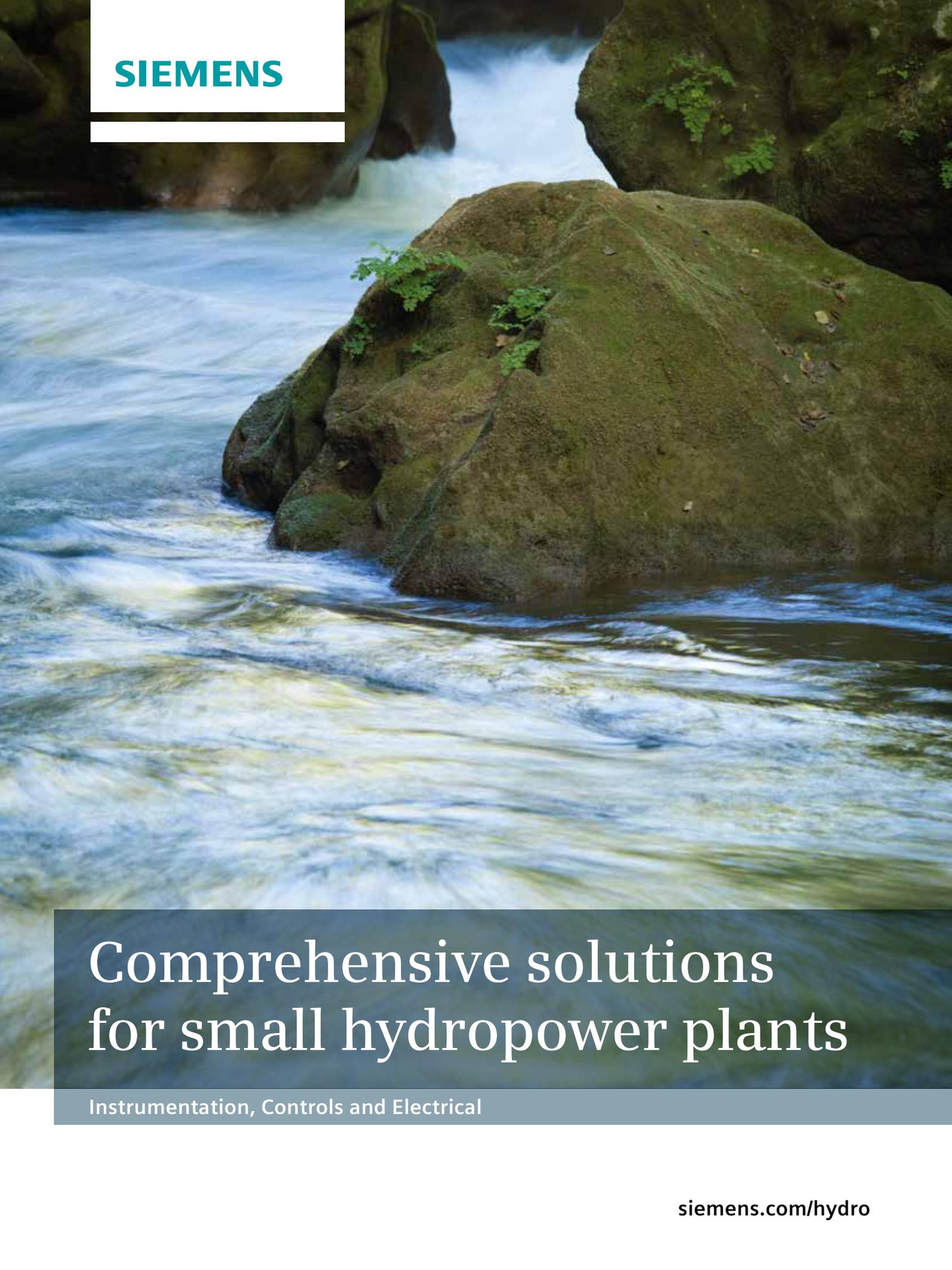




SIEMENS



Comprehensive solutions for small hydropower plants

Instrumentation, Controls and Electrical

[siemens.com/hydro](https://www.siemens.com/hydro)

In Véroia at the western edge of the Thessaloníki plain in Greece, the Aliakmon river is used to produce hydroelectric power.



Making hydro energy an investment that pays off

Renewable energy is the linchpin of tomorrow's energy mix. Solar, wind, biomass, and, of course, water are vital elements for an environmentally compatible global energy supply.

In view of the need to balance economic needs and ecological awareness, hydropower stands out in terms of profitability, sustainability, and availability. Small hydropower plants in particular have proven to be a functional and intelligent source of energy. Distributed power generation from hydro sources increases independence from fuel price developments and carbon emissions costs, potentially generating additional revenue from carbon emissions credits.

Siemens can draw on decades of experience and hundreds of small hydro-power plants installed worldwide. The company is renowned for technical excellence and outstanding service and can serve as a system provider with comprehensive expertise in the implementation of turn-key projects. This can translate into high profitability and availability of the plant and low total cost of ownership.

Hydropower plant Klimatia in Greece: Interior overview of Francis and Pelton turbines with synchronous generators and hydraulic units, medium voltage panels.



Expertise that generates revenue

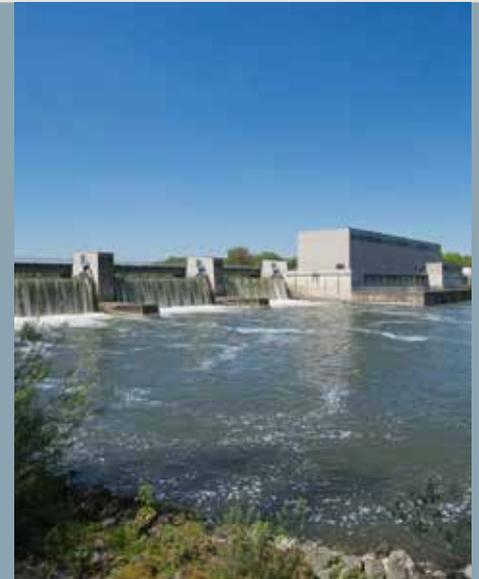
Proven solutions

Siemens stands out as an independent and reliable partner drawing on comprehensive know-how and technologies. The company promotes and continuously improves innovative solutions that help clients operate successfully. Siemens presents one face to the customer for an entire project as the solution provider. Its expertise in small hydropower plants covers:

- Solutions for turnkey small hydro-power plants
- Customized design and installation to meet the client's individual needs
- Modernization of existing plants with minimized production losses utilizing parts and equipment as suitable
- Integration of turbines from various manufacturers
- Integration of different turbines in one plant
- Local support, maintenance, and service help provide high availability
- Highest degree of operational safety and efficiency even for smallest plants

Project references

Photo courtesy of E.ON Wasserkraft GmbH



St. Anton, Austria
8 MW

Klimatia, Greece
7.55 MW

Ingolstadt, Germany
27 MW

Scope of supply and solutions

- Complete electro-technical solution for two twin-nozzle Pelton-turbines rated at 4,000 kW each
- Engineering, supply, installation, and commissioning
- 5 kV switchgear, 6,300 kVA and 5,250 kVA transformers
- Supply includes 50 switchboards providing automation for 3,000 I/O
- Control system with redundant PROFIBUS coupling via Ethernet

Engineering, supply, erection, and commissioning of

- Francis turbines 2x 3,150 kW and Pelton turbine 1x 1,250 kW
- Synchronous generators 2x 3,540 kVA and 1x 1,530 kVA
- Electrical equipment including: 2x 4,000 kVA, 1x 1,600 kVA and 1x 200 kVA transformers, 6.3 kV and 20 kV switchgear, low-voltage switchboard automation, control and monitoring (SCADA)

- Replacement of the machine automation systems at the Ingolstadt plant in conjunction with three other plant stages on the middle Danube
- Integration into the central control system
- Integration into the telecontrol system of Deutsche Bundesbahn
- Machine automation system with process visualization
- 16 2/3 Hz version with redundant synchronization
- Installation and commissioning, considering the railway network's uninterruptible energy supply needs

Customer benefits

- Energy supply security
- Cost-competitive, environmentally friendly renewable energy
- Comprehensive electro-technical solution

- Customized turnkey solutions
- Highest energy production due to high-efficiency systems
- Reliable and failsafe electro-mechanical components/systems
- Highest service level and support
- Cost-efficient investment
- Expertise and know-how applied to a wide spectrum of references

- Optimized implementation time, minimized production outage costs
- Modernization of electrical and control equipment, protection and excitation systems
- Integration into the water resources management (level control system)
- Central power plant operation

Francis turbine, synchronous generator, and hydraulic unit



Medium-voltage switchgear system



Oil-immersed distribution transformers



A convincing scope of supply

As the only integrated energy company that serves the entire energy conversion chain with products, solutions, and services, Siemens provides both sophisticated technology and substantial know-how. This includes the construction of new, small hydropower plants as well as the modernization of existing ones. Siemens is able to provide comprehensive solutions for small hydropower plants up to 30 MW from various reachable offices.

Modernization of existing plants

If an existing plant needs to be upgraded with state-of-the-art technology, Siemens is the partner of choice. By using the pre-existing technical equipment that is already installed on site, Siemens can optimize the technology with minimal budget requirements.

The Siemens scope of supply includes:

- Turbines from leading manufacturers
- Generators, transformers
- Turbine control
- Medium-voltage switchgear
- Excitation devices, voltage and efficiency factor regulators
- Machine automation
- Monitoring and control of the entire hydraulic system (dam, reservoir operation, weir system, residual water release)
- Safety devices
- Alarm signals and telephone alerts
- Remote control devices
- Remote data transfer
- Integrated power plant control systems
- Lighting, power installations, earthing and lightning protection
- Energy feed-in to the regional network
- Linking multiple plants

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