D^3T4H_2S

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LEAP-RE

Long-Term Joint EU-AU Research and Innovation Partnership on Renewable Energy

Pillar-1 project

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

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Consortium

The project is implemented across multiple countries, including France, Romania, Morocco, and South Africa.

- **S VERTICAL** (Coordinator, France)
- ENSTA Bretagne (ENSTA Bretagne, France)
- International University of Rabat (Morocco)
- University of South Africa (South Africa).
- University Dunărea de Jos (Romania)
- University Hassan II Casablanca (Morocco)

Aim of the project

- Elaborate a hybrid carbon fiber-reinforced polyamide 12 composite doped with carbon nanotubes (CNTs) for designing ultralight cryogenic composite vessels (ULCCVs).
- Conduct a multiscale and multi-physical study of the long-term behavior of the CF-reinforced PA12/CNT composite at cryogenic temperatures.
- Develop an expert tool for life-cycle management and predictive maintenance of ULCCVs.

Relevance vs MARs

- The green hydrogen market will likely grow significantly over the next few years because there is more demand for clean energy sources, and the government is doing more to build **a sustainable environment**.
- The project tackles a global challenge in reaching affordable and clean energy targets by addressing the design of a small-scale proof-of-concept storage vessel
- The D^3T4H_2S project aims to provide an integrated system expert tool to thermoplastic composite hydrogen storage vessel designers to optimize weight and sustainability while ensuring safety.

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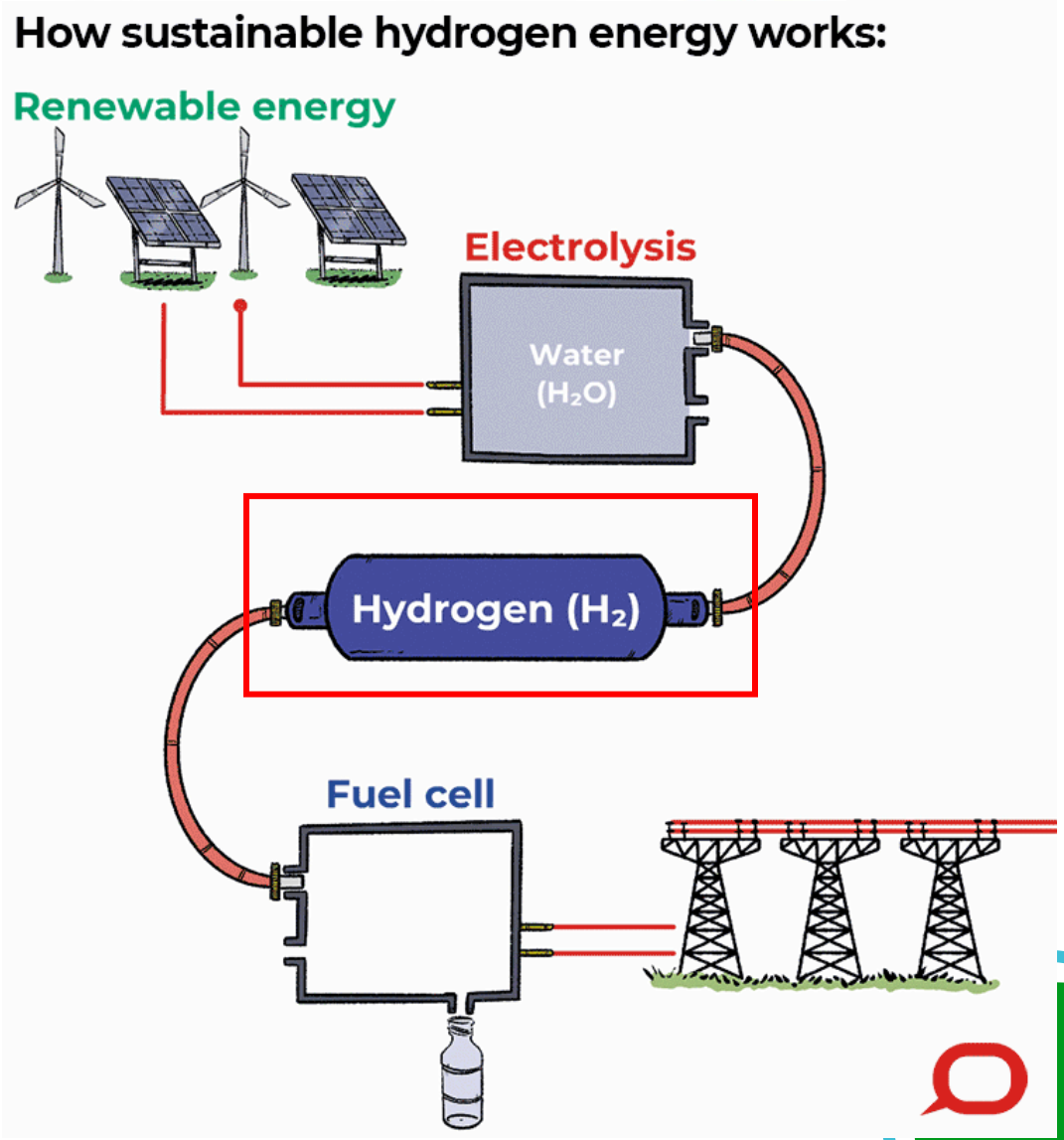
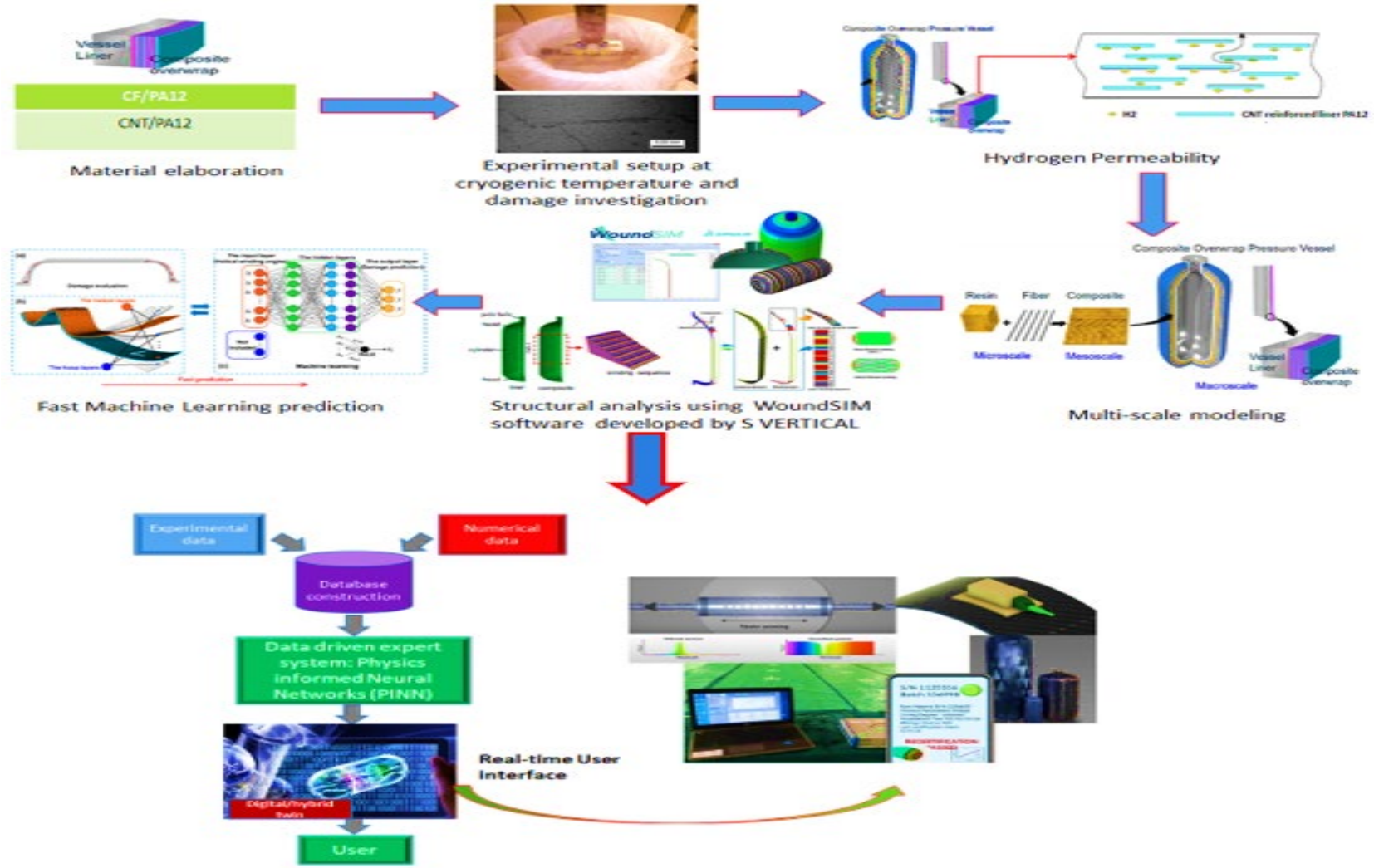
Key challenges addressed by the project

1. **Efficiency of Storage:** Rigidity, strength, and fatigue behavior of the hydrogen vessel,
2. **Safety Concerns**: Hydrogen, being highly flammable, poses safety challenges. Predictive analytics from a digital twin can help anticipate and mitigate potential risks associated with hydrogen storage.
3. **Economic Viability** : Assessment of cost targets and feasibility in production,
4. **Real-time Monitoring** : Data-driven insights to offer real-time monitoring of the storage vessels for factors like pressure, temperature, and structural integrity,
5. **Integration with Renewable Energy**: To facilitate the energy transition, it's critical to integrate hydrogen storage with renewable energy sources



Expected results: *Expert tool for real-time evaluation and optimization of hydrogen storage vessels*



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Contribution of the project to AU – EU R&D partnership

- ***Strengthening of Scientific Networks :*** fostering long-term collaborative relationships among researchers, institutions, and industries.
- ***Enhancing Innovation Synergy:*** Combining the strengths and innovative approaches from both continents can lead to groundbreaking solutions.
- ***Joint Infrastructure Development :*** *D*evelop shared research infrastructure, such as labs, testing facilities, or data centers, which can be utilized for future collaborative ventures.
- ***Talent and Skill Development :*** Cross-training and exposure to diverse research environments will nurture a cadre of skilled professionals who are well-versed in intercontinental collaborative research.
- **Sustainable Development Goals (SDGs) Alignment**: Projects that focus on clean energy solutions, like hydrogen storage, directly align with SDGs, ensuring that both the AU and EU are contributing to global sustainability targets.

The interest of Consortium members in participating in LEAP-RE clustering activities

Our project offers a range of activities for collaboration between AU-EU stakeholders in renewable energy research and innovation. The following are some potential interests of consortium members in participating in LEAP-RE clustering activities:

- **Digital Twin Modelling**: Utilizing virtual replicas of physical systems to predict behavior and performance.
- **Data-Driven Analysis**: Methods for harnessing large datasets to drive research conclusions and innovations.
- **On-Site Experimentation**: Best practices, challenges, and outcomes from hands-on, real-world testing scenarios.
- **Intercontinental Collaborative Research**: Insights into managing and optimizing joint research ventures between different continents, cultures, and regulatory environments.

THANK YOU

CONTACT US FOR MORE INFORMATION

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