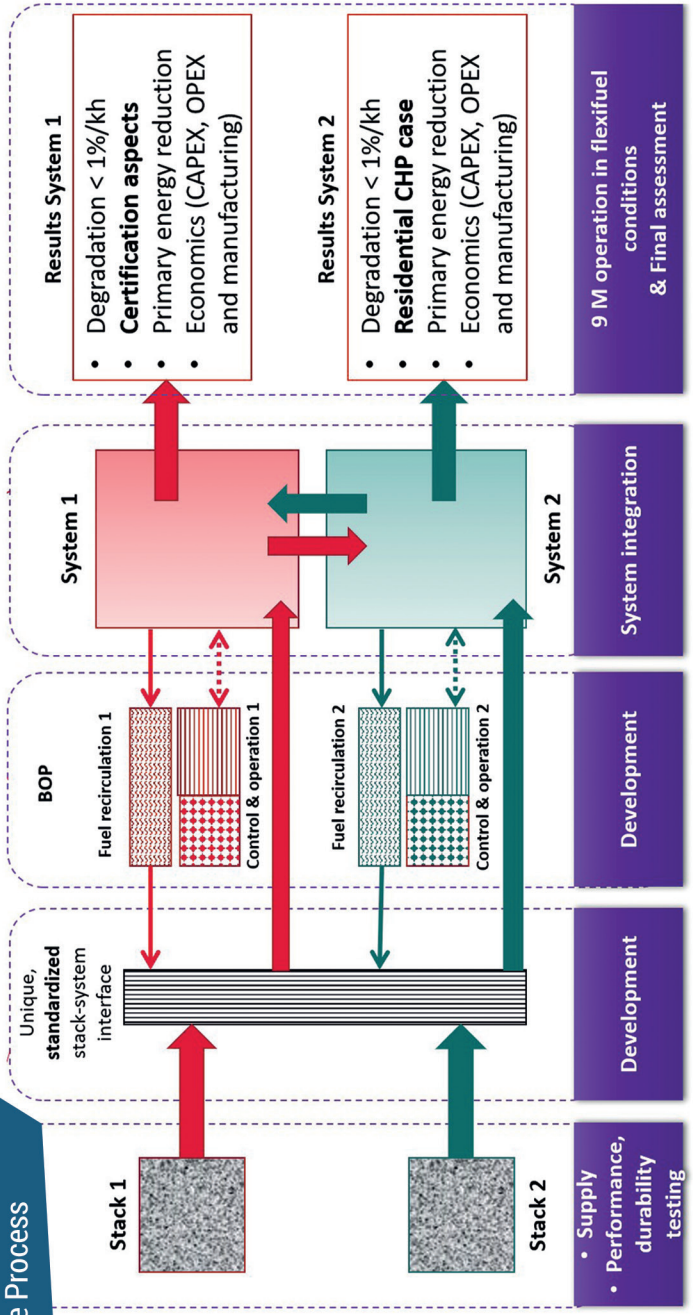
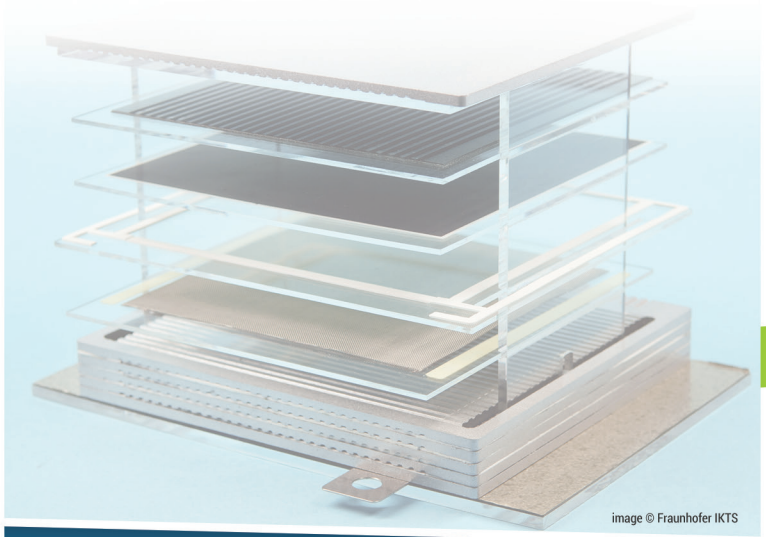
The Process



SO-FREE

Solid oxide fuel cell combined heat and power: Future-ready Energy



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SO-FREE

Solid oxide fuel cell combined heat and power: Future-ready Energy

Funded by the Fuel Cells and Hydrogen 2 Joint Undertaking (JU) under the framework of the European Commission Horizon 2020 programme.

Period: 2021 - 2024

PARTNERSHIP

PROJECT COORDINATOR

ENEA

AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE

ICI CALDAIE · Fraunhofer IKTS · JEN · AVL · Unimarconi · elcogen (Fuel cell technology) · PGE · kiwa

Broader Fuel Operation Window

Pre-certified SOFC-CHP system allowing an operation window from zero to 100% H2 in natural gas and with additions of purified biogas.

Stack-system Interface Standardization

Standardization of the stack module system interface, allowing full interchangeability of SOFC stack types within a given SOFC-CHP system, by the International Electrotechnical Commission (IEC) as a new work item proposal (NWIP).

System Demonstration and Certification

Two stack system interoperability run for 9 months in order to assess compliance with all applicable certification requirements of a TRL 6 prototype and demonstration in operational environment providing combined heat and power with natural gas with injections of hydrogen at TRL7.

SO-FREE Project

A truly flexible SOFC platform, addressing the 5 kWe power class, that allows to integrate multiple SOFC stack technologies within any CHP system, fed with any fuel mixture ranging from natural gas to biogas to pure hydrogen.

Pre-certification of the multifuel SOFC-CHP will follow applicable EU and international directives and regulations and prepare for field test certification. The inputs from the demonstration tests will be used to inform the assessment pathway to full CE certification. The demonstration will prove the operation with high electrical efficiency and high heat quality under variable fuel mixtures and will measure system performance degradation.

ACTIVITIES

System-ready stacks

Bridging the proprietary stack technology of two stack designs to a standardized integration into different systems, regarding hardware as well as operation windows, with respect to thermal, mechanical and electrical integration, assembly, service and maintenance.

Stack-ready systems

Two ~ 5 kW SOFC systems will be developed and functionally tested: via the standardized stack-system module interface both systems will be capable of using both stack module designs. Main BoP development aspects will focus on the fuel reforming, anode gas recirculation and thermal management as required for the wide operating range.

Pre-certification, Demonstration, Economic Assessment

Three interrelated actions will be performed: system pre-certification, demonstration and economic assessment. In particular multifuel SOFC-CHP will be pre-certified according to applicable EU and international directives and regulations, in preparation for field test certification: the demonstration will prove the operation with high electrical efficiency and high heat quality under variable fuel mixtures and will measure system performance degradation.

Dissemination, communication, standardization and exploitation

A Dissemination, Communication, Standardization & Exploitation strategy will be planned and carried out with the aim of promoting knowledge-sharing among the most relevant stakeholders, media and citizens and to enhance effective exploitation and multiplication of the project's main products (market-ready stacks and systems, certification and standardization procedures) following a detailed market analysis.