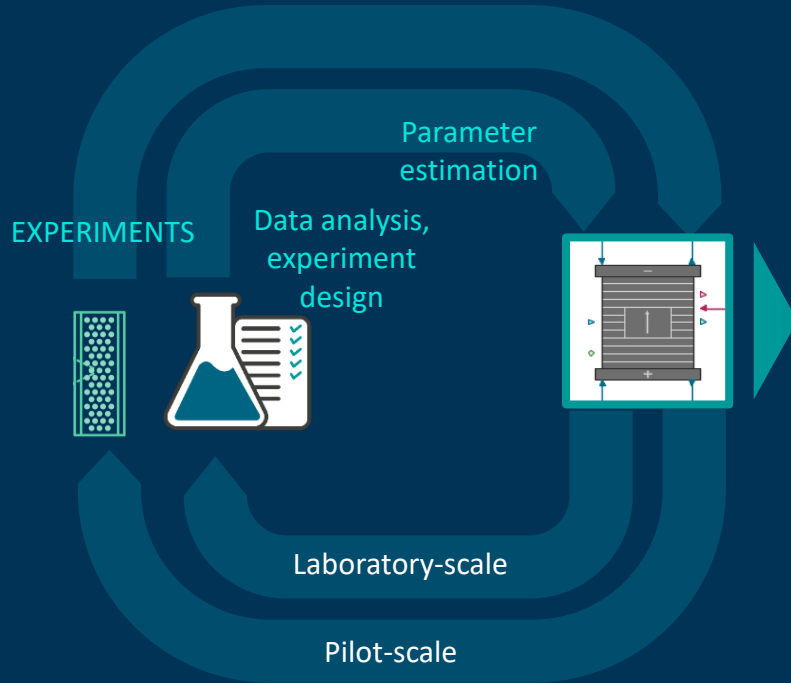


# | Introduction

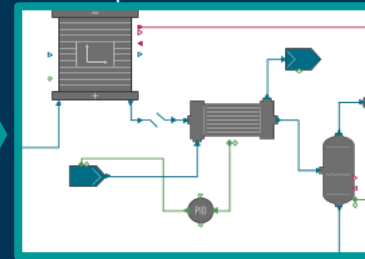
# Digital twins accelerate transition to hydrogen economy

## UNDERSTAND

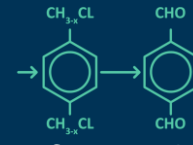


## ANALYZE & OPTIMIZE

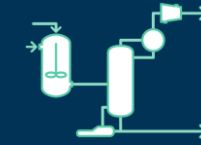
### PROCESS DIGITAL TWIN



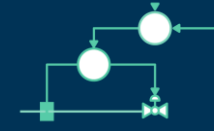
Asset / Site / Country



Conceptual process design



Front-end engineering design (FEED)



Control design & verification

Simulation

Uncertainty Quantification & Risk Management

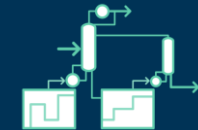
Optimization



Equipment design



Process optimization



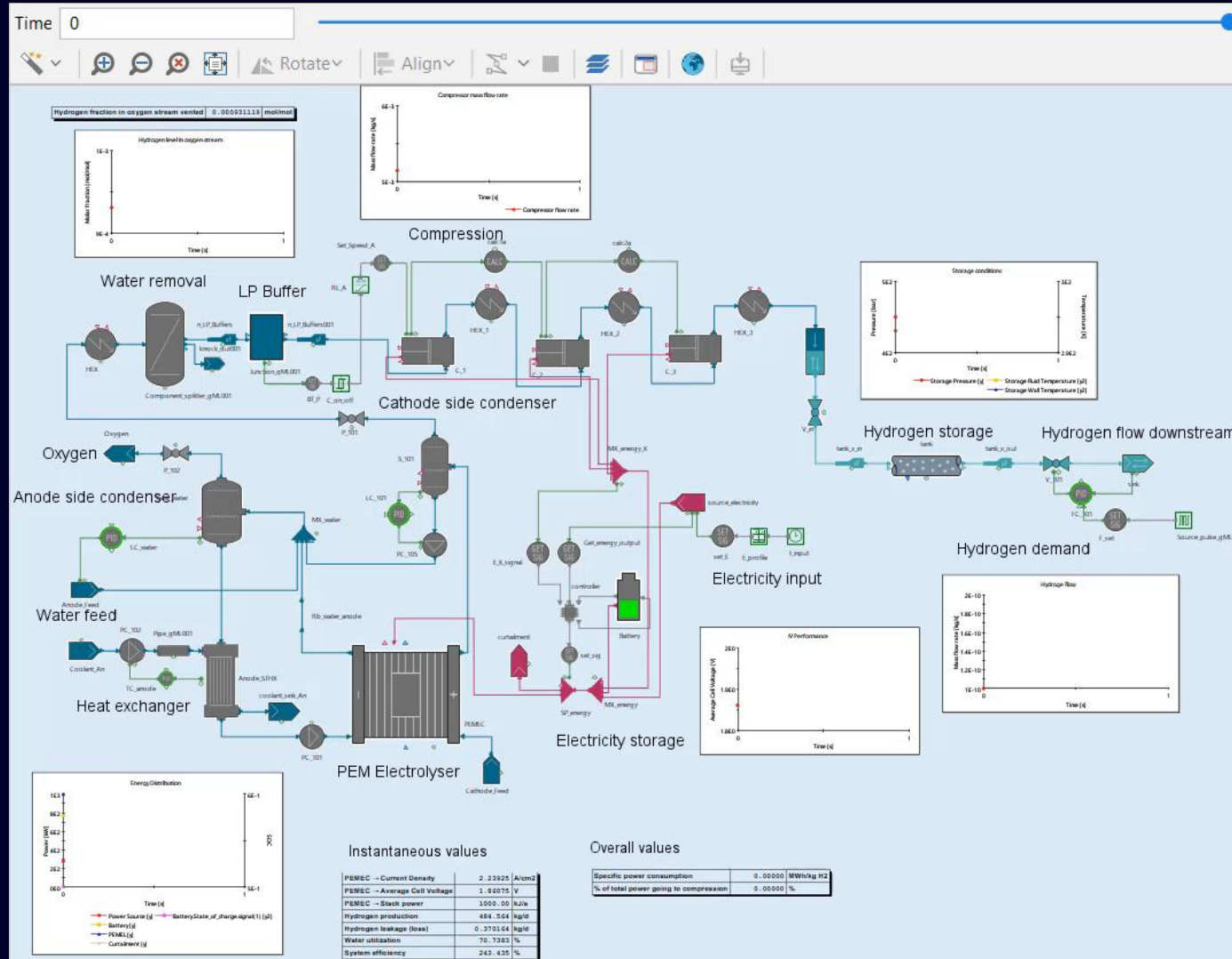
Operating procedures

Create a validated predictive model...  
... minimizing the number of lab experiments and pilot trials

... use the validated Process Digital Twin to explore the decision space, analyze, quantify and manage risk & optimize design

# gPROMS Process

## Modelling of green hydrogen production processes



- **Validate** electrolyzer models against data
- **System 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 considering variability

# | Opportunities ahead

# Opportunities for Digital Twins

## Expand across process life cycle

