Challenges

Renewable energy is one of the fastest growing sources of electricity. Hydroelectricity, one of the oldest methods for generating power, will play a significant role in the projected growth of worldwide generation.

Hydroelectric plants have long lifecycles, with some facilities still operating after more than 100 years. Periodic upgrades to equipment, as well as relicensing, allows utilities to extend the life of a hydropower facility so it can continue to produce electricity well into the future. Additionally, effective management of hydroelectric and pumped storage plant operation ensures the ongoing commercial viability of these assets.

Modernizing hydroelectric or pump storage plants, constructing new sites, and retrofitting flood control facilities for efficient power production affords many benefits, but each has its own challenges with cost, performance, and risk.

Consider It Solved.

For over a century, power producers have turned to Emerson to control critical power generation processes, increase plant efficiencies and megawatt production, and realize long-term O&M savings at both locally- or remotely-controlled facilities. Emerson solutions are trusted worldwide to provide reliable and secure automation for the power generating processes.

An Emerson total solution for your hydroelectric power plant can help you achieve business objectives — from a single turbine generator, to a powerhouse, cascaded hydro plants, or your entire generating fleet. Our ability to architect, implement, and manage a hydroelectric automation project will generate increased performance and risk.

As a leader in power generation automation, Emerson solutions can help reduce outages, promote consistent and safe equipment operation, improve plant performance, and support realization of financial objectives.

We recognize that power producers with diverse assets that include hydroelectric generation require broad-scope solutions that encompass innovative technology and lifecycle services. Emerson’s vast experience with both traditional and renewable generating assets enables us to provide integrated solutions that encompass the entire hydroelectric plant and associated body of water. Our automation strategies promote commercial success by increasing operational efficiency and improving reliability and availability while mitigating risk.
Emerson Offerings for Hydroelectric Power Plants

**Hydro Plant Control & Monitoring**
- Digital turbine governor control
- Digital generator excitation system
- Vibration monitoring and machinery health management
- Coordinated megawatt & megavar control
- Automated start/stop & generate condense sequencing
- Mechanical protection for vibration, overspeed, and temperature
- Gate and waterway monitoring and control
- Auxiliaries and balance of plant control
- Switchyard control and monitoring
- Integration with protective relays, IEDs, dispatch centers, and other systems

**Ovation Distributed Control & Monitoring**
- Automatic documentation and system management
- Enterprise data server and wireless device monitoring
- High system availability: no single point of failure
- NERC CIP compliant security solutions
- Digital bus solutions (HART, DNP3.0, ICCP, Foundation Fieldbus, Profibus, DeviceNet, ASiBus, etc.)
- Alarm management
- Operator tracking through events, trends, logs, diagnostics
- Historian and report generator

**SCADA & RTU System**
- Remote flow, level, and precipitation monitoring network
- Remote control of gates, circuit breakers, rakes, valves, and generator sets
- Remote terminal units with integral solar/wind power and radio systems
- Dispatch system and interface gateway

**Plant Optimization**
- Blade pitch - gate position control
- Unit response management and optimization
- Multiple unit water/load allocation and efficiency optimization
- Pond/lake level and multiple plant cascade flow control

**Simulation**
- Virtual environment for operator training, control validation, and process analysis

**Turbine & Turbine Generator Applications**
- Horizontal and vertical synchronous and asynchronous applications
- Main Francis, Kaplan, and Pelton turbines
- Pumped storage turbines
- Fishwater, permanent magnet, and induction turbine generators
- Frequency converters

**Legend**
- Balance-of-plant (Powerhouse)
- Control Room
- Corporate Offices
- Turbine and Turbine Generator Unit
- Switchyard/Transformer
- Penstock Control Gate, Water Intake, and Screen
- Plant Engineering & Maintenance Office
- Dispatch Center
- Reservoir/Dam/Run-of-the-River

**Fleet/Enterprise Management and Optimization**
- Enterprise-wide system integration, visualization, and dispatch
- Automatic generation and frequency control
- Fleet (including hydro, renewables, fossil) financial and emission optimization
- Fleet-wide asset management and reliability program

**Services**
- Plant automation, monitoring, and control assessments
- Operation & maintenance studies
- Telecommunication system assessments
- Cybersecurity assessments
- Preliminary engineering, project planning, and specification preparation
- Final engineering and procurement
- Installation, commissioning, and startup support

**Analog and Field Devices Intelligent**
- Transmitters: pressure, temperature, flow, and level
- Valves: general, severe-duty, specialty, and motor operated
- Actuators: electric, hydraulic, pneumatic, variable frequency drives (VFDs)

**Equipment and Condition Monitoring**
- Online vibration monitoring with smart alarms
- Temperature monitoring with online statistical analysis
- Online partial discharge monitoring
- Laser alignment and balancing
- Motor and pump diagnostics
- Oil analysis

**Intelligent Device Management**
- Asset management
- Multiple-network system for calibration, diagnostics, configuration, and audits

**Electrical Auxiliaries**
- UPS, power conditioning, and distribution
- Air conditioning and precision cooling
- Motors, gear reduction drives, couplings
- Backup power generators