



# Hydropower Plant Equipment

The hydro-electric industry's highly competitive environment places a growing need on safe, environmental, and cost-effective production. There is also an increasing emphasis on the requirement for capital investments in equipment and parts replacement to ensure outage times for equipment repair and maintenance are optimized.

Return on investment will need to be protected and enhanced in part by program improvements such as refurbishment or replacement of inefficient units with new high efficiency ones; improvements in the design of intake, flow passage, and tailrace hydraulics; and better tools for measuring productivity improvements achieved with planned initiatives.

Further ongoing reductions of capital outlay to ensure the continued production of low cost energy will require the development of improved maintenance and repair techniques. Such techniques are seen as using new processes and materials to extend equipment life. These procedures can speed up the repair process to reduce outage times, while condition assessment, equipment diagnosis, and monitoring can optimize "just in time" maintenance.

## Topics & Issues

1. Hydropower Technology
2. Condition Assessment & Inspection Guidelines
3. Asset Management
4. Maintenance Programming & Reliability Performance Monitoring
5. Work Force Productivity & Safety
6. Environmental Performance
7. Regulatory Affairs

## Technical Advisors



**Mr. Jean C. Pellerin** graduated from the University of Ottawa with a Bachelor's Degree in Electrical Engineering. He has over 36 years of experience in the operation, maintenance, and development of renewable energies, with a focus in hydro generation. During his career with Brookfield Renewable Energy, he was director of areas such as technical services, asset optimisation, and engineering development, and contributed to the company's growth through acquisitions and greenfield developments. He currently provides technical and strategic advice for several engineering firms.



**Mr. Greg Lewis** is a registered professional engineer and holds a BS in Civil Engineering from the Ohio State University and a MS in Mechanical Engineering from the University of South Carolina. Greg retired from Duke Energy in 2019 after more than 38 years of service, with the vast majority of that time being focused in management of hydro engineering, operations, maintenance, technical support, and project upgrades. Greg was actively engaged as a member of the Hydropower Plant Equipment interest group from 2004 to 2019 and served as the vice chair/chair from 2014 to 2018.

## Projects

### Hydropower Technology

- Operation of Hydro Generators with Bypassed Stator Coils
- Vibration and Alarm Settings for Hydro Machines with Hydrodynamic Guide Bearings
- Hydraulic Unit Governor Upgrading Guide
- Grounding and Bonding Best Practices
- Safe Protection of Hydro Unit Operating at Runaway Speed
- Hydro Turbine Generator Vibration and Balancing Field Guide

### Capital and Maintenance Investment

- Commissioning Guide for Turbines and Generators
- Optimum Timing for Generator Stator Rewinds Based on Generator Condition Assessment and Statistical Methods
- Hydroelectric Turbine-Generator Units Guide for Erection Tolerances and Shaft System Alignment
- Brushgear Maintenance Guide
- Penstock Maintenance and Repair Guide

### Maintenance Programming and Reliability

- Hydro Generators General Maintenance and Inspection Guide
- Staff Management of Hydraulic Generating Stations
- Penstock Inspection and Assessment Guide
- Electrical Overhaul Guide to Hydroelectric Turbine Generators
- Mechanical Overhaul Guide for Hydroelectric Turbine Generators
- Hydro Generator Start/Stops and Cycling Costs
- Cost of Start-Stop Operations

### Work Force Productivity and Safety

- Key Performance Indicators and Tracking R&D Performance
- Training for Hydro Plant Staff (Including Web-Based Approaches)
- Best Practice Guide for Planning and Executing Hydro Overhaul and Retrofit Projects/Optimization of Rehabilitation

### Environmental Performance

- Criteria for the Identification and Selection of Environmentally Acceptable Lubricants
- Dissolved Oxygen Monitoring Technologies Applicable to Hydraulic Generating Station Reservoirs, Tailraces, and Spillways

### Regulatory Affairs

- Overview of Security Technologies for Hydropower Facilities
- Fire Protection Lessons Learned, Study of Hydroelectric Fire Probabilities & Fire Risk Assessment
- Fire Protection and Suppression in Hydroelectric Plants

## Annual Activities

- 2 Meetings
- 1-2 Workshops
- 5-7 Conference Calls
- Weekly Information Exchange

## Task Forces

- Gates Task Force
- Penstocks Task Force

\*Participation is open to all Electrical Utilities, Independent Power Distributors, Government Agencies, and Universities.