Finanziato dall'Unione europea
NextGenerationEU

Ministero dell'Università e della Ricerca

Italiadomani
PIANO NAZIONALE DI RIPRESA E RESILIENZA

NEST
NETWORK FOR ENERGY SUSTAINABLE TRANSITION

NEST

Network for Energy Sustainable Transition

SPOKE 4
Clean Hydrogen and Final Use

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NEST: towards future energy scenarios

- Project funded by the Italian Ministry of Research under the Italian New Deal (PNRR) – NextGenerationEU
- Three years program: 2023 – 2025
- Follow-up actions planned

- **Academic Partners:** Politecnico di Bari, Alma Mater Studiorum – Università di Bologna, Politecnico di Milano, Politecnico di Torino, Università degli Studi di Cagliari, Università degli Studi di Genova, Università degli Studi di Napoli Federico II", Università degli Studi di Padova, Università degli Studi di Palermo, Università degli Studi di Pisa, Sapienza Università di Roma
- **Research and industrial partners:** CNR, ENEA, FBK, IIT, Fondazione Bruno Kessler, ARCO FC, Engineering Ingegneria Informatica, Exprivia, IDEA75, Intesa Sanpaolo, IREN, Ingenia, Nuovo Pignone Tecnologie, SNAM

Project organization

- "HUB" and "Spoke" structure
- 9 Spokes

Spoke 1: Solar
Spoke 2: Energy Harvesting and Offshore Renewable
Spoke 3: Bio-Energy and new fuels for a sustainable future
Spoke 4: ***Clean Hydrogen and final uses***
Spoke 5: Energy Conversion
Spoke 6: Energy Storage
Spoke 7: Smart Sector integration
Spoke 8: Final use optimization, sustainability and resilience in the energy supply chain
Spoke 9: Energy-sustainable advanced materials

Spoke 4: Clean Hydrogen and Final Use

- **WP 4.1. Development of electrochemical hydrogen technologies**: from materials to systems: development of functional components/systems of electrochemical technologies for H2 production/use
- **WP 4.2. Alternative clean hydrogen production processes**: development of clean H2 production processes different than electrolysis, to valorize clean thermal energy sources and biogenic value chains.
- **WP 4.3. New technologies for Hydrogen storage**: development of functional components and systems for H2 storage and distribution, also including development of E-Fuels and H2 carriers/derivatives.
- **WP 4.4. Systems and technologies for final uses**: development of systems/technologies based on FCH (as well as traditional energy systems to be upgraded to be fuelled by H2) towards their future use in different civil, industrial, power generation and transport applications.
- **WP 4.5. Cross-Cutting activities to support H2 widespread**: valorisation of “transversal competences ” that can facilitate the widespread and impact assessment of an Italian H2 value chain.

Objectives of WP4.5 – Cross-Cutting Issues

The WP consists in a set of inter-related cross-cutting research activities intended to support the diffusion of hydrogen technologies with the following objectives:

- Tracking regulatory state-of-the-art and pre-normative research to identify further regulatory needs.
- Assessing the safety of the hydrogen value chain, addressing the development of guidelines for the safe use of hydrogen technology and of advanced sensors
- Providing a life cycle assessment and addressing the recovery of critical materials from electrolysers in a circularity perspective
- Developing tools for the planning of hydrogen production, addressing the techno-economic feasibility, business and investment plans for the development of the hydrogen value chain

Tasks and expected achievement

- **Pre-normative and regulation assessment** activities for hydrogen technologies: Pre-normative research. State of the art of regulation addressing critical issues and prospects for modification.
- **Health and safety guidelines for qualified risk assessment** methodologies for hydrogen technologies: Identification and improvement of best available models, tools and data repositories concerning the Health and Safety of the Hydrogen value chain
- **Life Cycle Assessment**, monitoring, diagnostics, end-of-life and recycling procedures and processes: Procedures for Life Cycle Assessment of low temperature electrolysis technologies and methods to recover critical materials from the MEAs
- **Business modelling and financing/investments** procedures for hydrogen technologies widespread: A business model for hydrogen technologies widespread will be developed, coupled to tools to evaluate the techno-economic feasibility of different scenarios (in urban and industrial contexts) of power-to-X and hydrogen-to-power/-to-heat solutions

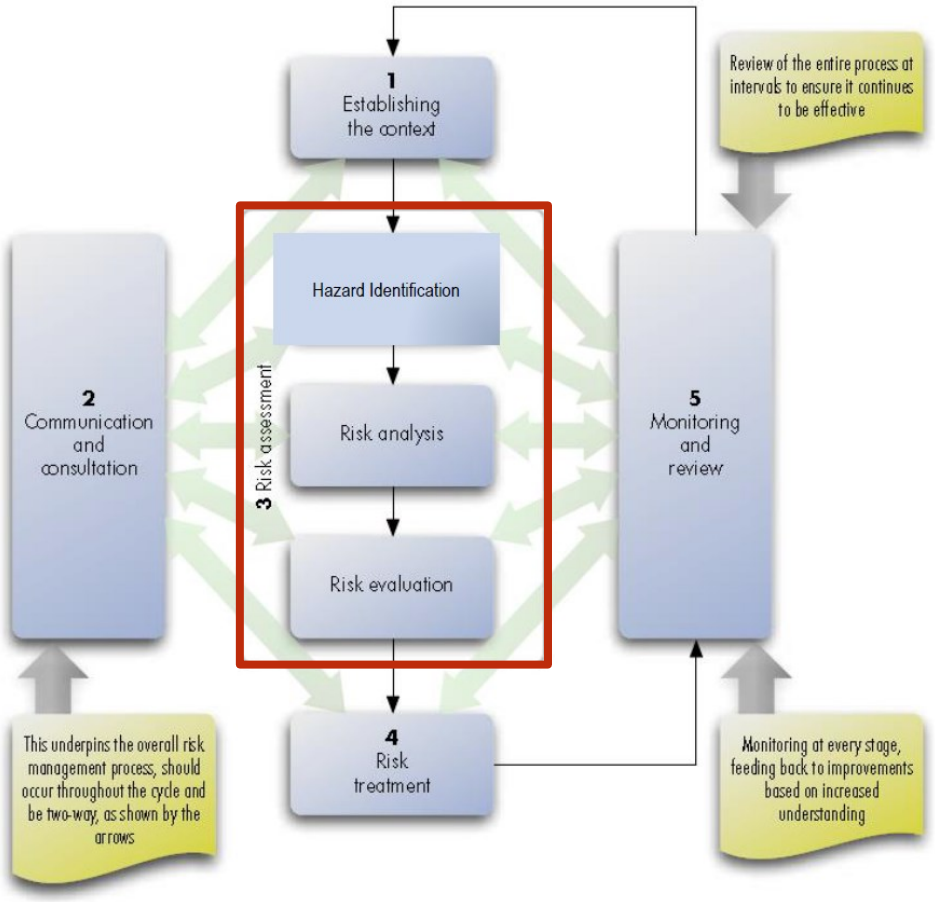
TASK 4.5.3 - Health and safety guidelines for qualified risk assessment methodologies for hydrogen technologies

Baseline Risk Assessment procedures:

- Reference values for the leak frequencies of hydrogen components
- Identification of procedures for frequency data tailoring
- Identification of best available models for consequence assessment

Safety Case:

Case study for application of methodology: **ceramic district**



TASK 4.5.3 - Health and safety guidelines for qualified risk assessment methodologies for hydrogen technologies

SAFETY CASE

- Cluster of 3 spatially contiguous plants with data representative of an existing ceramic district
- Various hydrogen conversion scenarios

MOTIVATION

- Location in districts with high concentration of small- to medium-sized factories belonging to a hard-to-decarbonize sector
- Hydrogen identified as the most suitable decarbonization lever for the sector

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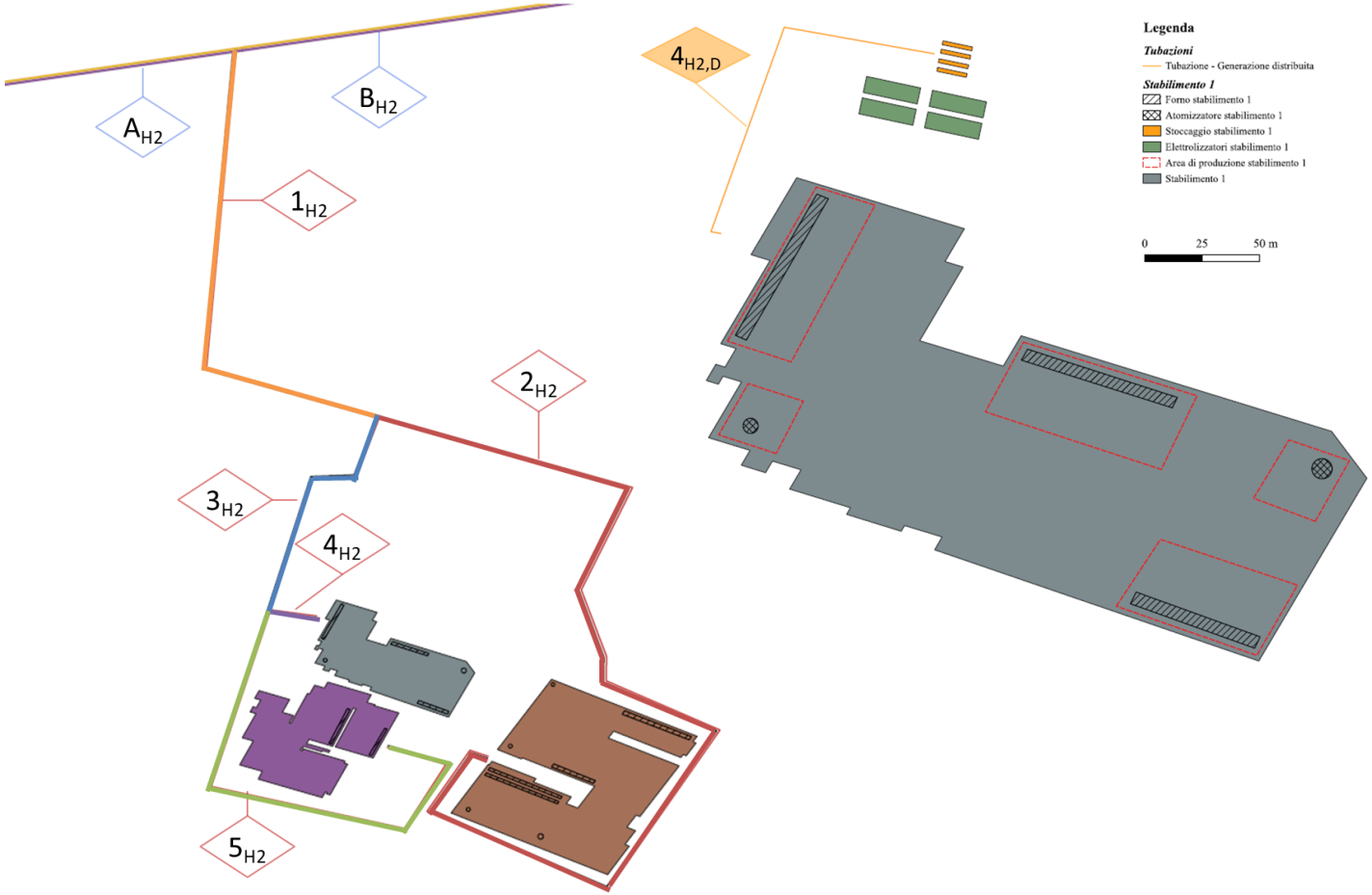
TASK 4.5.3 – Safety case – benchmarking of alternative solutions for tiles manufacturing



THANK YOU FOR YOUR TIME!

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