Solutions for reliable energy flow

Cooling Systems
More than 40 years of experience in pure water cooling systems technology

Hitachi Energy is a pioneering technology leader that works closely with utility, industry, transportation and infrastructure customers to improve their performance while lowering environmental impact. Hitachi Energy operates in more than 90 countries with about 36,000 employees.

Hitachi Energy delivers the complete value chain in low, medium and high voltage technologies for electrical power transmission, distribution and usage. The comprehensive range of products help enhance safety, reliability and efficiency of power networks.

Hitachi Energy is one of the leading market players in pure water cooling systems for power transmission, industrial processes and ‘clean tech’ applications. Our mission is to deliver reliable and energy efficient solutions with optimized lifecycle cost. Our offering covers all important areas – from development, design, sales and production, to assembly, testing, installation, commissioning, training and service.

We provide cooling solutions for new constructions as well as upgrades for existing systems in all types of environments, from deserts to tropical climates, offshore and onshore. Our solutions are available for all kinds of applications including nuclear power, wind power, HVDC and SVC projects, industries, medical and research applications, clean tech applications like hydrogen production, fuel cells, battery storage and ultra-fast EV chargers.

1980
Swedewater Established

1983
Acquired by ASEA

1987
Part of ABB Power Systems

1997
Supplier to Siemens for HVDC projects

1982
First thyristor water cooling unit (WCU)

1985
First HVDC water cooling unit

1992
Supplier to GEC-Alstom for HVDC projects
Global installed base

- Countries where cooling systems from Hitachi Energy are installed

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>2005</td>
<td>ISO 14001 and OHSAS 18001</td>
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<tr>
<td>2012</td>
<td>Largest HVDC cooling system in the world</td>
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<tr>
<td>2015</td>
<td>Supplier to Toshiba for HVDC projects</td>
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<tr>
<td>2017</td>
<td>First battery cooling system delivered</td>
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<tr>
<td>2019</td>
<td>Energy storage cooling with chiller module</td>
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<tr>
<td>2020</td>
<td>EV Charger cooling developed</td>
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<td>2021</td>
<td>Hitachi Energy launched</td>
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Cooling system
Modular solution for high energy efficiency

**Optimized operational performance**
Cooling systems from Hitachi Energy are designed with high redundancy when needed, both in components and control.

**Flawless quality and reliability**
Cooling systems from Hitachi Energy are of flawless quality and reliability to achieve the stable operation of any equipment where cooling is needed.

**Customised solutions**
Custom solutions for different voltage levels, cooling capacity and different dimensions can also be developed. Modular design for different units to be used in HVDC cooling system are available as well which ensure robust solutions.

**Proven Technology**
Cooling systems are custom made solutions for various industrial and power transmission applications. Hitachi Energy’s cooling systems are reliable and energy efficient with optimized life cycle cost. We have cooling capacity from 2 kW to several megawatts. The most commonly used cooling media is water. The specific application determines when to use pure water, tap water or glycol water mixture.

**Pure water - when coolant with low conductivity is needed:**
- Cooling of semiconductors in electrical devices such as HVDC, SVC, converters, drives etc.
- Applications such as food and medical industry where pure water without chemicals are needed
- Cooling of Fuel cells and hydrogen production application
- Cooling of magnetic coils such as generators and motors

**Tap water - when conductivity is not an issue:**
- Room cooling and energy storage
- Cooling in applications not in contact with electricity

**Glycol-water mixture - when freezing of the media is at risk:**
- When ambient temperature is below 0°C

NOTE: Other coolants also available when needed e.g. eco-friendly oil.
How cooling systems work
The principle of all pure water cooling systems is fundamentally the same. There is a main loop cooling the object. Water transfers the heat to water-to-water or water-to-air heat exchangers. From the main loop a small part of the flow passes through a water-treatment circuit. The water is filtered mechanically and is also continuously purified from ions and oxygen when needed. The conductivity of the cooling water can hence be maintained as low as < 0.1μS/cm (at 25°C).

Scope of supply
Hitachi Energy’s cooling systems can supply a completely engineered system optimized for your needs, including coolers, pump skid, water treatment unit, connecting pipes, MCC, CPC and UMD (uninterruptible motor drive).

Pre-fabricated Systems
Our cooling systems are pre-fabricated and assembled in one or several units. Most of the systems include control equipment with PLC and software. The systems are tested and verified before delivery. As we deliver systems globally, we have developed design standards and control routines for efficient on-site installation and start up. Most of our customers can easily set up the systems themselves by following our manuals, or contact our service department for assistance.

Flow diagram showing the basic principle of a cooling system
All types of applications
Power transmission, industries and clean technology

Cooling systems for HVDC
HVDC installations need flawless quality and reliability to achieve the stable operation. To optimize operational performance, all our cooling systems for HVDC are designed with high redundancy, both in components and systems. Purity and low conductivity of water are other important quality factors we put much focus on.

Cooling systems for SVC
Layouts of cooling systems for FACTS are often complex and have short lead times. High quality in components and workmanship are equally important for SVC installations. Hitachi Energy’s vast experience combined with modular concept helps deliver efficient solutions at optimized costs.

Cooling for rectifiers and converters
Large consumers of direct current (DC), e.g. aluminum smelters and chemical processing industries, use high power rectifiers with pure water cooling. Converters for different industrial areas such as oil, gas, railway systems and offshore constructions also need pure water cooling.

Cooling for metallurgic processing
We have developed several pure water cooling systems for furnaces and stirrers, as well as for electromagnetic brakes for moulds. Our cooling systems are specially designed for consistent high performance in very demanding environments. Components are selected not only for precise function and reliability, but to withstand rough handling, dust and high temperature.

Cooling for hydrogen production
Process of hydrolysis, i.e. electrolysis of water to extract hydrogen, has significant heat losses. This heat needs to be controlled for stability and efficiency of process. Efficient single circuit cooling with pure water serves this purpose, while ensuring qualitative process due to extremely low conductivity.
Cooling of hydrogen fuel cell
As a zero-emission source of energy, hydrogen fuel cells are gaining fast popularity in both stationary as well as mobile (transport) applications. To ensure stability and efficiency of a fuel cell, the heat generated through chemical process in it needs to be controlled. Our pure water based cooling systems for fuel cells can be used for stationary applications, as well as ships or on- and off-road vehicles.

Cooling of batteries
Batteries are a highly popular mode of energy storage, for both stationary as well as mobile (transport) applications. During fast charging or discharging batteries tend to heat up, due to which the lifetime of the batteries can be reduced. Our specially developed cooling solutions and modules dissipate this heat. They are particularly effective for batteries installed in compact spaces and with > 1C charging / discharging rate (common in cars, boats and ships).

Cooling of EV chargers
Growing fleet of electric vehicles (EVs) leads to a high demand for charging infrastructure. Modern ‘ultra-fast’ chargers (<150 kW) can cater charging needs of multiple electric vehicles quickly, but face issue of cable heating and potential damage due to it. With our cooling solution for EV chargers, this heating can be mitigated in a safe, ‘quiet’ and cost-effective way.

Cooling for research and medical applications
Electromagnets in accelerator rings and cyclotrons for research or medical use are often cooled with low conductivity water. Such projects can be extremely customer-specific. We also make customized standard units which are produced in small series over a number of years. Well-proven design and short lead times are our key success factors.
Providing value to our customer

Installation and commissioning
To ensure that the starting up and operation of the cooling system run smoothly, our professional supervisors are present on site. Being specialists in pure water cooling, we are able to guide you along the way and are experienced trouble-shooters.

Service and maintenance
We provide preventive and perform corrective maintenance programs including status control and follow-up.

With a service agreement we can work with you to identify the service levels that best meet your needs.

Spare parts
Our spare parts are verified and meet all safety and reliability standards. Availability for our products lasts up to 20 years. We have the most frequently used parts in stock Projects filed since 1980.

Training
As several pure water cooling systems are customized, we provide tailor-made courses on site or digitally. To make learning easy, your staff will be able to practice on equipment for realistic hands-on training.

System condition diagnosis
Our specialists help you assess the condition of your cooling system and can give you professional advice for measures to be taken to ensure the functioning and enhanced life time of your equipment.

Upgrading and Retrofitting
In order to find the best solutions for upgrading, modernizing or retrofitting a pure water-cooling system, we document and evaluate important functional values. Our experts focus on reliability for your refurbishment program, whether it concerns upgrading existing cooling systems with improved functionalities, new operating mechanisms, upgrading cooling controls or designing an upgrading kit for better performance.

The advantages of retrofitting are:
- Reduced operating and maintenance costs.
- Increased availability, safety and reliability
- Prolonged service life
- Optimized operations
- Reduced need for maintenance
- Longer maintenance intervals
- Updated to new technology
Our Commitment

Quality assurance

We are committed to provide the best products and services. Our products comply with or exceed the latest international standards. In addition to type tests in independent laboratories, our certified design and manufacturing process guarantee the highest quality. We are certified according to ISO 9001:2015.

Sustainability

For Hitachi Energy, sustainability is about balancing economic success, environmental stewardship and social progress to benefit all our stakeholders.

Sustainability considerations cover how we design and manufacture products, what we offer customers, how we engage suppliers, how we assess risks and opportunities, and how we behave in communities where we operate and towards one another, while striving to ensure the health, security and safety of our employees, contractors and others affected by our activities. We are certified according to ISO 14001:2015, ISO 45001:2018 and ISO 50001:2018.
As an integral part of the cooling system, we offer a large range of service offerings to optimize the efficiency of the equipment and increase its productivity.