
amon
AMMONIA TO POWER

Basic Information

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TITLE:
Development of a next generation Ammonia FC system

ACRONYM: *AMON*

START & END DATE:
01.01.2023 – 31.12.2025 (36 months)

TOTAL BUDGET:
4 293 653,75 €

MAXIMUM GRANT AMOUNT
3 998 028,75 €

PARTNERS:
13 Partners, of which 3 from Switzerland

AMON Consortium

FBK
Fondazione Bruno Kessler
(Italy)

SolydEra
(Italy)

Alfa Laval Technologies
AB (Sweden),
Alfa Laval Aalborg
AS (Denmark),
Alfa Laval SPA (Italy)

VTT Technical
Research Centre
of Finland
(Finland)

Technical University
of Denmark
(Denmark)

Ecole Polytechnique
Fédérale De Lausanne
(Switzerland)

SOL Spa
(Italy)

KIWA Nederland
BV (The Netherlands)
e KIWA Cermet (Italy)

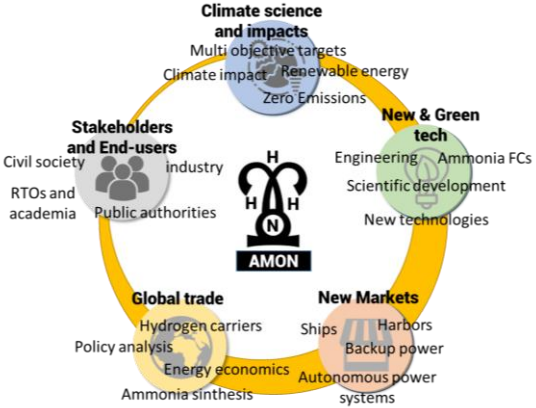
Electrolyser &
Fuel Cell Forum
(Switzerland)

Fachhochschule Zentralschweiz
Hochschule Luzern
(Switzerland)

AMON Concept

Direct, efficient, reliable ammonia conversion into high temperature solid oxide fuel cells.

Use of an important hydrogen carrier to produce electric power and enhance the flexibility of the energy system



Interdisciplinary Approach

AMON

The overarching objective

The overarching objective of AMON is the development of a novel system for the utilization and conversion of ammonia into electric power at high efficiency using a solid oxide fuel cell

- Design of the basic components of the system including the fuel cell, the ammonia burner, ammonia resistant heat exchangers, the engineering of the whole Balance of Plants, and the validation of the compliance with ammonia use for all the specific parts and components.

- Development of the ammonia cracker, and an anode gas recirculation.

- For solid oxide fuel cell: G8X cell from SOLIDPower, first validated in a laboratory at the level of single cells, for electrochemical properties, degradation, and post-mortem analysis, at the level of single repeating units for the validation of interconnects and sealing components, and at the level of stacks and stack modules.

- An overall Ammonia fuel cell system will be engineered and manufactured to be tested in a relevant environment in a port area (Venice). The final system will be in the size of 8 kW stack module, with an ammonia cracker and a heat management system. It will aim at an overall electrical efficiency of about 70%..

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Five specific objectives

SO1	Design and develop a fuel cell stack module at a scale of 8 kWel, tested and qualified to convert (directly or through an integrated ammonia reformer) ammonia into power, possibly using the internal reforming capacity of a solid oxide cell operating at high temperature and managing the power output through the control of the cell fuel utilization. The stack module will be qualified through cell testing (electrochemical, long term and posttest analysis), SRU testing (to qualify interconnecting materials to ammonia), single stack testing (to qualify long term durability, optimization of cell control and fuel utilization, heat balance), and full stack module testing (to qualify and test the specific module operating modes and qualify the stack highest efficiency and specific control strategy).
SO2	Qualify a system 100% tolerant to ammonia in all the components and related materials, including heat exchangers, burner and potential reformers and anode gas recirculation, as well as the fuel cell in all the building materials, layers and interconnects.
SO3	Target 70% system electric efficiency, pursued by the optimal use of the cell to reduce heat generation and consumption and leveraging the fuel utilization to a maximum, integrating novel solutions such as anode gas recirculation to eventually be utilized.
SO4	Validate the stack and system flexibility to allow for 30% partial load and full flexibility in the overall range.
SO5	Qualify the system for at least 3000 hrs operation with demonstrated 90% availability in the operating hours and less than 3% degradation rate at nominal power condition measured over 1000 hours of continuous operation.

Maturity Level

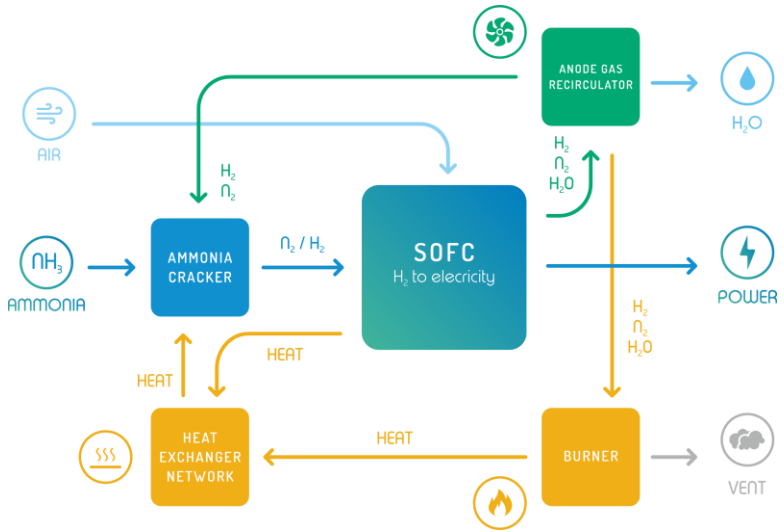
AMON will be able to advance the final integrated technology from TRL 3 to TRL 5

Research will be focused on components of the system such as the fuel cell, the ammonia burner, ammonia resistant heat exchangers, the whole Balance of Plants

The engineering for optimal system integration will need optimized solutions coming from TRL 4 and proposing fully integrated fuel management

Technology Concept

- Simple conceptual layout of the technology
- Develop novel SOFC stack, Burner, HXs, Control unit
- Option to design and develop ammonia cracker and anode gas recirculator



THANK YOU

more info www.amon-project.eu

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