Selected Images of the NRStor Modeling System

It is often said that the modeling process is just as important as the models themselves. This certainly proved to be true in the Ontario study. The models were developed and used in a transparent, interactive process to promote discussion among the staff, managers and regulators from the agencies and companies. The result was continual improvements in the model and continual learning among the NRStor team and the participants in the discussions. The White Paper concentrates on the models’ special features that made these discussions possible. Selected images of the modeling system are shown below.

**Ontario Planning Model**

Simulates 30 years, with 24-hr profiles for a typical day in each month. Finds the spot prices and the GA rate to get the all-in price to the Local Distribution Companies. The model is used to find the value of a storage facility.

- Transfer the assumptions on monthly loads and capacities of existing generators: CHP, hydro, nuclear and wind.
- Transfer the operational rules, such as the hourly pumping & generating profiles when storage is used for load leveling.
- Transfer measures of performance, such as the % of wind integration achieved when storage is used to provide incremental & decremental reserves.

Simulates a typical week for each month of the year with loads and capacities from the long-term model. Wind generation is highly variable, based on historical capacity factors for each hour of the week. The model is used to explore different ways to operate a storage facility.

**Ontario Operations Model**

**Figure 3 in the White Paper:** Design of the modeling system.

**Figure 4 in the White Paper:** Opening view of the long-term planning model.
Figure 5 in the White Paper: View of stacked generation in the weekly operations model.

Figure 6 in the White Paper: View of the key stocks and flows for GCAES operations in the weekly model.