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Discover the Future of Hydrogen Production with PhoeniX HPO

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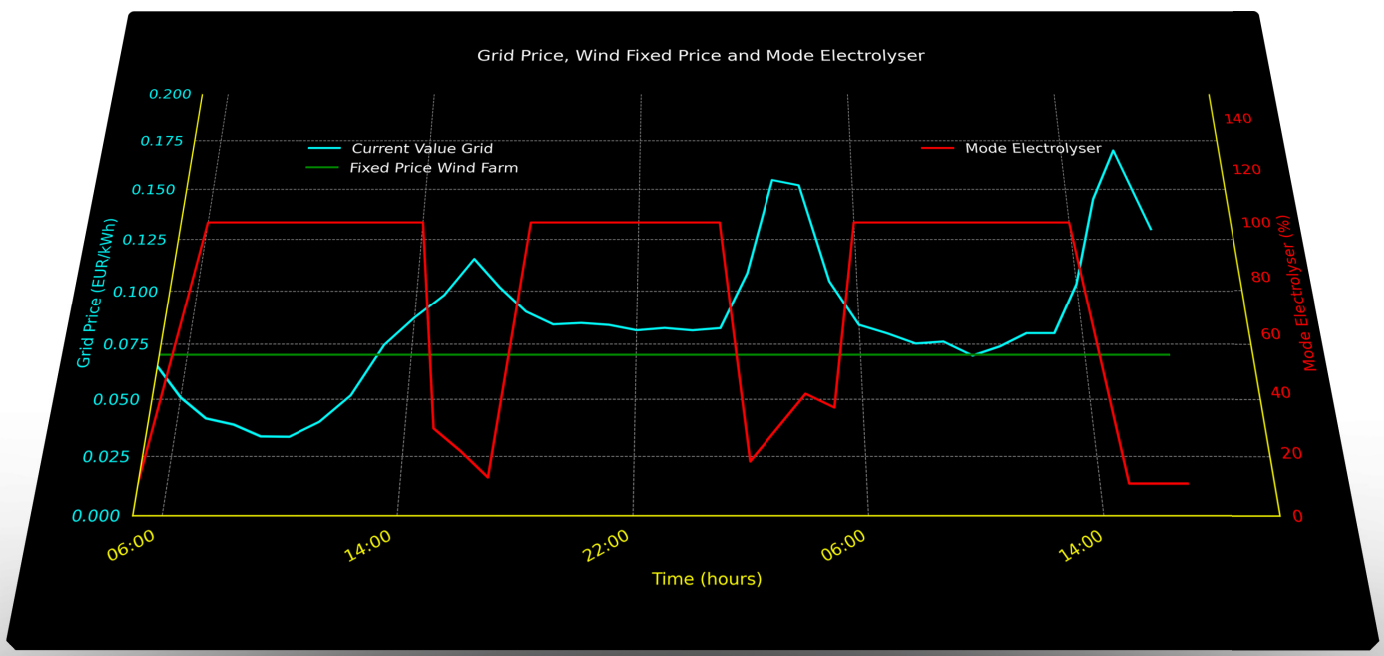
Introducing PhoeniX HPO: The Ultimate Hydrogen Production Optimizer

With the volatility of electricity prices and renewable energy availability, efficiency and adaptability in hydrogen production plants are crucial. The PhoeniX HPO system, developed by eFuelution, offers a cutting-edge solution designed to optimize every aspect of hydrogen production. Combining advanced predictive optimization with Digital Twin technology, PhoeniX HPO ensures that your hydrogen production process is as efficient, cost-effective, and reliable as possible.



- efficient
- cost-effective
- reliable

What is PhoeniX HPO?

PhoeniX HPO, short for Hydrogen Production Optimizer, is a revolutionary system that integrates both software and hardware to manage the complete operations, or parts thereof, of a hydrogen production plant. It adapts to fluctuations in electricity availability, pricing, and hydrogen demand, ensuring optimal production schedules and efficient use of resources. By leveraging machine learning algorithms and creating a virtual replica of your production system, PhoeniX HPO can simulate various operational scenarios, predict outcomes, and optimize performance.

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Optimizing Your Electrolyzer Performance

Most electrolyzers today run in a steady state and are switched on when there is electricity available or switched off when no hydrogen is required or the storage is full. This is inefficient in an environment where the input of electricity and its price varies and where the hydrogen output needs to meet fluctuating demand. Hydrogen should be produced in time to meet demand and at the moment that green electricity is available from connected renewable energy sources or at a low price from the grid. Unfortunately, electricity is not always available or cheap when the customer requires its hydrogen.

The main factors affecting this include:

Electricity Availability

Solar power is not available at night or is less during cloudy days. Wind power is abundant only on windy days. Grid power availability can be limited by the maximum rating of the grid connection, and curtailment due to net congestion is an imminent issue.

Electricity Pricing

The balance between supply and demand of electricity is quickly changing as more wind and solar power is integrated into the grid, leading to large price fluctuations depending on the weather.
Prices might even become negative during sunny and windy days.

Hydrogen Demand

The produced hydrogen serves various purposes, such as continuous flow for 24/7 industrial production or intermittent dispensing for fleet owners and hydrogen stations.

Balancing these factors is key to reducing hydrogen production costs, which is achieved through predictive optimization. This approach ensures hydrogen is produced when electricity is available and affordable, aligning production with real-time and predicted demand.

Plant Control System: PLCs and PCS

An electrolyzer plant typically consists of three main parts: the power supply, the electrolyzer itself, and the dispenser. Each part is supplied by its own Original Equipment Manufacturer (OEM) and has its own control system, typically a Programmable Logic Controller (PLC). The PLC monitors the status of the equipment and controls its behavior, switching the equipment on or off and instructing it at which rate or speed it should run.

The total electrolyzer plant is controlled by a Plant Control System (PCS), which synchronizes the behavior of the three main parts. For example, the PCS will switch the electrolyzer off when the storage of the dispenser is full.

Predictive Optimization

The Plant Control System is typically unaware of its surrounding environment. It does not know if the sun will be shining tomorrow or if the demand for hydrogen next week is high or low.

The eFuelution optimizer does know these things. It decides fully automatically if and at which rate the electrolyzer should run, based on predictive information from your electricity supplier, the weather forecast, and your customers' demand patterns.

The eFuelution Electrolyzer Optimizer runs 'in the cloud' with standardized interface protocols. As long as you have an internet connection, it can optimize your electrolyzer wherever you are.

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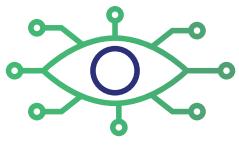
Key Features

The PhoeniX HPO system boasts a range of features designed to enhance hydrogen production:



Predictive Optimization Engine

Uses advanced machine learning algorithms to forecast electricity availability and pricing, optimizing hydrogen production schedules based on real-time and predictive data.

Digital Twin Model

Creates a virtual replica of the hydrogen production system, allowing for real-time simulation and optimization, helping to predict outcomes and make data-driven decisions.

User Interface and Dashboard

Provides an intuitive platform for monitoring and controlling the production process, displaying real-time data, key performance indicators (KPIs), and alerts.

Data Integration and Management

Collects and processes data from various sources, ensuring data integrity, consistency, and security, and supports seamless integration with other enterprise systems.

Security and Access Control

Implements multi-layered security measures, including role-based access control (RBAC) and data encryption, to protect system integrity and data privacy.

Hardware Integration

PhoeniX HPO seamlessly integrates with various hardware components essential for hydrogen production:

Programmable Logic Controllers (PLCs)

Serve as the central control units, interfacing with sensors and actuators to monitor and control various parameters in real-time.

Sensors and Actuators

Collect real-time data on parameters such as pressure, temperature, and flow rates, providing precise control over the production process.

Communication Devices

Facilitate reliable data exchange between hardware components and the PhoeniX HPO software, ensuring seamless integration and real-time data flow.

Deployment and Maintenance

The PhoeniX HPO system offers flexible deployment options and proactive maintenance strategies:

Flexible Deployment

Can be deployed on-premises or in a cloud environment, with a modular architecture that allows for scalability and adaptability to your needs.

Proactive Maintenance

Regular software updates and patches enhance functionality and security, while remote monitoring and diagnostics support proactive issue resolution.

Comprehensive Support

Extensive documentation and training materials are available to ensure your team is well-equipped to manage and maintain the system.

Benefits

Adopting the PhoeniX HPO system brings numerous benefits:

1

Efficiency

Optimize hydrogen production schedules to minimize costs and maximize efficiency.

2

Sustainability

Achieve sustainable hydrogen production through advanced technology and seamless integration.

3

Cost Savings

Reduce operational costs with predictive optimization and real-time data analysis.

4

Reliability

Ensure continuous, reliable operation with robust hardware and proactive maintenance strategies.

Why Choose PhoeniX HPO?

PhoeniX HPO is designed for clients who are serious about advancing their hydrogen production capabilities. With its sophisticated technology, robust architecture, and user-friendly design, PhoeniX HPO stands out as the premier choice for optimizing hydrogen production. Whether you are starting a new project or upgrading an existing facility, PhoeniX HPO can be tailored to meet your specific needs, ensuring flexibility and scalability. Join the future of hydrogen production with PhoeniX HPO and take your operations to the next level.

Maximize your hydrogen production efficiency with PhoeniX HPO, the future of hydrogen production optimization.

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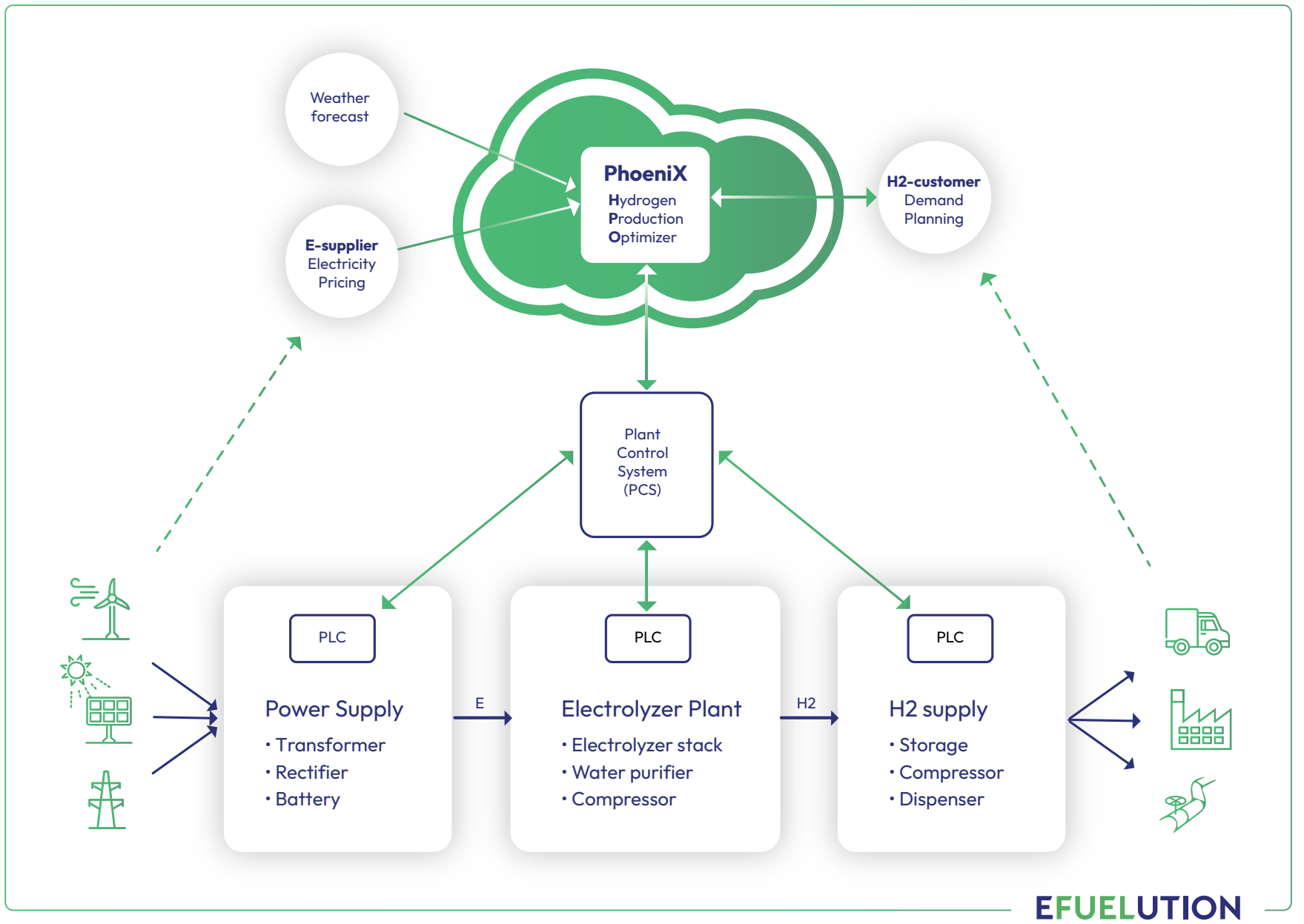
PhoeniX HPO

Hydrogen Production Optimizer

Typical electrolyzer automation landscape



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Efuelution specializes in the development of innovative hydrogen production optimization technologies. Our mission is to accelerate the energy transition by providing advanced solutions that improve efficiency, reduce costs, and enhance the sustainability of hydrogen production processes. As the creators of the PhoeniX Hydrogen Production Optimizer, we leverage sophisticated predictive algorithms, digital twin models, and real-time data analysis to help industries optimize their hydrogen production operations. By combining engineering expertise with innovative software, Efuelution is at the forefront of transforming the clean fuel landscape, ensuring a greener future powered by sustainable hydrogen.

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Siemens Digital Industries Software helps organizations of all sizes digitally transform using software, hardware, and services from the Siemens Xcelerator business platform. Siemens' software and the comprehensive digital twin enable companies to optimize their design, engineering and manufacturing processes to turn today's ideas into the sustainable products of the future. From chips to entire systems, from product to process, across all industries. Siemens Digital Industries Software – Accelerating transformation.

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Femto Engineering offers overall solutions for complex Computer Aided Engineering (CAE) in the field of consultancy, software, secondment, training, technical support and R&D. We apecialize in analyzing, validating and optimizing products using structural (FEM), flow (CFD) and system (1D) simulations. Our mission is to help our customers improve and optimize their products and processes using advanced simulation software. As an Expert Partner of Siemens Digital Industries Software (DI-SW) Femto Engineering supplies and supports the Simcenter portfolio (Femap, Simcenter 3D, Nastran, STAR-CCM+, Amesim and Fibersim) throughout the whole Benelux region.

VMB AUTOMATION

Founded in 2001, VMB Automation delivers advanced hardware and software solutions for the machine building and process industries. Serving sectors like oil and gas (with a focus on hydrogen), agro-food, water management, and logistics, VMB specializes in tailored automation systems that enhance efficiency and ensure reliability in complex industrial processes. VMB Automation's expertise in the hydrogen sector includes developing automation solutions that optimize hydrogen production and storage. Their services cover programmable logic controllers (PLCs), sensors, and key components that enable real-time monitoring and control of industrial systems. Through close collaboration with clients and years of industry experience, VMB delivers scalable, high-performance solutions that address modern production and energy challenges. With a commitment to future-oriented technologies like hydrogen, VMB Automation continues to lead in industrial automation, ensuring clients are equipped to meet evolving demands.