

Manitoba Hydro Will Maximize Revenues on Deregulated Market

Manitoba Hydro has contracted Synexus Global to implement the *Vista* Decision Support System for short-term security-constrained and optimized scheduling of Manitoba Hydro's generation resources. *Vista* will provide detailed hourly generation target schedules for the next 7 days based upon forecast demand, hydrological and market conditions. The software allows the operations planning staff as well as the market planning department to take advantage of various transaction opportunities by optimizing the use of the hydro generation resources.

Manitoba Hydro has about 5,000MW of installed capacity, of which 95% is hydroelectric. The hydroelectric facilities are made up of:

- a series of plants on the Winnipeg River totalling 560 MW
- the 450 MW Grand Rapids plant on the Saskatchewan River
- the 160 MW Jenpeg and the 225 MW Kelsey plants on the Upper Nelson River
- the Lower Nelson facilities, comprising Kettle (1225 MW), Long Spruce (1000 MW) and Limestone (1350 MW).

Much of Manitoba Hydro generation resources are located in remote areas throughout the province. The transmission system is generally stability-limited, which requires the consideration of the security limiting constraints on generation output. The transmission network includes two large High Voltage DC systems connecting the plants on the Lower Nelson to the load centers in the south. Consequently, *Vista* will represent

important characteristics of the transmission system, including:

- HVDC line losses as a function of load and transformer configuration
- Bi-directional line limits
- Plant limitation as a function of line loading



Jenpeg Generating Station

Moreover, hydraulic generation efficiencies are greatly affected by trash-rack losses and the effects of ice on stage and spillway capacity. The hydraulic representation within *Vista* is being enhanced to explicitly capture these impacts.

Manitoba Hydro is a coordinating entity with the MISO (Mid-West Independent System Operator), and has a coordinated transmission tariff and operations spanning a large portion of the mid-west USA. The generator is also a member of the Mid Continent Area Power Pool (MAPP) generation reserve sharing pool and has requirements to provide reserves to the pool. Manitoba Hydro is very active in capacity and energy markets in neighbouring provinces in Canada and in the United States.

Vista will be implemented to provide short-term scheduling capability and optimization of generation resources. The model will be

Vista Newsletter

installed in System Control: it will be used as a decision support tool for real-time operation, to adjust and optimize operations as required due to real-time conditions. The system is undergoing acceptance testing and is expected to be fully operational early in 2003.

For additional information on Vista please contact Stu Bridgeman at vista@synexusglobal.com

The Autoridad del Canal de Panama is Now Using Vista

The Autoridad del Canal de Panama (ACP) was already equipped with some of the most advanced weather and inflow forecasting technologies. Nevertheless, to improve water management and to increase the power generation without compromising navigation, a Decision Support System (DSS) was required. Consequently, ACP contracted Synexus Global to implement the *Vista* DSS software for the Panama Canal system.

The Panama Canal system consists of six locks connecting the Pacific Ocean to the Atlantic Ocean. The locks are operated using fresh water from two seasonal reservoirs: Lake Gatun and Madden Lake. Each reservoir includes small power plants (24 MW and 36 MW, respectively).



Panama Canal

Vista implementation was completed in July 2002 and ACP is now using *Vista* to produce decision guidance for water releases and hydro-electric generation (short-term operations as well as mid- and long-term planning).

Columbia Vista October Update

BPA and Synexus Global are working diligently towards the delivery of a Short-term (ST) planning module. There are primarily two development tracks underway, data integration and model functionality. The data integration involves connecting to the four primary live feeds of data:

- SCADA (hourly project elevations, flow, generation, etc.)
- ST Loads (includes System and Interchange loads, by region)
- ST Inflows (natural inflows)
- Unit Outage (outage plans from the official Unit Outage application)

The remaining "engine" work for the ST module includes:

- ST Sim. (a "smart" simulator)
- Banks Lake (PGS) functionality
- Treaty and Non-treaty Storage Operations
- Report Generator (tool to create report templates)
- River routing and incremental flow reports

There is a host of other activities underway including User Guide development, training plans, BPA process mapping, test/production network design and hardware procurement. The Project Team is hoping to begin acceptance training during the first part of December, take a break for the holidays, and resume again in January for follow-up and completion.

Streamline your Operations with Synexus Global's Integrated Solution – SimSys

SimSys is a powerful simulation system used by specialists and managers to perform analyses based on legacy applications. Customized specifically to your needs, SimSys streamlines the planning and scheduling of your operations and allows you to achieve greater productivity.

SimSys is a state-of-the-art integrated solution that:

- Provides comprehensive integration capabilities of legacy applications and enhances the interactivity between applications
- Improves data management by organizing and simplifying complex data structure
- Incorporates your mathematical models to compute, optimize and analyze solutions
- Facilitates decision-making by simulating scenarios and comparing results
- Reduce significantly development cost.

SimSys is used by Hydro-Québec and the Brazilian System Operator.

For additional information on SimSys please contact Michel Carreau at simsys@synexusglobal.com

Hydro-Québec Chooses Synexus Global to Integrate its Planning Models into SimSys

After the development and implementation of its short-term scheduling model by Synexus Global (ref. paper on HydroVision, Seattle, July 2002), Hydro-Québec chose Synexus Global to integrate a chain of 8 mid-term planning models into SimSys' platform.

The legacy models make the planning preparation cumbersome because they use

different set of data and have deficient user – interfaces. The models, which provide planning for an horizon of 1 to 5 years, are the following:

- weekly planning of the complete network: generation, reservoir level and discharge, network transit and energy exchange based upon a deterministic linear programming methodology
- similar planning but using stochastic discrete dynamic programming approach
- St-Lawrence hydro system weekly simulation model
- daily planning using stochastic model providing the management rule to operate reservoirs of a hydro system highly constrained by flood or drought issues
- peak demand simulation model
- generating unit and transmission line outage analysis: impact on the available generation outage analysis and impact on the maintenance scenarios and cost
- optimum unit loading analysis tool.

This is the second phase of a multi-phase endeavour that will bring the following benefits to Hydro-Québec:

- Providing a common Graphical User Interface for all the planning models
- Integrating several platforms into a single one with a unique data repository
- Providing an open architecture platform
- Providing a flexible and scalable solution.