



HYDROFOR™

Hydro Power Forecasting

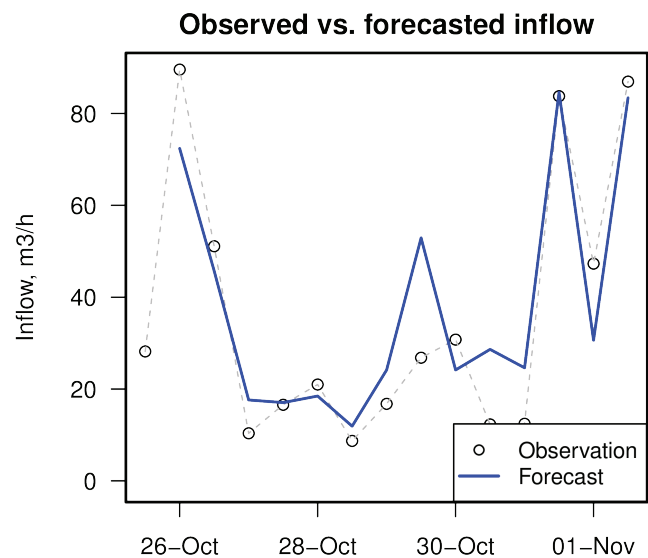
HydroFor™ is a software solution for operational hydro power forecasting. HydroFor™ forecasts in-flows to hydro power plants which can then be used to forecast or optimize the power production from run-off-the-river or reservoir based hydro power plants.

Why do you need HYDROFOR™

Hydro power forecasting is a necessity in order to plan and operate the power system efficiently. This applies to both commercial players in liberalized power markets and system operators. Accurate hydro power forecasting is needed by asset owners and electricity traders in order to optimize and trade power production efficiently. By increasing forecast accuracy, asset owners and traders can optimize the operation of hydro plants with reservoirs and reduce costs of imbalance fees and penalties from run-of-the-river hydro plants.

Transmission system operators need accurate hydro power forecasts to maintain system stability and keep system operating costs at a minimum.

The highly accurate hydro power forecasts delivered by HydroFor™ help asset owners, traders and system operators around the world to manage and optimize their portfolio every day.



Key benefits:

- ✓ Market leading hydro power forecast accuracy
- ✓ Highly flexible and configurable to almost any conditions
- ✓ Reduces costs for traders, asset owners and TSOs
- ✓ Low maintenance system with minimal interference for the customer
- ✓ Tailor-made modules handling complex requirements for various types of hydro plants

How does HYDROFOR™ work

HydroFor™ is a self-learning and self-calibrating software system based on a combination of physical models and advanced machine learning. The physical model separates forecasted inflow into a direct component from immediate precipitation into the reservoir and a delayed component represented by precipitation aggregated over the catchment. The model is trained using forecasted inflow (precipitation and evaporation) and observed inflow derived from reservoir water level, turbine flow and overflow. This combines the best of artificial intelligence with hydro power domain knowledge in order to produce the most accurate hydro power forecasts available.

Forecasts are produced every time the system receives new data, which can be updated weather forecasts or new measurement data. HydroFor™ can run in either an online mode (continuously receive real-time measurement data) or in an offline mode where historical data is retrieved monthly, or any other time interval.

The system can use one or more weather forecast providers as input and automatically detect the optimal prioritization of the different weather forecasts for each hydro plant and for different forecast horizons.

The self-learning and self-calibrating algorithms will continuously learn about the catchment area and the hydro plant characteristics. The algorithms will adapt to changing conditions, seasonal variations, and as the turbine ages, such that forecasts stay accurate over time without the need for manual configuration.

HydroFor™ can deliver power forecasts in almost any file format and can be integrated directly into the operational IT-platform of the client, such that data is retrieved and delivered seamlessly to and from relevant systems.

HydroFor™ is available as a software package installed locally on the client's servers, or as a service hosted on servers operated and maintained by ENFOR™. HydroFor™ is supplied with various support, maintenance and license packages, which can be customized to client specifications to provide a cost/performance ratio which fits the needs of the individual client.

Key features:

- Integrates with all major weather forecast providers
- Runs in both online or offline mode
- Configurable forecast horizons, update frequency and time resolution
- Configurable browser-based graphical user interface and reporting tool
- Data integration interfaces supporting numerous formats, file types and protocols
- Uncertainty bands on forecasts
- Scenario generation
- Data integration interfaces based on FTP, SFTP or Web Services supporting numerous formats and file types (CSV, XML, SOAP, JSON etc.)

About ENFOR

ENFOR provides forecasting and optimization solutions for the energy sector. Utilities, energy traders, transmission and distribution system operators use ENFOR solutions for forecasting of wind power, solar power, hydro power, electricity and heat demand as well as optimization of district heating systems. Based in Denmark, and established in 2006 as a spin-off from the Technical University of Denmark, the company has a solid operational track record and successfully serve customers all over the world.

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*"The future is an unknown, but a somewhat predictable unknown.
To look to the future we must first look back upon the past."*

- Albert Einstein