Clean Hydrogen Partnership

Topics in the call 2026

Hydrogen End Uses: Clean Heat and Power

Luca Feola,

Eleni Kontonasiou

Hydrogen End Uses: Clean Heat and Power Overview

Main Focus

- Reversible proton conducting ceramic cells and stacks
- Reversible Solid Oxide Fuel Cells integrated with the grid
- Gas turbine combustion technology using ammonia

What is new

- Combination of Co-ionic with proton ceramic conduction
- Scale up of reversible solid oxide fuel cells stacks
- Development of a full-scale combustor using ammonia-based fuels at TRL5

Co-funded by the European Union

Clean Heat and Power Applications Overview

Topic	Type of Action	Budget (M€)
HORIZON-JU-CLEANH2-2026-**04-01**: Next generation of reversible proton conducting ceramic cells and stacks for efficient energy applications at ≥1 kW scale	RIA	3
HORIZON-JU-CLEANH2-2026-**04-02**: Demonstration of rSOC operation for local grid-connected hydrogen production and utilisation	**IA**	8*
HORIZON-JU-CLEANH2-2026-**04-03**: Fuel-flexible gas turbine combustion technology for clean and efficient ammonia firing	RIA	5

*** This is the maximum Clean Hydrogen JU contribution that may be requested – proposals requesting Clean Hydrogen JU contributions above this amount will not be evaluated**

Clean Heat and Power - Topics

HORIZON-JU-CLEANH2-2026-**04-01**: Next generation of reversible proton conducting ceramic cells and stacks for efficient energy applications at ≥1 kW scale

Enabling reversible operations at intermediate temperatures with reduced degradation and costs (TRL 4)

- Design and manufacturing of materials, components and assemblies to improve performance, efficiency, and durability. Production of stacks to demonstrate these innovations.
- Proton ceramic or co-ionic conduction. All geometries (e.g. tubular or planar) and cell architectures are in the scope of the topic.
- Integration with renewable energy sources and validation in use cases involving hydrogen and, where relevant, operation with other carriers, co-electrolysis or dehydrogenation processes.

HORIZON-JU-CLEANH2-2026-**04-02**: Demonstration of rSOC operation for local grid-connected hydrogen production and utilisation

Validate rSOC performance, reliability, and economic viability in real-world conditions (TRL 5 → TRL 7)

- Design, development, installation and operation of a rSOC application. Minimum capacity is **1 MW** (production mode).
- Operation for over 5,000 h under dynamic conditions, both operation modes (SOFC/SOEC and switching).
- A comprehensive techno-economic analysis, focusing on capital and operational costs, and an LCA/LCC analysis should be conducted.

Clean Heat and Power - Topics

HORIZON-JU-CLEANH2-2026-**04-03**: Fuel-flexible gas turbine combustion technology for clean and efficient ammonia firing

Pave the way for utilisation of ammonia-based fuel as carbon-free energy vector in power generation (TRL 5)

- Fundamental understanding and characterisation of the physics of ammonia-based fuels at gas turbine-relevant operating conditions.
- Advanced combustion models and combustor concepts with novel injection schemes enabling clean and efficient gas turbine operation.
- Demonstration of combustion concepts and validation of combustion models in dedicated atmospheric and high-pressure combustion tests with full-scale engine combustor hardware (TRL 5).
- Focus on fuel flexibility (up to 100% ammonia-based fuels), low NO_x emissions, and maximum efficiency reduction (<2% points).
- Explicit encouragement for International Collaboration (in particular with Japan's national research and development agency, NEDO)

Co-funded by the European Union