Hydrogen Power Plants Service & Solutions

Serving the entire power generation value chain



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www.siemens-energy.com/hypp

Our energy landscape is changing

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

Low- or zero-emission power generation

Reduce CO_2 footprint and energy consumption

Reduce high carbon producers

Utilize excess renewable energy

Grid flexibility and reliable transmission

Partner with innovative technology leaders





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

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.

Global Service | Hydrogen Solutions | Hydrogen Production | Intelligent Control System | EPC & Financing



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.

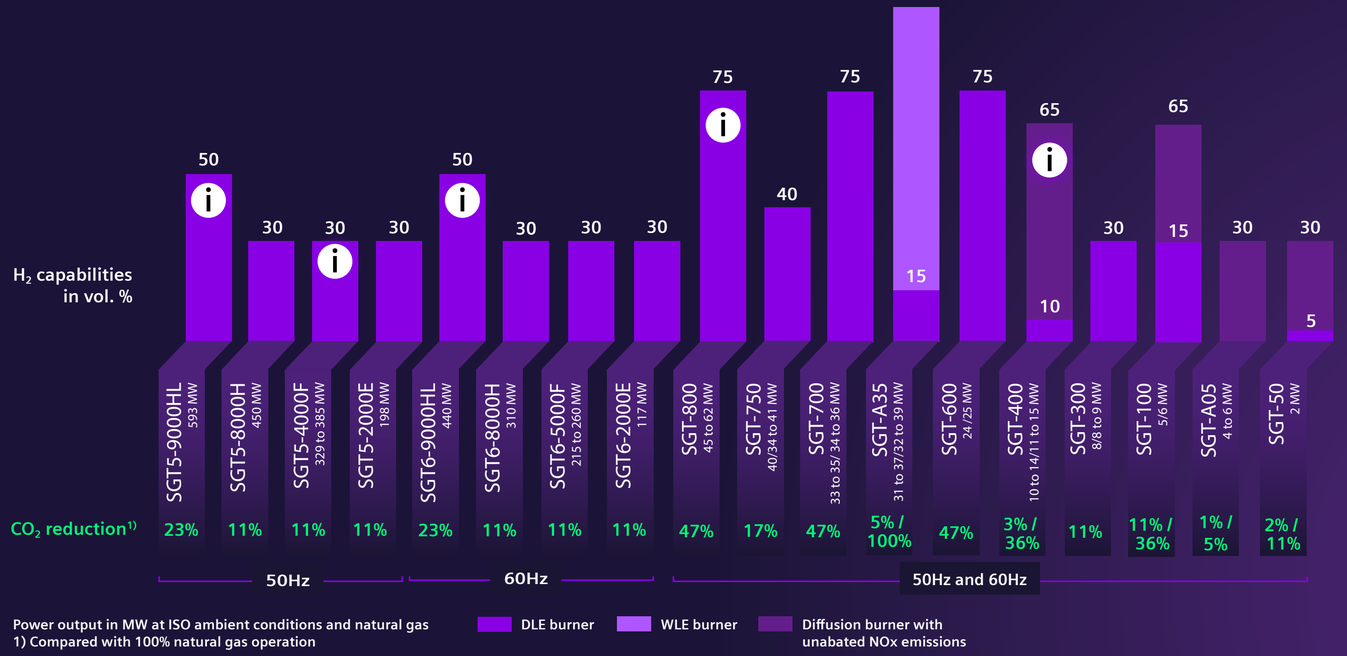
Siemens Gamesa Renewable Energy

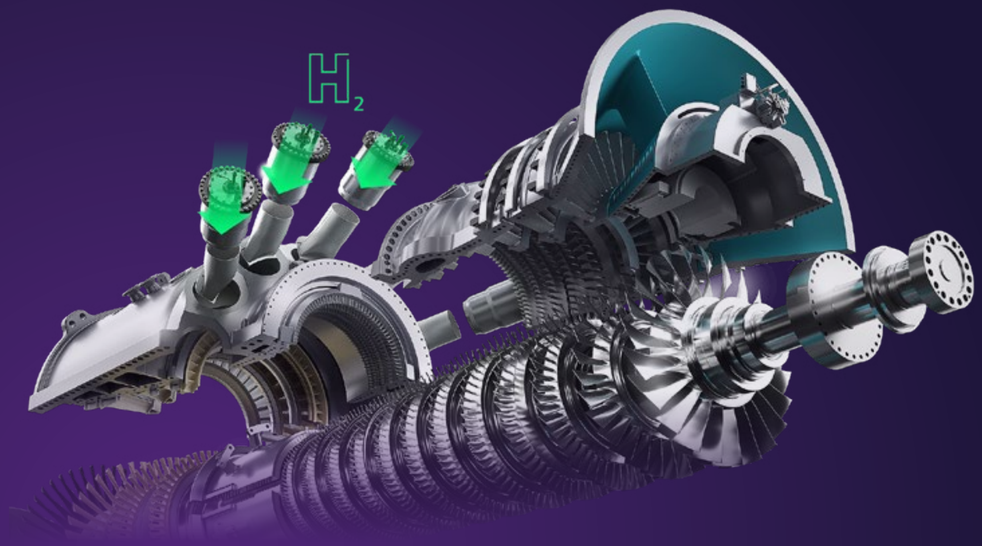
We provide wind energy technologies and services for a sustainable future. We are one of the world's leading suppliers of on- and offshore solutions.

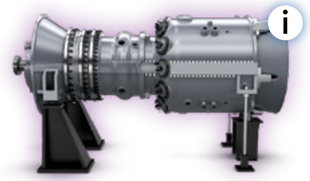


H_2 combustion experience built on development across fleets

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







Size L
e.g. with a SGT5-9000HL or SGT6-9000HL gas turbine



Size M
e.g. with a SGT-800 gas turbine



Size S
e.g. with a SGT-400 gas turbine

Large Gas Turbines | Medium-Sized Gas Turbines | Small Industrial Gas Turbines

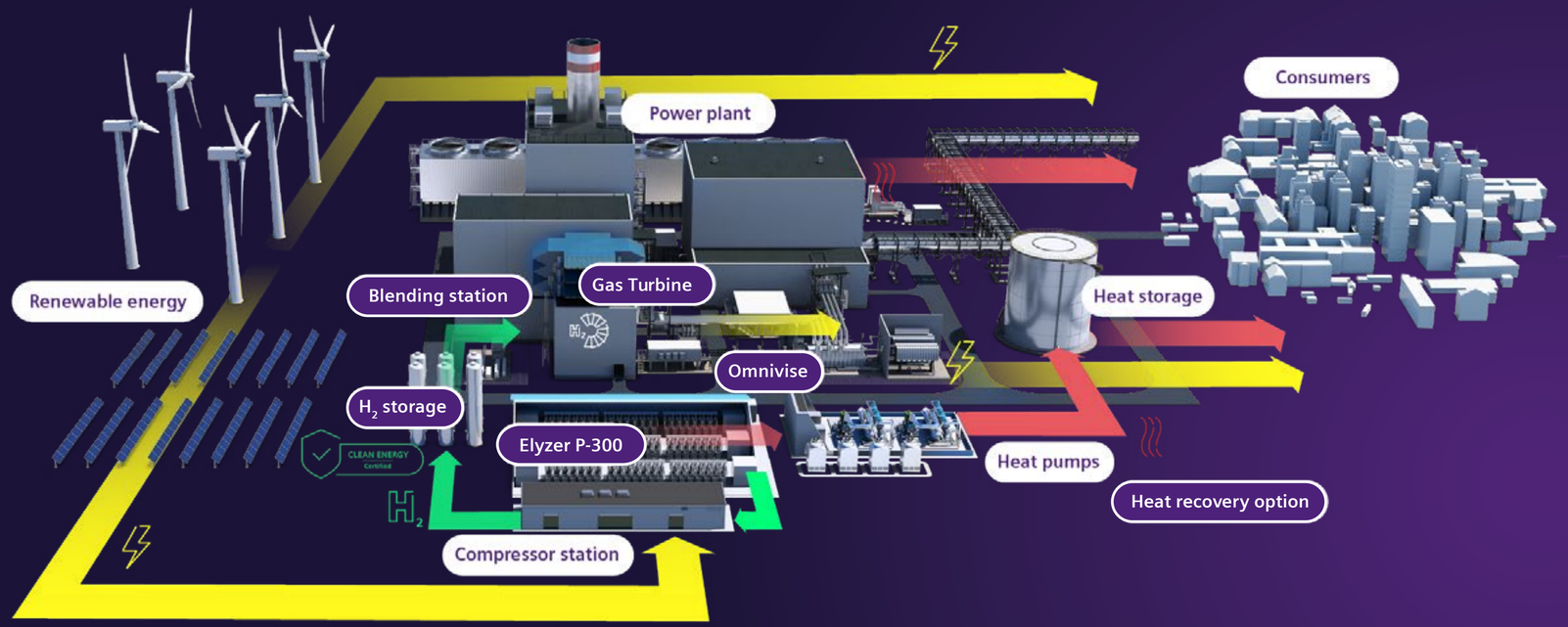
Large Gas Turbines

>45 years experience on H_2 by syngas combustion in IGCC projects

Up to 60% H_2 content tested in full pressure combustion tests with diffusion combustion in can-annular systems (5000F and 8000H). Experience in annular and silo systems (2000E and 4000F) can be transferred across frames.

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

Combining power with heat generation allows for excellent overall efficiency

Hover over to find your decarbonization solution.

- Traditional Power Generation
- H_2 Production, Storage & Certification
- Intelligent Control System
- Heat Recovery

RESET

Make your plant H_2 ready now and save

H_2 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.

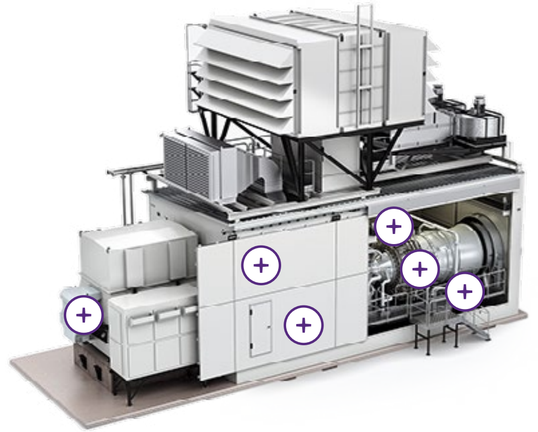
New Burner Design — 100% vol

Smaller modifications and certifications required1 — ~50-70% vol

Limited modifications, commercially available1 — ~30% vol

Minor to no modifications[1] — ~15% vol

1 Percentage varies from GT model to model and emission limit requirements

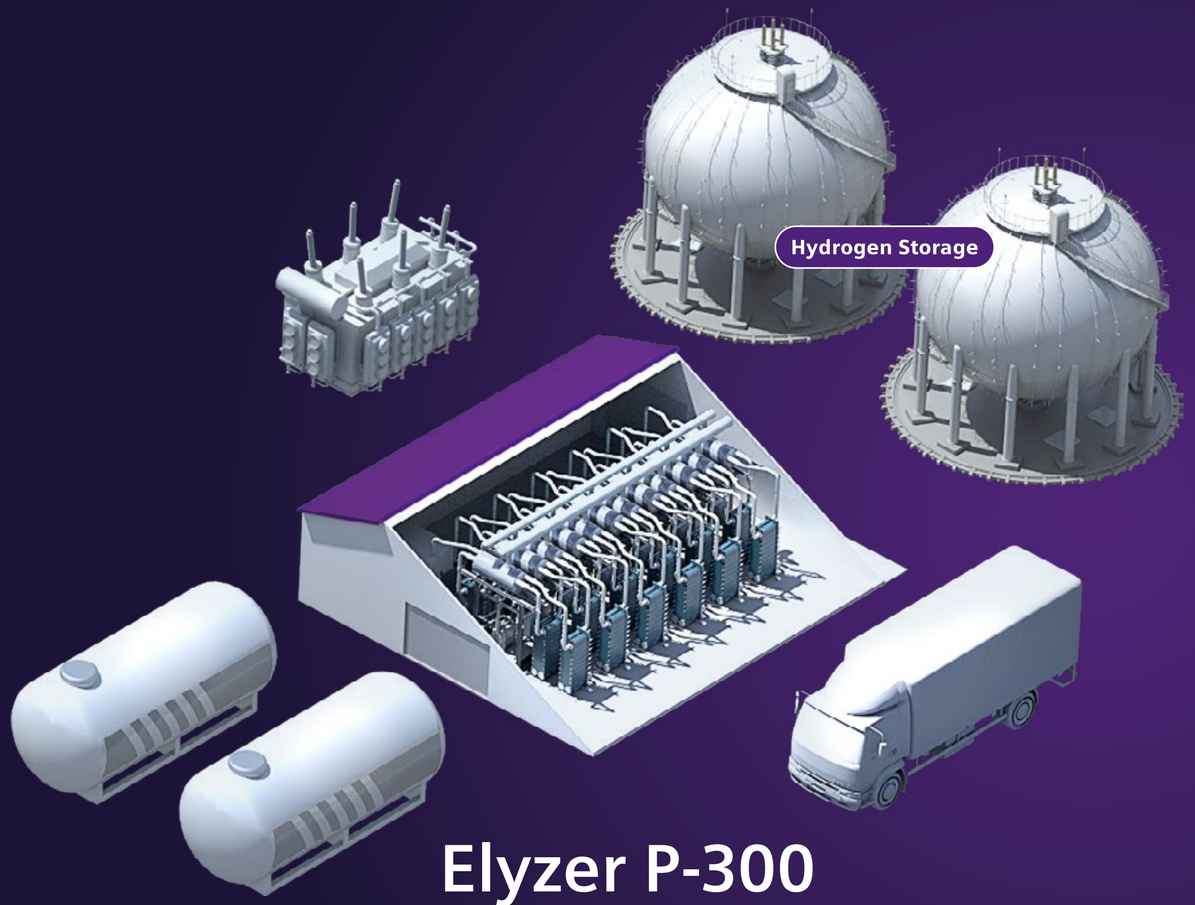




Our electrolyzers are proven and efficient

Elyzer P-300 enables grid support services with efficient hydrogen yield and maximum dynamics.

- More than just an electrolyzer, the Elyzer P-300 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 and Proof of Sustainability ready
- The Elyzer P-300 is scalable to meet your electrolysis needs



Elyzer P-300



Elyzer P-300 – Full module array, 24 modules. The next paradigm in PEM electrolysis

17.5 MW
plant power demand

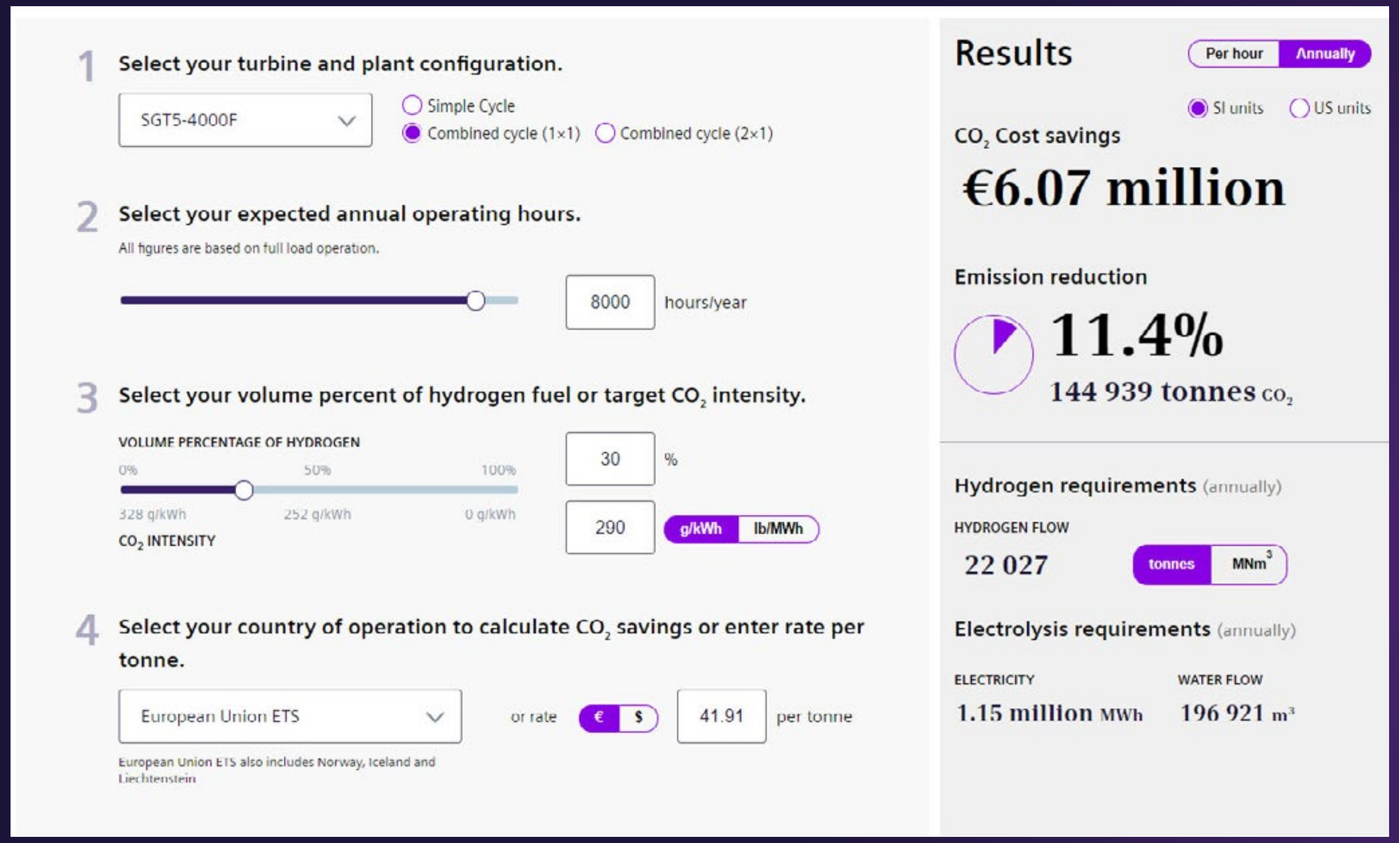
>75.5%
plant efficiency

24 modules
to build a full module array

335 kg
hydrogen per hour

Hydrogen Decarbonization Calculator

Realize your potential cost savings through CO_2 reduction with our Hydrogen Decarbonization Calculator



Let us help you reach your decarbonization targets.

Calculate your CO_2 reduction and cost saving potential by running your turbines partly or fully on hydrogen.

Start Now

The CO_2 emission data is based on methane. CO_2 emission intensity is stated per kWh electricity with exception for Combined Heat and Power, which is stated per kWh electricity and heat.

The CO_2 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 comes from exchangerate.host.

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Our expert teams are near you

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

All

Hybrid Projects

Hydrogen Power Plants

Hydrogen Production and Power-to-X



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Siemens Energy Global GmbH & Co. KG
Freyeslebenstr. 1
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E-mail exchange.energy@siemens.com

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Siemens Energy Inc.
4400 Alafaya Trail
Orlando, FL 32826-2399, U.S.

For more information, please visit our website: www.siemens-energy.com

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