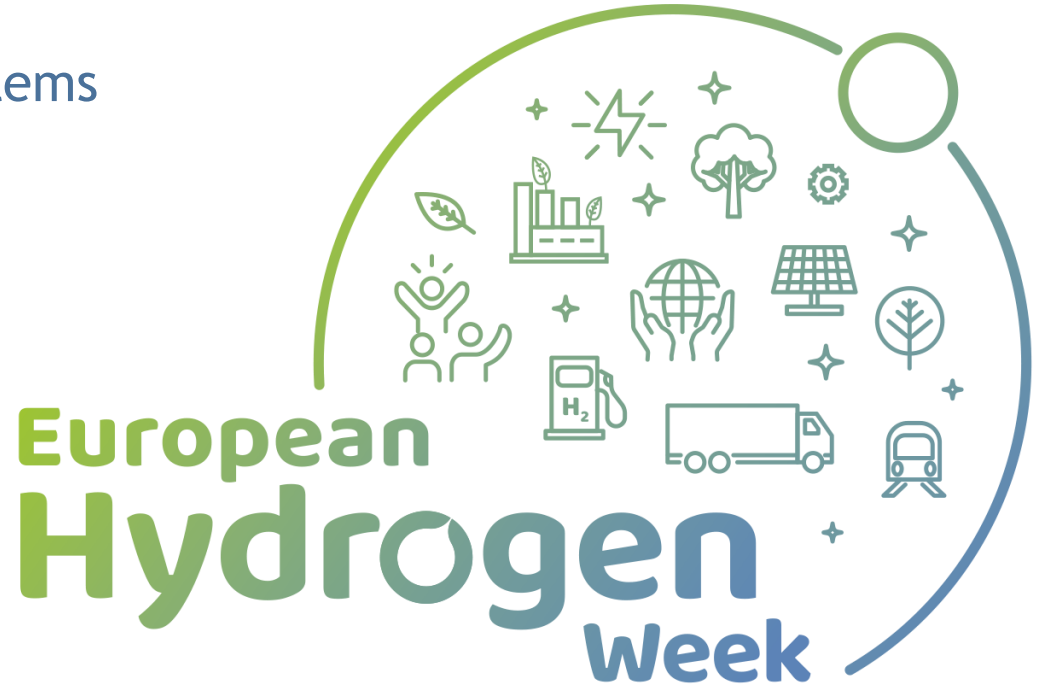
ComSos

Commercial-scale SOFC systems



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Clean Hydrogen Partnership

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#EUResearchDays
#PRD2022
#CleanHydrogen

Project Overview

Call year: 2017

Call topic:
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

Project dates:
1.1.2018 - 31.8.2023

Total project budget:
10 277 500 €

ComSos

% stage of implementation
6/7/2022: 88 %

FCH JU contribution: 7 486 955 €
Other financial contribution:
2 790 545 €

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European Hydrogen Week

Project Overview

VTT

CONVION

ENERGYMATTERS
CONSULTANTS FOR ENERGY SOLUTIONS

sunfire

NEW ENERGY GENERATION SOLID POWER

HTceramix

POLITECNICO DI TORINO

Finland
VTT (Research)
Convion Ltd (Industry)

Netherlands
Energy Matters BV (Industry)

Germany
Sunfire GmbH (Industry)

Switzerland
SolidPower SA (Industry)

Italy
POLITO (Research)
SolidPower SpA (Industry)

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Project Summary

- The key objective is to demonstrate SOFC based CHP solutions (450 kW_e)
  - ✓ Convion: 2 units of 60 kW_e each (total 120 kW_e)
  - ✓ Sunfire: 6 units of 25 kW_e each (total 150 kW_e)
  - ✓ SolidPower: 15-30 units of 6-12 kW_e each (total 180 kW_e)
  - ✓ 9000 hours of demonstration time of each units (~ One year)
    - To proof electrical efficiency to be more than 50%, and overall efficiency close to 90%
    - To proof lower emission of CO_2, NO_X and particulate than conventional technologies
    - Statistical data for end-users and investors
- Other key objectives are
  - ✓ EU worldwide leadership in Mini FC-CHP market
  - ✓ Take benefits from µ-CHP volumes and cost reductions
  - ✓ Confirm investment opportunity
  - ✓ Additional jobs creation for Mini FC-CHP

Project Progress/Actions - Installed units

Achievement to-date

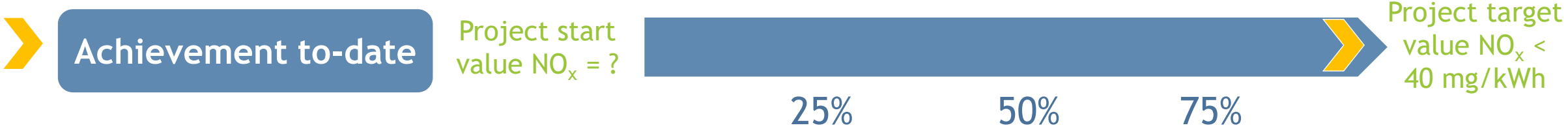
Project start value = 0 kW_e

25% 50% 75%

Project target value = 450 kW_e

- 450 kW_e have been installed or are under installation process or demo sites have been chosen
- Sunfire five units installed (150 kW_e)
  - ✓ Four in Taiwan
  - ✓ One in Austria
- Convion two units installed (120 kW_e)
  - ✓ One in China
  - ✓ One in Estonia
- SolidPower twenty units are on the way (180 kW_e)
  - ✓ Four in Italy (36 kW_e)
  - ✓ 16 in Germany (144 kW_e)
  - ✓ Delays in installations → Will be installed before summer 2023

Project Progress/Actions - Emissions



- One system from each manufacturer has been validated by measuring emissions during normal operation, start up and shut down
- During normal operation CH_4 and CO emissions are nearly zero (or below detection limits)
- NO_x levels are very low (below detection limits) < 40 mg/kWh
- Systems work as an air cleaner: Less particles in the exhaust flow than in surrounding ambient air
- All the results were very similar and proved that SOFC-technology is very environmentally friendly

Project Progress/Actions - Electrical efficiency

Achievement to-date

Project start value = 41-50%

25% 50% 75%

Project target value > 50%

- Convion > 60%
- SolidPower > 57%
- Sunfire > 50%
- All units show very good performance (Eff >50%)

Risks, Challenges and Lessons Learned

- More than 300 kW_e SOFC power has been installed
  - ✓ The rest 150 kW_e (SP units) will be installed before summer 2023
  - ✓ 9000 operation hours of each units will not be reached in 8/2023
- Market segment is demanding
  - ✓ To find customer is challenging
  - ✓ Commitment of customer takes lot of time
- ComSos units provide learnings about design, installation and operation
  - ✓ All units show very good performances (Eff >50%)
  - ✓ All systems fulfil emission requirements
- It seems that the key objectives of the project will mainly be achieved

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Exploitation Plan/Expected Impact

Exploitation

The main exploitation of the project results will be realised in the products:

- Sales volume
- Turnover
- Jobs
- New business models

Impact

- Components for ComSos units have been manufactured and sourced in Europe → Impact on the European manufacturing and component supply chain
- ComSos technology has been introduced to mini-CHP markets → Impact on European leadership in a SOFC products in the range of 10-60 kW_e
- Increase in number of employees in OEMs → Impact on a job creation
- Identification and preparation of alternative business models and financing arrangements → Impacts on novel routes to the market
- SOFC power generators do not create harmful emissions → Impact on environment

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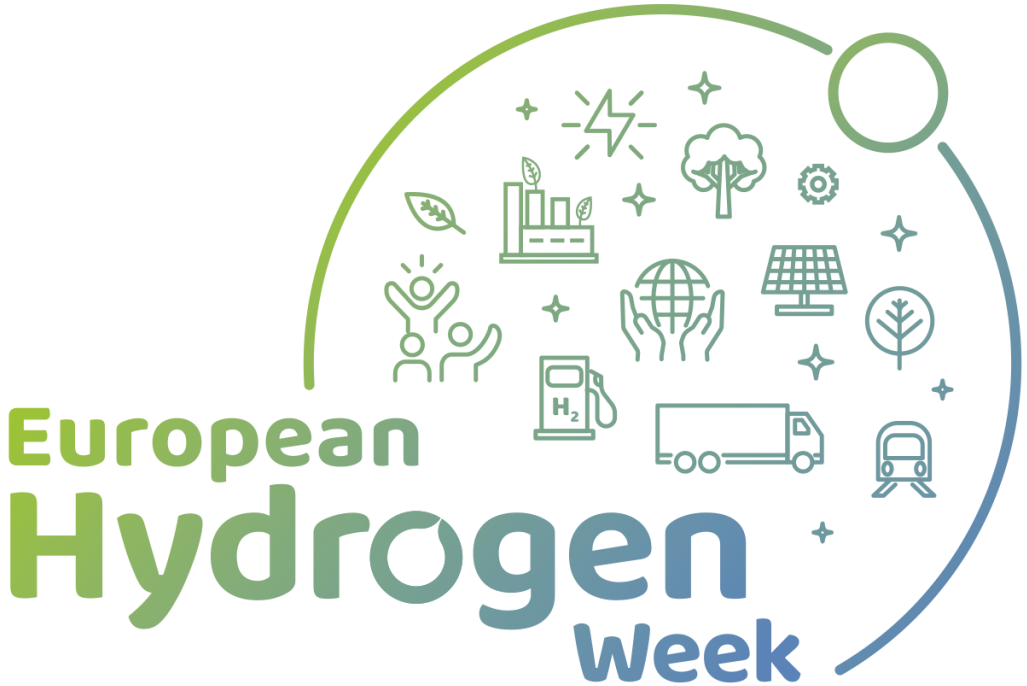
Communications Activities

More news can be found from ComSos webpages:

https://www.comsos.eu/



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