Hydrogen Power Plants Service & Solutions

Serving the entire power generation value chain on your PATH2Decarbonization
Our energy landscape is changing

By 2025, hydrogen strategies will be leading the energy transition.

<table>
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<th>Low- or zero-emission power generation</th>
<th>Reduce CO2 footprint and energy consumption</th>
<th>Reduce high carbon producers</th>
<th>Utilize excess renewable energy</th>
<th>Grid flexibility and reliable transmission</th>
<th>Partner with innovative technology leaders</th>
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We energize society

Find your path to decarbonization with end-to-end solutions that suit all of your existing and new equipment needs

Siemens Energy Hydrogen  Siemens Energy Decarbonization  Hydrogen Power Plants  Path2Decarbonization

Who is being impacted?  What is Siemens Energy doing?  Why hydrogen-ready power plants?  What can you do?
Serving the entire hydrogen value chain

Our expert in-house competencies can support your goal to be a key player in the energy transition with hydrogen power generation.

Our innovative products support customers in transitioning to a more sustainable world.

Generation
We provide products, solutions and services for conventional power generation with high efficiencies. We reduce carbon emissions from existing assets and develop technologies that that will be critical in the future for the decarbonization of power generation applications.

Industrial Applications
We support our customers in oil and gas, as well as other industries, by providing safe, reliable and highly efficient rotating, electrical, automation and digital products, solutions and services.

Transmission
We partner with our customers to build and operate efficient grid infrastructures. We offer reliable products, solutions, and services improved with digital functions to meet the growing demand for sustainable electrification.

New Energy Business
We shape the green hydrogen economy. We develop technologies to couple our economic sectors with renewable sources of power.

Siemens Gamesa Renewable Energy
We provide wind energy technologies and services for a sustainable future. We are one of the world’s leading suppliers of on- and offshore solutions.
H₂ combustion experience built on development across fleets

We rely on steady increases of hydrogen to meet strict reliability standards.

June 2021
Integrate all aspects of your power generation in one system

Siemens Energy is combining its unique portfolio of gas and steam turbines, electrolyzers, and heat pumps, and turning it into a unique optimized power plant solution with one operating system.

New Hydrogen Ready Turbine
Green power generation can be a valuable addition with a new 100% hydrogen-ready power plant in your decarb journey

Co-Firing Existing Turbines
Existing service units can be upgraded to operate with a hydrogen co-firing mix

Heat Recovery Option
Combining power with heat generation allows for excellent overall efficiency
Make your plant H₂ ready now and save

H₂ gas turbines can be upgraded to hydrogen at a later date, reducing future retrofit costs.

Upgrade requirement

- Requirement to modify existing gas turbines and combined cycle power plants to burn hydrogen in the future
- Minimization of risk of having future "stranded investments" when deciding today on new GT/CCPP power plant construction projects

Potential future developments

- Hydrogen content in gas pipeline likely to increase in future due to electrolyzers gaining wider acceptance and discharging hydrogen into the gas grid
- Changes in legislation enforcing decarbonization of power sector leading to a requirement to co-burn increasing content of clean hydrogen

Siemens Energy Gas Turbines

As an OEM for key components, we have the experience, technical domain expertise, and standardized approach for co-firing and recommend a collaborative approach to exploring the current capabilities of a facility and establishing a path forward to accomplish optimal hydrogen co-firing milestones.

| New Burner Design | 100% vol |
| Smaller modifications and certifications required¹ | ~50-70% vol |
| Limited modifications, commercially available¹ | ~30% vol |
| No modifications¹ | ~15% vol |

¹ Percentage varies from GT model to model and emission limit requirements
Our electrolyzers are proven and efficient

Silyzer 300 enables grid support services with efficient hydrogen yield and maximum dynamics.

More than just an electrolyzer, the Silyzer is a cornerstone to new market design

Optimized portfolio levels depending on solution scope

Designed for fast installation, low cost and maintenance friendliness

Pre-engineered Balance of Plant packages for faster time-to-market

The Silyzer is scalable to meet your electrolysis needs

Silyzer 300 – Full module array, 24 modules. The next paradigm in PEM electrolysis

17.5 MW
plant power demand

>75.5%
plant efficiency

24 modules
to build a full module array

335 kg
hydrogen per hour
Hydrogen Decarbonization Calculator

Realize your potential cost savings through CO₂ reduction with our Hydrogen Decarbonization Calculator

Let us help you reach your decarbonization targets.

Calculate your CO₂ reduction and cost saving potential by running your turbines partly or fully on hydrogen.

The CO₂ emission data is based on methane. CO₂ emission intensity is stated per kWh electricity with exception for Combined Heat and Power, which is stated per kWh electricity and heat.

The CO₂ costs are based on The World Bank’s Carbon Pricing Dashboard (data from 1st of April 2021) with the exception of UK ETS which is based on a trading price of £43.99 (19th May 2021) and USD/GBP exchange rate of 1,415. Carbon pricing projections for advanced economies (IEA SDS 2030, IEA SDS 2040) are based on IEA's Sustainable Development Scenarios. Exchange rates come from exchangerate.host.

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Our expert teams are near you

Siemens Energy’s global footprint enables engagement in hydrogen projects anywhere

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**CLEMON, SOUTH CAROLINA**

Hydrogen Study at Duke Energy’s Combined Heat and Power Plant

**Hy-Orange Storage and Decarbonization**

**Challenges**
- Decarbonization of the 110,000 lbs/hr of peak campus steam demand
- Economics of zero-emissions hydrogen production
- Regulatory process for hydrogen pilot projects in the Carolinas
- Regulation, safety and perception with hydrogen production and usage in proximity to the campus and community

**Use Cases**
- Steam
- Re-electrician of hydrogen
- Mobility / Public transportation

**Solutions**
- Conceptual study to understand economics among technology owner, asset owner and off-taker
- Explore scope and economic requirements for a pilot demonstration of the CHP system at Clemson University

**Benefits**
- **14.3 MW** output from SGT-400
- **33 MW** peak campus steam demand
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