Experiments and actions on the pilot projects 2 until 30.06.2023

CHALLENGE

The objective is to construct a digital twin integrated with artificial intelligence that facilitates sustainable and efficient energy management by bridging the gap between energy producers and consumers.

HOW

The proposed approach involves linking a digital twin with the actual physical world and leveraging AI to enable real-time energy monitoring and management.

WHY

The driving force behind this project is to accelerate and improve decision-making processes in energy resource management while elevating the maritime sector to match the advanced technological standards and efficiency seen in other production industries.

FINAL RESULT

The desired outcome is to develop and implement a functional digital twin equipped with advanced artificial intelligence capabilities to manage energy consumption and production in the physical world effectively.

GOALS FOR INNO2MARE PROJECT

The INNO2MARE project aims to leverage digital twin technology, energy management, and artificial intelligence to promote innovation and sustainable development in the maritime industry. The project seeks to:

- Develop and implement digital twin solutions to facilitate efficient and safe energy management in maritime operations.
- Utilize AI to optimize energy consumption and reduce carbon emissions.
- Foster collaboration among stakeholders in the marine industry to drive the development of new technologies and processes that enhance performance and sustainability.

By achieving these goals, the INNO2MARE project will enable the maritime industry to meet future challenges while promoting innovation and sustainability.

Progress

1. Digital Twin Modeling Framework

There was a discussion on the digital twin modeling process and multiple tools for creating digital twins were presented and discussed upon, among others Technomatix Plant Simulation and Visual Components. A key decision was made regarding the tool to be used for this process. Technomatics Plant Simulation (TPS) was selected, and it will be an integral part of the project moving forward.

Next Steps:

- Tool Integration: Begin the process of integrating Technomatics Plant Simulation into the project's workflow.
- Modeling Development: Start the development of digital twin models using TPS.
- Workshops: Schedule workshops for creating detailed block diagrams for each project segment.
- Collaboration: Share models and resources with the team to ensure smooth collaboration on the modeling process.

2. Data Analysis and Synchronization

A comprehensive analysis of the available data needed for the project was conducted, evaluating both its quality and accessibility. Several key challenges were identified during this analysis. First, there are significant gaps in the data, including restricted access, incomplete records, and a number of technical issues that complicate the process. Additionally, time delays and synchronization problems were highlighted as critical concerns, particularly with outdated information. To address these challenges, the team recommends exploring alternative data sources to fill in the missing information, enhancing data collection and storage processes to minimize delays, and establishing stakeholder agreements to improve access to the necessary datasets. In line with these recommendations, a live visit to ISKRA's production facilities is planned. This visit will serve as an opportunity to assess the available ERP system data and to discuss potential strategies for improving data collection.

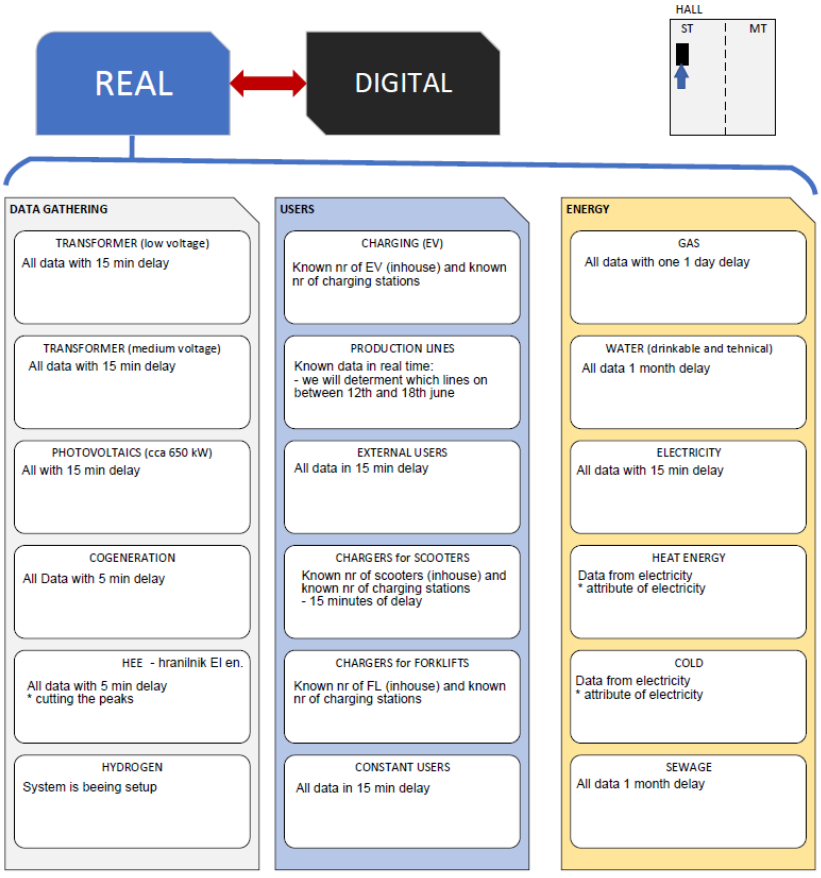

Figure 1: Identified energy producers and consumers alongside resources used.

3. Data Exchange Testing

In terms of data exchange, the team has agreed to test two methods: SOAP and JSON REST services. A mock service will be established using Postman with fictitious data to evaluate the connection. Additionally, UL FS and DIGITEH will each provide two IP for the testing process. Following the test, the performance of the mock service will be reviewed, and any necessary refinements to the data exchange protocols will be made based on the results.

Conclusion and Future Directions

The project has made significant strides in defining its framework, identifying tools, and addressing data-related challenges. Upcoming priorities include:

- **Finalizing block diagrams** for all segments.
- **Enhancing data exchange mechanisms** for seamless integration.
- **Analysing ERP system data** during ISKRA production facility visits.