HRESP – Hybrid Renewable Energy Simulation Platform

Development status

Phase 3

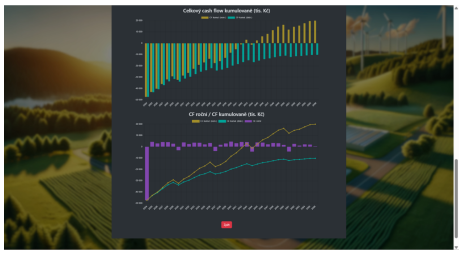
Technology validation and implementing it in real environment. Testing the technology outside of the laboratory and its adjustment to external conditions.

IP protection status

Software (copyright; other forms of protection are in preparation)

Partnering strategy

Collaboration, investment, licensing



Institution

VŠB – Technical University of Ostrava

Vlastník

VŠB - Technická univerzita Ostrava

Challenge

The motivation behind the development of the HRESP software (https://hresp.vsb.cz) lies in supporting decarbonization, community energy, and the efficient use of renewable energy sources in practice — both in industry and the public sector. The aim is to facilitate decision-making, increase investment returns, and promote the implementation of innovative energy solutions. Its main uniqueness lies in the combination of technical calculations (production of H_2, O_2, electricity, and heat) with economic analyses and decision-making support for participation in power balancing services.

Description

HRESP is a comprehensive application designed for modeling, optimization, and economic evaluation of hybrid systems utilizing renewable energy sources (primarily photovoltaics and wind turbines) in combination with electrolyzers for hydrogen production. It enables simulation of technical parameters for the production of electricity, hydrogen, oxygen, and heat, while also integrating investment and operational economic analyses. The tool supports decision-making related to participation in power balancing services for the transmission system. HRESP uses up-to-date data from public sources and its own database of wind power plants, ensuring accuracy and flexibility of simulations. Thanks to its open architecture and the separation of visualization from computation, the tool is user-friendly and suitable for industrial enterprises, municipalities, and consulting firms seeking to efficiently plan and optimize investments in green technologies. Unlike standard databases, it enables automated processing of current data from multiple sources, instant evaluation, and real-time visualization.

Commercial opportunity

The anticipated commercial use of the HRESP software primarily involves licensing to industrial companies, municipalities, and energy consulting firms that seek to efficiently plan, optimize, and economically evaluate the operation of hybrid renewable energy

systems and hydrogen technologies. The software enables users to reduce costs, increase return on investment, and participate in power balancing services. HRESP differs from traditional data management systems through its specialization in energy and hydrogen technologies and its ability to integrate both technical and economic data in a single environment. Unlike standard databases or spreadsheet-based tools, HRESP allows automated processing of current data from various sources (e.g., PVGIS, internal databases), immediate evaluation, and real-time visualization. It offers centralized information management, minimizing the risk of errors, data loss, or duplication, and allows for quick and accurate generation of reports for strategic decision-making. Thanks to its open architecture and customizable input parameters, HRESP is significantly more flexible and efficient than traditional systems, which often require manual data entry and are not optimized for complex energy simulations. Commercial use also includes the possibility of integration into enterprise processes, delivery of expert analyses and decision support, and potential expansion with additional modules tailored to market needs. HRESP thus provides a tool for the digitalization and innovation of energy management at a time of increasing importance of decarbonization and community energy.