

## Accelerating hydrogen process development

The climate crisis is driving significant change in the energy and chemicals sectors, with substantial new process development and adaptation of existing processes to accommodate new feedstock and energy sources.

However, getting new processes to market rapidly poses many challenges. Developing, building and operating low-carbon hydrogen assets is costly, carries risk, and if targets are to be met, must be implemented at unprecedented speed.

Siemens gPROMS digital process design technology is helping the hydrogen industry to address these challenges and significantly reduce time-to-market for new hydrogen processes, using tools that allow innovators to rapidly explore the process design space, determine optimal process parameters, identify and resolve operability issues and manage risk under uncertainty.

gPROMS digital twins can be applied across the process lifecycle, from early-stage R&D to full operation, capturing and deploying knowledge to create value at every stage.

Contact us to find out how digital design can accelerate process development.

## gPROMS Process for hydrogen processes

Digital process design helps bring better new processes to market faster.



Model of a complete green hydrogen production process including electrochemical conversion, buffers, compression, high-pressure storage and distribution

- Validate electrolyzer models against data ensure predictive accuracy
- Whole-plant optimization determine optimal operating set-points, and buffer and equipment sizing
- Global system analysis assess robustness to wide range of energy availability and hydrogen demand profiles
- Dynamic simulation assess impact of unplanned failures on system performance
- **Dynamic optimization** optimize design taking into account variability

## Where does digital process design help?

There are many areas where digital process design can be applied to significantly reduce time-to-market. Here are a few:



New hydrogen processes

Siemens' gPROMS technology is widely used to design hydrogen electrolyzer processes for optimal handling of varying energy availability



**Blue hydrogen and CCUS** 

Siemens is a pioneer in modeling tools for carbon capture, storage & utilization processes to determine optimal design and operation of blue hydrogen processes



Fuel cell car development

We work with major automotive companies to accelerate development of the next-generation of hydrogen fuel cell cars



## New greener routes to chemicals production

Whether converting grey ammonia to blue through CCUS, implementing electrolyzers, or electrifying chemicals processes, our gPROMS modeling tools accelerate process development



Adsorption process design

gPROMS Process provides leading adsorption system design capabilities, including a cyclic steady-state solver



Optimized catalysts for new green processes

Siemens' gPROMS leading catalytic reactor technology helps accelerate development of new reactors and catalysts