

# MODERN HYDROPOWER

MODERN HYDROPOWER IS AN ESSENTIAL PART OF THE NORDIC ELECTRICITY SYSTEM.

MODERN HYDROPOWER INVOLVES DEVELOPING NEW INNOVATIONS THAT ARE ACTIVELY USED IN PRODUCTION.

MODERN HYDROPOWER IS A RESPONSIBLE CHOICE FOR BOTH THE ENVIRONMENT AND PEOPLE.



# RELIABLE MAINTENANCE OF THE ELECTRICITY SYSTEM



## WE PRODUCE RENEWABLE, EFFICIENT AND RELIABLE ELECTRICITY

Hydropower plays an important role in the Nordic and Finnish electricity systems. Hydropower accounts for more than 50% of all electricity produced in the Nordics and approximately 20% in Finland. In the Finnish electricity production the share of renewable energy sources was 54% in 2022 and 68% in the Nordics. In the EU, hydropower is the second most significant form of renewable energy production after bio power.

## OUR HYDROPOWER PLANTS PRODUCE VITAL BALANCING POWER

Hydropower is the main source of balancing power in the Nordics. The role of hydropower as balancing power is emphasised as the share of production forms affected by the weather increases. In the electricity system, production and consumption must be equal at all times, and with hydropower, fluctuations in the weather-dependent production

can be balanced within seconds, which helps ensure the functioning of the Nordic electricity system in all situations. Hydropower is the only form of production that can restore the electricity system in major failures. Distributed and reliable hydropower is crucial for our electricity system's availability and security of supply.

## WE DO LONG-TERM WORK TO ENSURE ENERGY EFFICIENCY

By modernising our hydropower plants, we can produce more electricity, increase our production capacity and add decades to the plants' service lives. Modernisation also increases the plants' energy efficiency and provides environmental benefits: for example, the new technology and sizing of turbines in the Iijoki river plants' modernisation programme provided a power increase of approximately 10%. The new design of the turbines offered better efficiency, and switching to water lubrication eliminated the risk of oil spills.



## WE IMPROVE TIMELINESS THROUGH MODERN SYSTEMS

The power plants along the Iijoki river use Finland's most advanced river regulation system for the centralised control and optimisation of production along the entire river. This improves the efficiency of the production of balancing power, which is important for the balance of the electricity system.

The benefits provided by automated regulation are significant when measured over the total production of the power plants along the Iijoki river. The system also takes environmental aspects better into consideration than previously. The automation guarantees more precise control of the reservoir water levels.

# MODERN TECHNOLOGY AND INNOVATIONS

## WE DEVELOP TECHNOLOGY THROUGH PARTNERSHIPS

With the University of Oulu, we have developed a completely new kind of turbine regulator. The innovation provides faster and more precise regulation of electricity production in hydropower plants, enabling efficient responses to rapid changes in the electricity system.



## WE APPLY MAINTENANCE INSIGHTS

We continuously develop the maintenance of our power plants jointly with our partners. This enables us to ensure that the plants operate reliably and to minimise the impact of our operations on the environment and other use of waterways. An example of insightful maintenance is the caisson innovation developed by our experts. It saves time

and money in power plant repairs and considerably improves safety at work. The caisson technology makes underwater construction possible in dry conditions and cuts production interruptions from a month and a half to a few hours. In addition, the quality of concrete work is better when it is carried out dry.



## WE PROVIDE FINNISH TOP-LEVEL EXPERTISE

Nearly 200 bored piles were used to repair the earth dam of our Melo power plant on the Kokemäkijoki river. The dam involves the deepest bored pile wall structure in Finland and is the largest dam ever repaired using this method. This unique project was made possible by the excellent cooperation with our expert partners.

## WE USE THE LATEST TECHNOLOGY

We use modern technology and pilot new ideas in the maintenance of our hydropower plants. For example, robotics are used in the imaging of the tunnels of our Jumisko power plant in Kemijärvi,

which reduces production interruptions required for maintenance work. Remote sensors provide up-to-date information on water level fluctuations, and we use drones in the monitoring of the condition of shores, for example.



## SUSTAINABLE PRODUCTION IS OUR GOAL

We believe that the same river can accommodate hydropower production, people and nature. We believe the needs of the environment, people and society should be balanced.

Hydropower production alters the aquatic environment and especially affects the living conditions of migratory fish. In addition to transports and stocking, we continuously develop diverse solutions for migratory fish. We are committed to restoring the natural migration patterns of migratory fish in cooperation with other operators.

Finland's first downstream migratory route has already been built at the power plant furthest upstream along the Iijoki river at Haapakoski. We also promote the construction of the Raasakka fishway at the power plant furthest downstream. In addition, we will introduce a Finnish innovation, a hydraulic fishway Fishheart at the Raasakka power plant for 2023–2025. We believe that the best outcome is achieved in close local cooperation, when we use diverse methods, proceed in a step-by-step manner and apply research.

We also develop the aquatic environment through local cooperation in the old Iijoki riverbed in Raasakka and at the ecological flows of the Iijoki river headwaters, among others.

We maintain close dialogue with residents and other stakeholders in our area of operation. We are actively involved in several cooperation projects, including the Iijoki Agreement, which implements the Iijoki waterway vision. The waterway vision is a shared future vision of the Iijoki river in 2030. We also participate in joint projects in the Kemi-Ounasjoki river basin.

### **POHJOLAN VOIMA OYJ**

Mikonkatu 7 A 5, P.O.Box 40,  
FI-00101, Helsinki, Finland  
Telephone +358 10 478 5000  
[www.pohjolanvoima.fi](http://www.pohjolanvoima.fi)  
Twitter@PohjolanVoima

# **DECISIVE POWER.**