Long-term resource planning for resource planners and portfolio managers

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Energy Planning & Trading

Capacity Expansion

Hitachi Energy

Hitachi Energy Capacity Expansion gives resource planners and portfolio managers the valuable ability to assess and develop strategies to address current and evolving renewable portfolio standards and emissions regulations. The solution provides optimal long-term resource plans with the potential options of resource additions, retirement, refurbishment and changes in operations.

Capacity Expansion develops long-term, 20- to 30-year resource investment plans, including technology type, fuel, size, location and timing of capital projects required to meet reliability requirements.

The resource alternatives that can be analyzed include demand response, energy efficiency programs, and transmission expansion in addition to new unit construction. The solution uses either mixed integer programming (MIP) or linear programming (LP) algorithms for the optimal solution to solve for the desired time period with the existing system as well as alternatives for future expansion plans.

The primary feature of Capacity Expansion is its ability to analyze renewable portfolio standards and emissions regulations. Renewable portfolio standards can be modeled for the entire portfolio or for multiple jurisdictions. In addition, Capacity Expansion will also consider a wide range of emissions constraints for multiple emissions. Emissions constraints can be multi-layered and overlapping to simultaneously account for regulations at an individual station as well as system and multi-jurisdiction regulations. This allows the modeling of complex renewable and emissions regulations and provides the ability to develop strategies for current and potential regulations, including the Clean Power Plan annual and interim rate regulations.

Integrated resource planning

Power supply planners deal with complexity in meeting their load and contract obligations in the future while considering technology improvements, aging assets and self-build versus buy options. For instance, utilities create long-term plans to provide a framework for prudent future actions that are required to ensure continued, reliable, and least-cost electric service to their customers. These plans must account for not only resource expansion plans, but also renewable and emissions regulations.

Request for proposal (RFP) evaluations

Capacity Expansion is a powerful tool for evaluating RFPs for resource acquisition. Companies that procure resources through RFPs are faced with the task of determining the best combination of resources that minimize cost and meet renewable and emissions regulations. In addition, the number of responses may be numerous, making the task of identifying the best combination difficult.

Capacity Expansion allows numerous alternatives to be included and is not limited to generic or typical resource types. Therefore, the analysis and selection process requires less time and provides accurate results. The ability to simultaneously evaluate all responses provides a robust result for third-party audits and achieving regulatory approval.

Environmental compliance planning

Use Capacity Expansion to include complex emissions compliance rules as well as renewable energy requirements. Using the latest technology, the model is able to determine the optimal investment plan that meets all environmental and reliability constraints. The model considers a large number of alternatives including construction, retirement, multiple retrofit options, fuel blending, efficiency programs, demand response and emissions planning constraints.

Specify emissions regulations with a choice of six types of emissions constraints:

1. Cap
2. Cap and trade
3. Rate on individual sources
4. Price
5. Average annual rate
6. Average period rate

Leverage the broader e7 solution set

Organizations that require development of integrated resource plans can use Capacity Expansion in conjunction with additional e7 solutions for additional detailed modeling. The e7 system allows resource plans to be saved and used in Portfolio Optimization and PROMOD® solutions to provide full hourly chronological simulations to provide operation level detail.

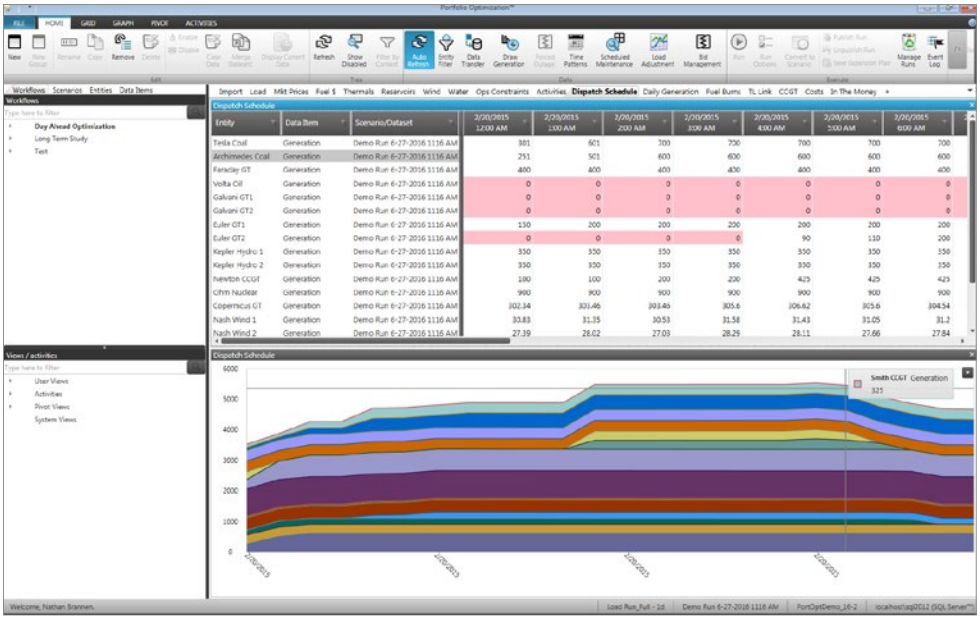
e7 platform

Data management system

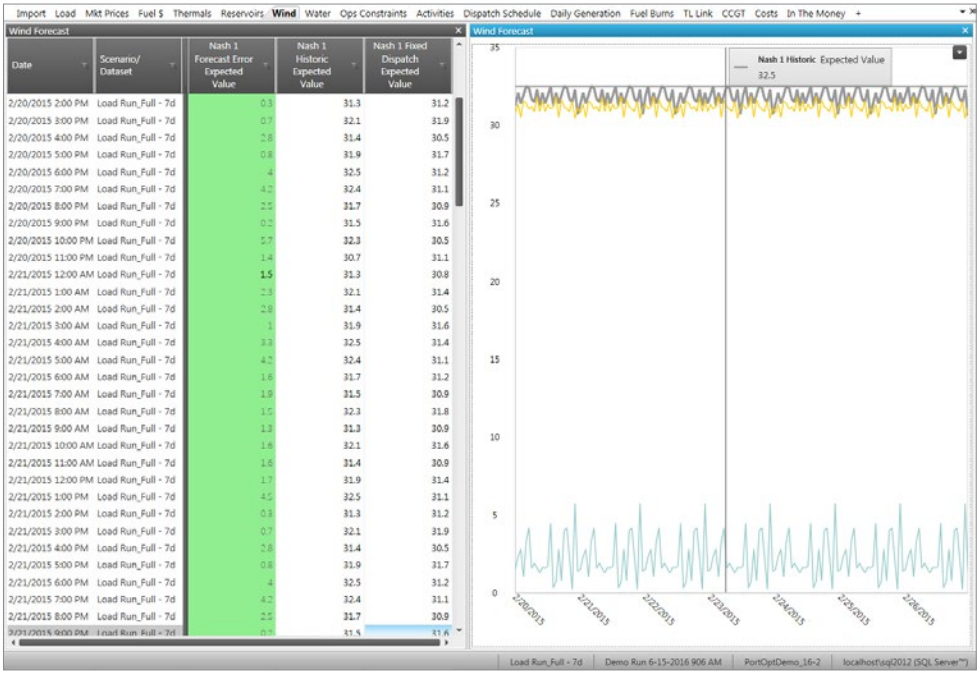
Capacity Expansion is built upon Hitachi Energy's latest technology platform, e7, which has been completely refreshed to address the changing needs of the modern customer. It utilizes a common interface that is shared by Hitachi Energy's other market and portfolio solutions, allowing a consistent look and feel across many products (Portfolio Optimization, PROMOD and SENDOUT).

New workflow management features, configurable reporting and an in-application formula tool provide users the flexibility to mold the application to their specific needs. Easy-to-configure activities can be automated, resulting in a seamless integration with upstream and downstream systems. All of these features have been developed to optimize the user experience, regardless of whether they are modeling a small portfolio deployed on a single machine or modeling multiple markets in the cloud on thousands of nodes.

Workflows
A workflow is a collection of user-defined views including data entry views, activities, pivot tables, and output reports. These views are easily defined, customized and ordered creating a consistent and repeatable user experience that reduces time spent searching for data and allows for a greater focus on modeling.

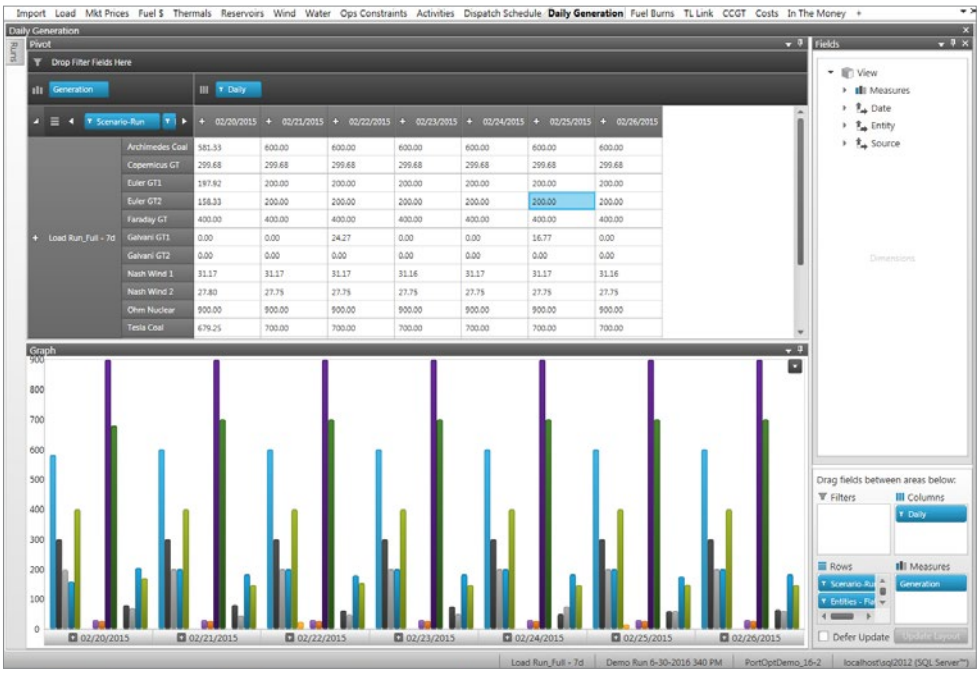


Data views
Data views are configured by the user and can include both input and output data items. Input values can be displayed in unique datasets or as the fully resolved data exactly as it is sent to the engine. Views allow full data entry and editing as well as simple graphing and reporting. Creating a new view is as easy as selecting a scenario, entity(s) and data item(s).



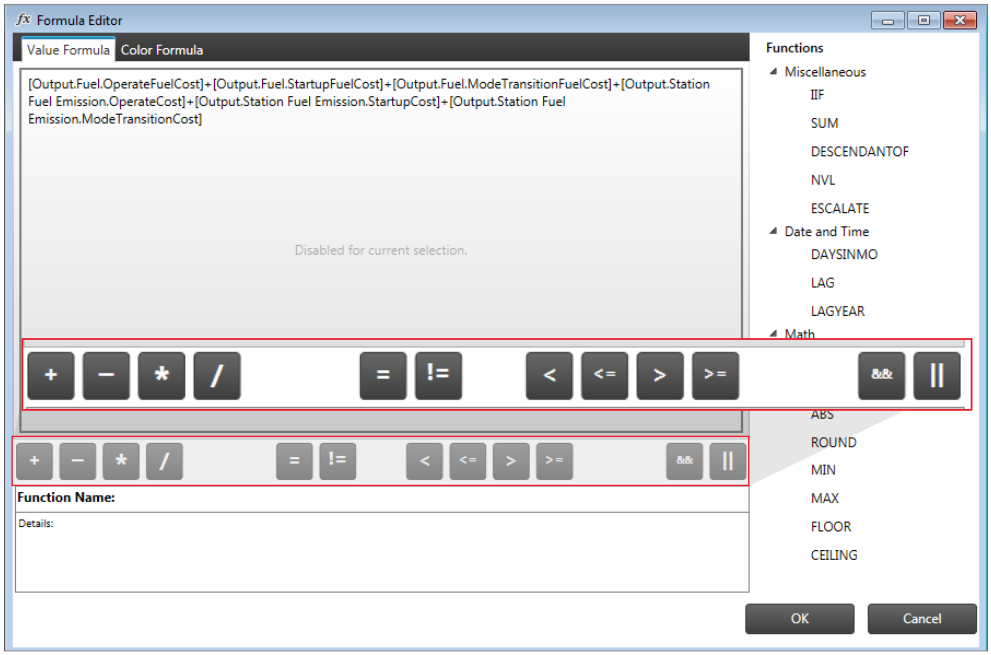
Pivot views
In-application reusable pivot tables allow for complex reporting and aggregation, with the ability to look at a single scenario or compare multiple runs. Configuration of a pivot table is consistent with any user-defined view and can be included in a workflow as described above.

Pivot views facilitate graphing for quick and easy visualization of results to better understand the information within the raw data.



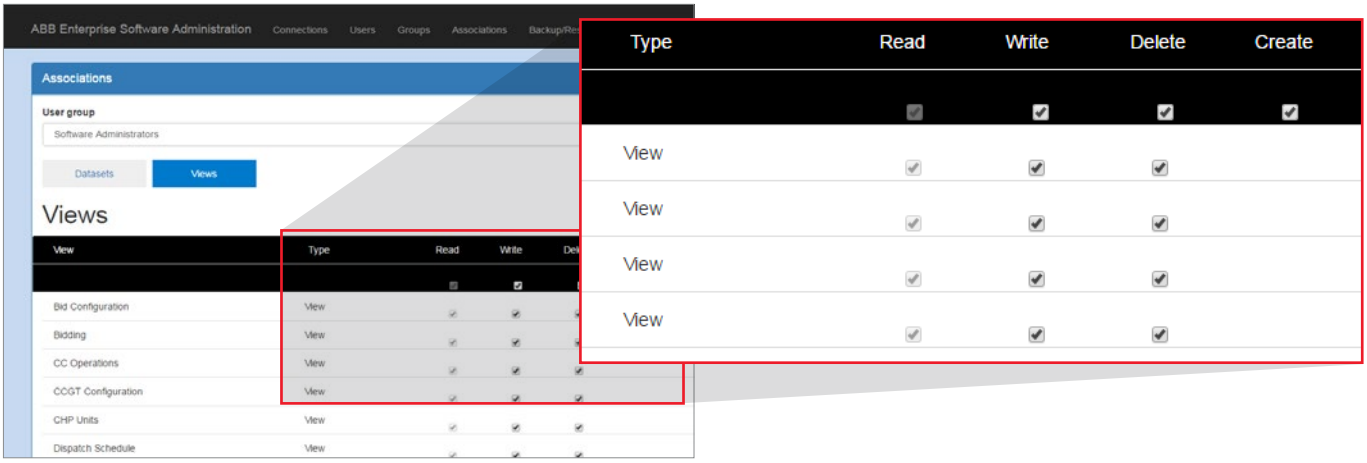
Formulas
Formula Editor functionality allows for basic adjustments of data such as patterns, escalations or reusable indexes to more complex calculations including conditionals and topology aggregations. Included in the formula capabilities are:

- Basic math functions
- (+, -, *, /)
- Complex math functions (abs, sum, exp, log, round, min, max, floor, ceiling)
- Built-in functions
- (iif, decendantof, nvl, lag, lagyear, daysinmo)
- Inputs can derive their value from a combination of indexes, patterns or functions
- Custom outputs can be calculated based on inputs, outputs, indexes and functions
- Output cells can be shaded
- different colours based on
- conditional statements



Security

With disparate groups using the software, there is a need for different groups to have permissions to different areas and data within the software. With the security capabilities groups of users can be limited to only editing and viewing data in specified datasets and views within the software. This allows the same software to be deployed to numerous groups pointing to the same database and prevents groups of users from viewing and editing data they should not be permitted.

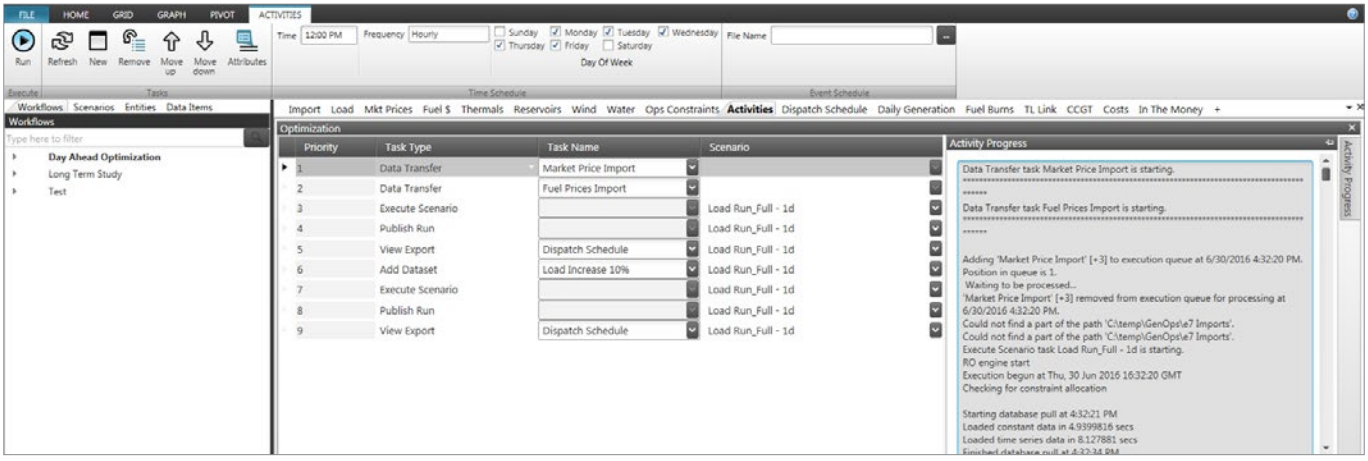


Automation and activities

An activity is a user-defined, in-application set of steps built as part of a workflow. Automation of activities give users a simple way to define a set of tasks (activities) to execute automatically. These steps include items such as:

- Executing a scenario
- Importing data
- Publishing a run to an output API
- Adding or removing datasets from a scenario
- Executing custom T-SQL for easy integration

Once configured, automation can significantly reduce repeatable steps, reduce data input errors and ultimately reduce the time to obtain valid results.



About us

Hitachi Energy's Enterprise Software product group

We provide industry-leading software and deep domain expertise to help the world's most asset-intensive industries such as mining, energy, and utilities solve their biggest challenges, from plant level, to regional network scale, to global fleet-wide operations.

Our enterprise software portfolio offers an unparalleled range of solutions for energy portfolio management, asset performance management, operations and workforce management and network control to help customers reach new levels of efficiency, reliability, safety and sustainability. We are constantly researching and incorporating the latest technology innovations in areas such as mobility, analytics and cloud computing.

We offer unmatched capabilities to integrate information technologies (IT) and operational technologies (OT) to provide complete solutions to our customers' business problems.

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