Stationary Applications

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Week

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European

Commission



PRD parallel sessions on stationary applications

3rd Dec. 09:30 - 10:50



Stationary Applications: Gas to Power and Heat

3rd Dec. 11:00 - 12:20



Fuel Cell Technology for Stationary Applications

European









Fuel cell for domestic heat and power

Europe market is in the order of 22,000s systems, ~25% increase since last year





Complementary to heating system



Replaces heating system







Products continue performing as expected

<u>Challenges and opportunities:</u> additional cost reductions (larger production volumes) and 100% H_2 units



European Hydrogen Week

Next generation component designs & manufacturing

Support to research on innovative concepts for improved lifetimes and low manufacturing costs is allowing European industry to keep leadership

European

- Week
 Fully printed catalyst coated membrane with equivalent performance (>0.67W/cm2) and durability (<0.25%/1000h)
 - Developed and costed a fully printed CCM manufacturing process line (120 m² footprint, 3GW/year)

S Interconnects

Feasibility of roll-to-roll process demonstrated

• Low cost steels showed to perform similar as high cost steels (in lab)



Cellitor

LOWCOST-IC

Adapted 3D printer for SOFC printing Cell A
 (4 materials at the same time)

#CleanHvdrogen

- **Printed SOFC single repeating unit** by different 3D printing techniques
- Novel surface geometries with increased power density explored with 3D printing #PRD2021

Improved performance, durability, and cost competitiveness of SOCs

- Validation of large cells and short-stacks
- Gathers European Solid Oxide industry and research community



Next generation component designs & PoC

Significant stack cost reductions @ mass production achievable Fuel flexibility with high temperature PEM fuel cells

🕑 Stack

- **qSOFC**
- **75% reduction of conditioning time** leading to stack CAPEX reduction
- 10 s In-line inspection of cell
- 1100 €/kWe stack cost @ 10MW/year
- New stack production plant secured







PoC

- > 50% System η_e , < 30W/l power density
- < 0.4 %/kh Degradation, <3,000 EUR/kW_e
- Scale-up of the system to 50-100 kW_e



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Commissio







Power to Power for isolated micro-grid or off-grid remote areas

Autonomous, 100% renewables, modular, 2/3 demo-sites in operation

Demo Agkistro, Greece 💦

- **45kW**_e electrical capacity @ 45% system η (rated)
- **25kW** H2 production capacity , 10.8kgH2/day @ 70% system efficiency (rated)
- Complete, operation started end 2020

Demo Rye, Norway 🛕

- 87kW_e electrical capacity @ 40% system n (rated)
- 50kW H2 production capacity, 21.5kgH2/day @ 68% η (rated)
- Operation started beg. 2021

Demo Gran Canaria, Spain 🔊

- Wind & solar P2P (fuel cell + electrolyser + H2 storage)
- **Electricity supply** for a milking facility, replacing diesel generation
- Grid extension restrictions, surrounded protected
 area









Agri-food processing plant, avoiding the installation of new transmission line



Supporting loads for a fish farm by integrating RES



Milk factory

www.remote-euproject.eu

Europear

HH

Hvdroae

Higher CAPEX, lower OPEX

Alternative to diesel generation

Basis for next-generation P2P systems

Zero local air emissions

P2P

End Users



FC-based containerized transportable gensets

Clean power generation for temporary events, all is ready for the first demos Festivals, construction sites, urban events, shore power





Remote power with solid oxide fuel cells

Demo campaign has started: remote gas/oil infrastructure, telecom towers Exporting European solutions abroad (North America)





Greening big industry using H₂ in MW scale FCs

Early installations driven by high regional power prices abroad Prototype of the next generation of flexible PEM Fuel Cell built and validated

By-product H₂ from a **refinery** in Martinique, **1 MW**_e PEMFC Waste H₂ from a **chloralkali plant** in China, **2 MW**_e PEMFC







Next generation GRASSHOPPER plant

- A 1,500 EUR/kW_e@ 25 MW/year
- Commissioning and first start-up

Subscription Dynamic operation test , 20-100% load





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\land Next generation stack

300 cm² active cell area

25 kW_e capacity

20 khrs lifetime

450 EUR/kW_e mass product.



