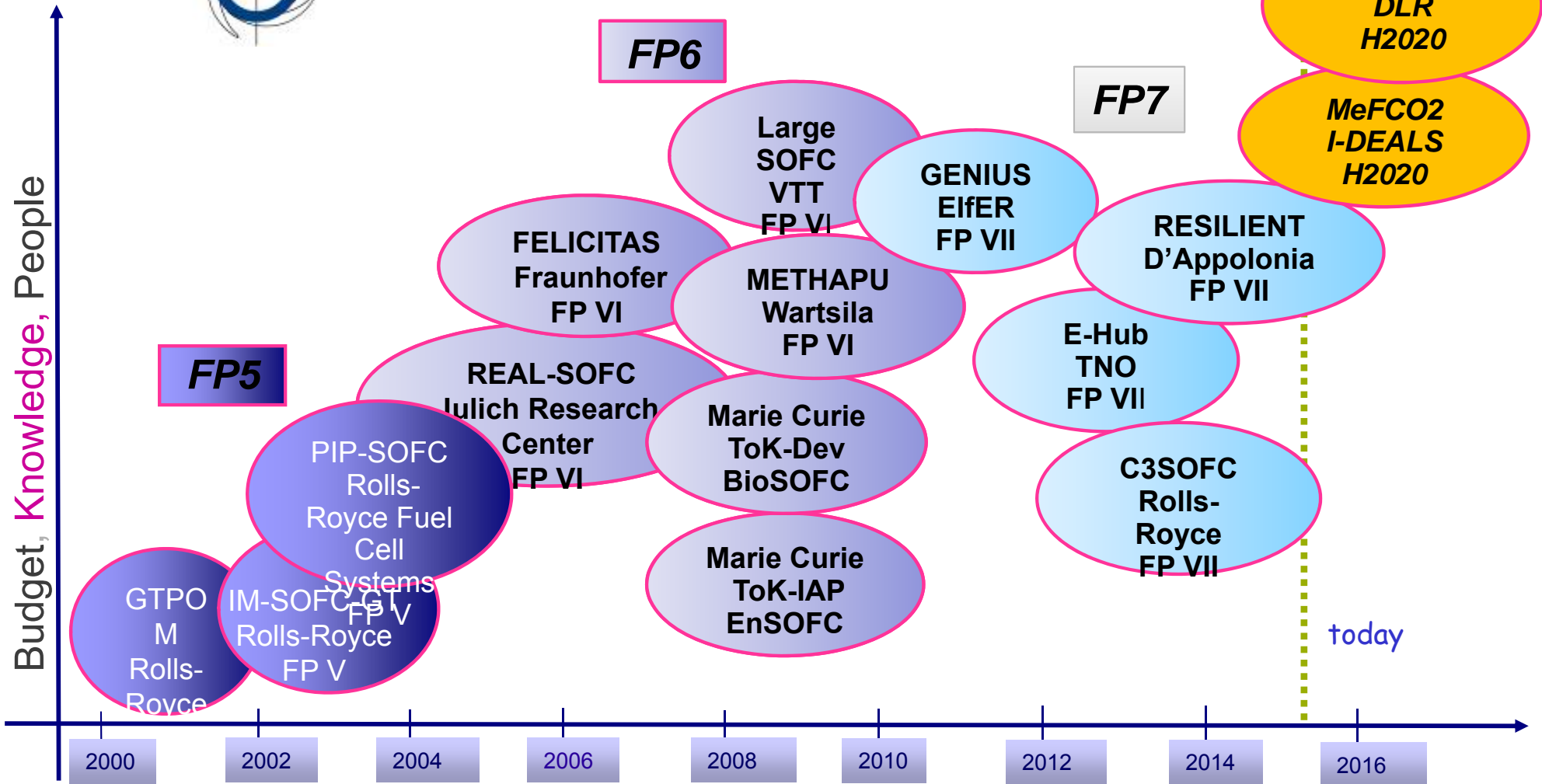
Renewable sources

Hybrid Systems (Fuel Cell / mGT)

Energy Storage (“chemicals”)



European Projects





European
Commission



The EU Framework Programme
for Research and Innovation

HORIZON 2020





European Commission - Research - Participants
Proposal Submission Forms

Horizon 2020

Call: H2020-SPIRE-2014

Topic: SPIRE-02-2014

Type of action: IA

Proposal number: SEP-210132691

Proposal acronym: MethCO2



The problem



According to the Intergovernmental Panel on Climate Change (a scientific intergovernmental body under the auspices of the United Nations), GHG emissions must be reduced by 50 to 80% by 2050 to avoid **dramatic consequences of global warming**.



Clearly, these goals are the result of a **European problem which is a priority for the EU political agenda**. However, the achievement of such goals must be accomplished without limiting European competitiveness. Conversely, this scenario represents a sound opportunity to design, develop and deploy innovative systems to increase energy efficiency and renewable energy usage, cut CO₂ emissions and obtain an economic output.

Current alternatives

In the last few years, in parallel with the development of Carbon Capture and Storage (CCS) technologies, a new vision about CO₂ is rising focused on the development of technologies able to reuse CO₂ instead of storing it. In this way, CO₂ is not considered a problem or a waste to be treated with a significant economic impact, but rather a **key valuable element to be used for the sustainable future of the chemical industry**.





Our approach



Our project:

MefCO₂ (Methanol fuel from CO₂) - Synthesis of methanol from captured carbon dioxide using surplus electricity.

Aim:

To develop an innovative green chemical production technology which contributes significantly to the European objectives of decreasing CO₂ emissions and increasing renewable energy usage, thereby improving Europe's competitiveness in the field.

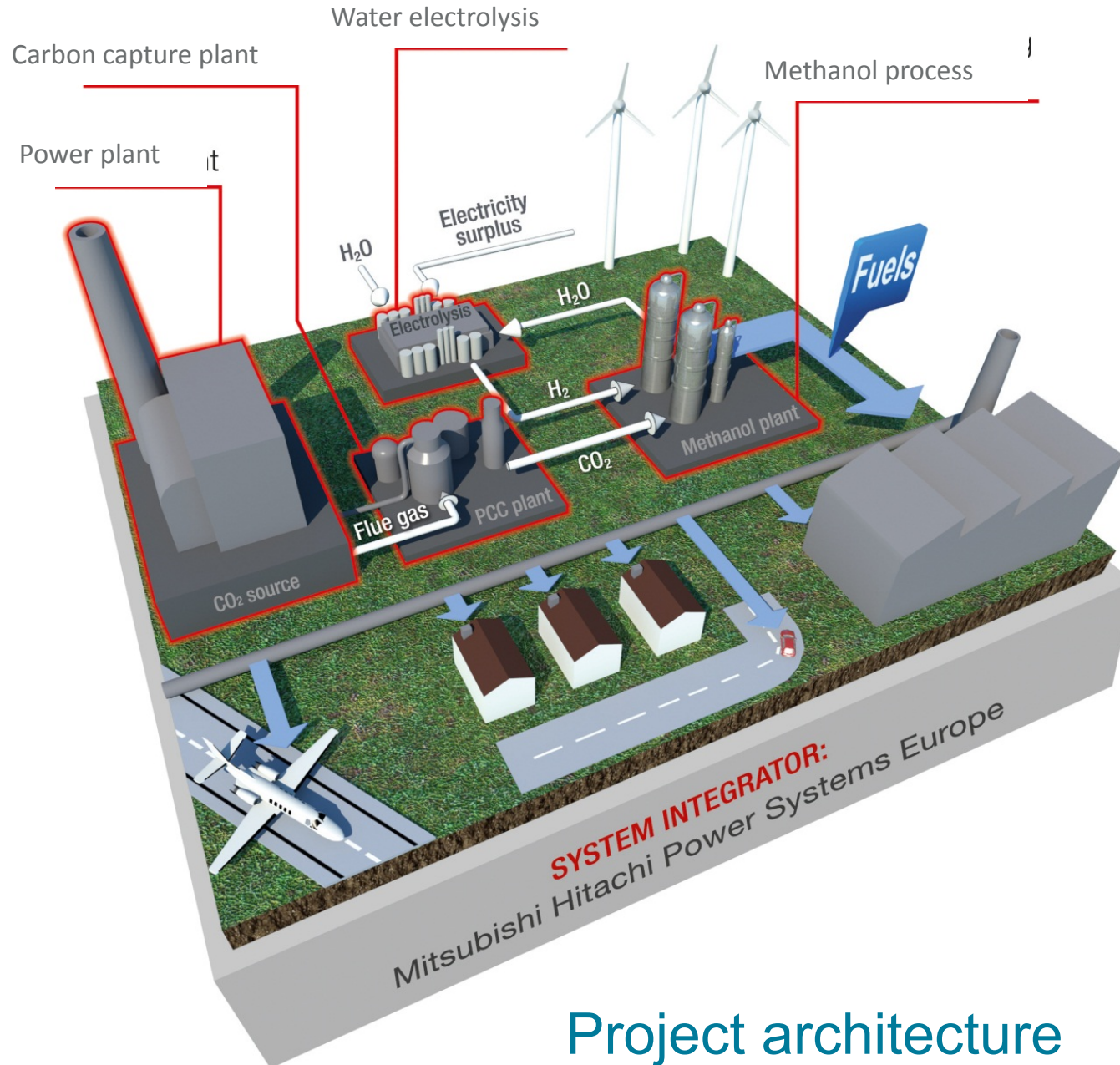
Concept:

The overall concept underpinning the project lies in the utilisation of ordinarily emitted greenhouse gas carbon dioxide and hydrogen, produced from redundant electrical energy into a widely-useable platform chemical, methanol. The technology is being designed in a modular intermediate-scale, with the aim of being able to adapt it to varying plant sizes and gas composition.





MefCO₂ - Methanol fuel from CO₂



Project architecture





Project team



- **i-deals** (Spain) → Coordination, dissemination & exploitation 
- **National Institute of Chemistry Slovenia** (Slovenia) → Catalysis and reaction engineering 
- **Mitsubishi Hitachi Power Systems Europe** (Germany) → System integrator 
Subcontractor: **STEAG** (Germany) → Power plant owner 
- **Cardiff Catalysis Institute** (UK) → Research in catalyst synthesis 
- **Carbon Recycling International** (Iceland) → CO₂ to methanol technology developer 
- **DIME - University of Genoa** (Italy) → Thermo-economic analysis and process optimisation 
- **Hydrogenics Europe** (Belgium) → Electrolyser technology developer 
- **University of Duisburg Essen** (Germany) → CO₂ capture technology provider 



Envisaged project results



The current project is to encompass flexible (in operation and feed) methanol synthesis with high carbon dioxide concentration-streams as an input, the latter originating from thermal power stations using fossil fuels.

The technology is also intended for the application of existing biomass combustion and gasification system streams, operating for the production of electric/thermal energy, as opposed to chemical synthesis. The other synthesis reactant, hydrogen, is to originate from water hydrolysis using surplus energy, which would be conversely difficult to return to the grid.

Advantages:

The primary advantages of this technology shall be its flexibility, medium-scale operation (deployed “at exhaust location”), and facile integration capacities.

Benefits:

- Mitigation of exhaust carbon dioxide and reduction of greenhouse gas emissions.
- Stabilisation of electric grid by the consumption of the electric energy at its peaks.
- Production of methanol as a versatile chemical for further conversion.

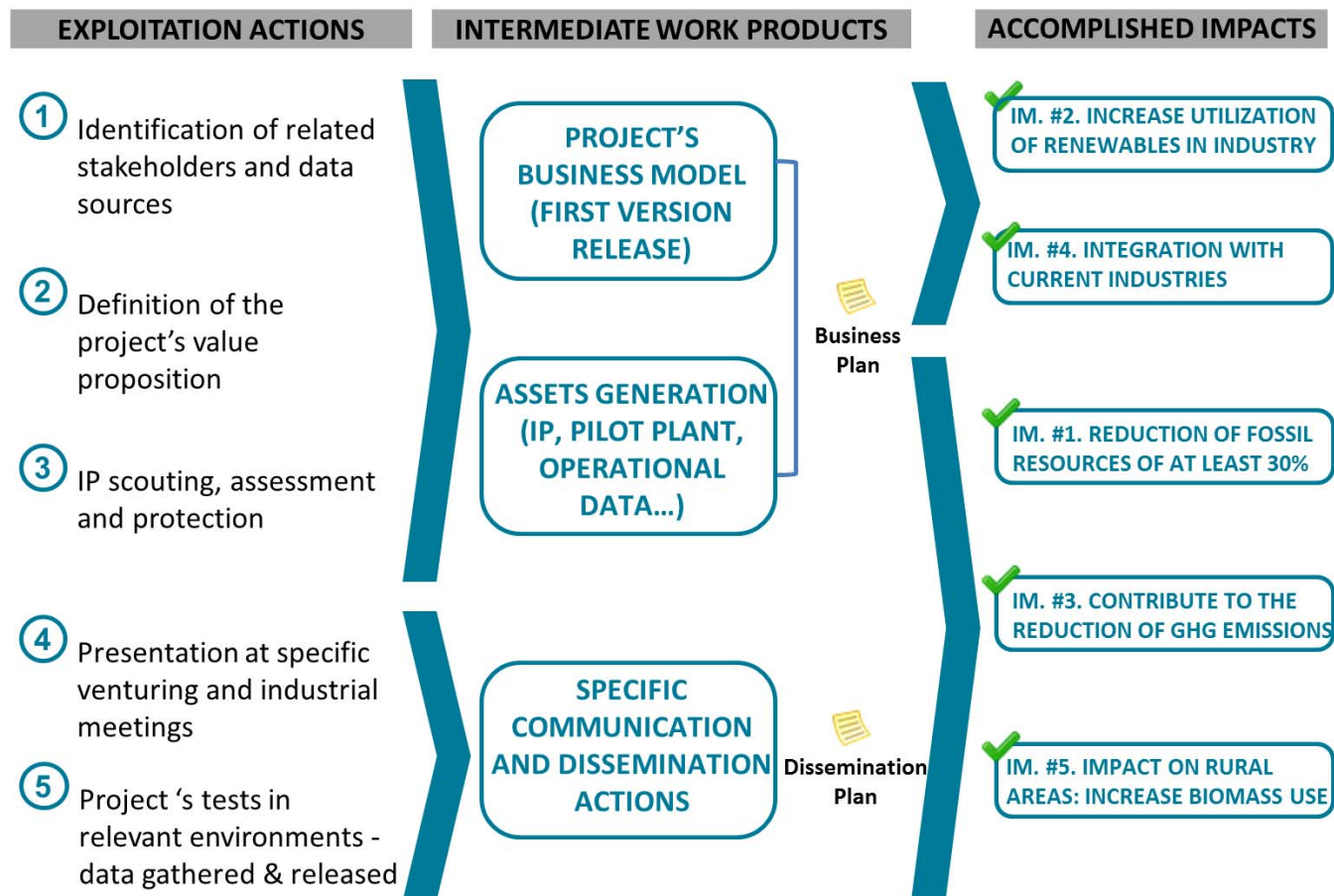


The route for exploitation



An exploitation action is a revenue generation mechanism pursuing the commercialisation of a project's assets to certain client segments with an adequate value proposition.

The project can be a business if thanks to the right exploitation actions and customers segments, the identification of the most suitable market is approached → product-market fit.





The EU commitment



Europe has the know-how, the ability and the ambition to lead the world in developing the technologies required to tackle climate change, and is a leading player in the area of low carbon technologies through a diverse range of policy initiatives. One such initiative is the **SPIRE** Public-Private Partnership launched as part of the **Horizon 2020** framework programme, to ensure the development of enabling technologies and best practices along all the stages of large scale existing value chain productions that will contribute to a resource efficient process industry.



RESEARCH ON FUEL CELLS & HYDROGEN

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WELCOME TO THE NEW EUROPEAN RESEARCH GROUPING ON FUEL CELLS AND HYDROGEN - N.ERGHY!

The N.ERGHY association is representing the interests of European universities and research institutes in the Fuel Cell and Hydrogen Joint Technology Initiative (FCH JTI). Together with industry and the European Commission, it is responsible for shaping the programme of the JTI (called Annual Implementation Plan - AIP, and Multi-Annual Implementation Plan - MAIP).

The FCH JTI's objective is to promote, support and accelerate the research and deployment process of fuel cell and hydrogen technology in Europe from the point of view of the research community. → more

SEARCH



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SAVE THE DATE

Stakeholder Forum on 19 November 2015
Programme Review Days on 17 – 18 November 2015

Brussels, Belgium

The Fuel Cells and Hydrogen 2 Joint Undertaking is very pleased to invite you to its 8th Stakeholder Forum. More than 350 participants from the European Industry and Research communities together with decision-makers will attend the annual event of the FCH 2 JU to discuss on alignment and integration of activities and instruments at Regional, National, European and International level to accelerate the commercialization phase of Fuel Cells and Hydrogen technologies.

The forum will take place on Thursday 19 November 2015 at the "Claremagree building", Rue de la Loi 170, B-1040 Brussels, in the heart of the EU Institutions area.

The FCH 2 JU Programme Review Days will take place on 17 and 18 November 2015 at the same venue. The top selection of FCH 2 JU funded projects will present their progress status, and the targets fixed in the multi-annual and annual work plans will be assessed.

Details of the programme and registration information will be available at the beginning of September 2015 at www.fch2.europa.eu

Thank you to mark these dates in your agenda.

More information will come shortly on our website www.fch2.europa.eu

We look forward to seeing you in Brussels!



Contact: info@i-deals.es