



Update on EPRI's Electric Generation Expansion Analysis System (EGEAS) Software

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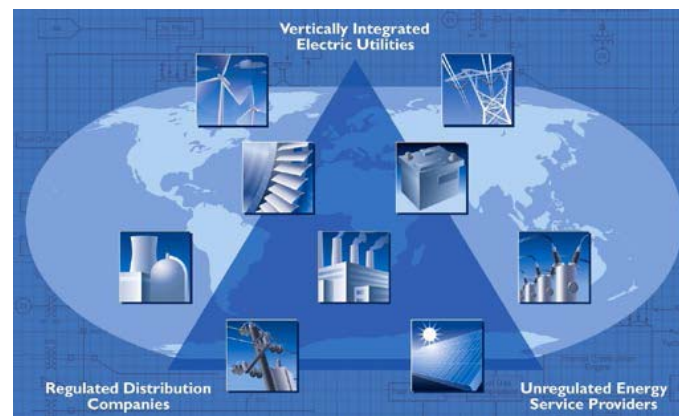
EGEAS Users Group Meeting

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Overview of EGEAS

- EGEAS is a state-of-the-art modular production costing and generation expansion software package.
- EGEAS is used by electric company planners and others to develop and evaluate integrated resource plans, avoided costs, plant life management plans, and environmental compliance plans.
- EGEAS accommodates dispatchable generation sources (e.g., coal, gas, nuclear), demand-side management (DSM) and renewable energy sources.
- EGEAS was the forerunner of the current generation planning simulation and optimization models, and is still used by a number of electric companies and regional planning organizations.
- To learn more about EGEAS, please visit EPRI.com here:
<http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=00000000001016192>



Key Features of EGEAS

- Includes dynamic programming algorithm to develop candidate portfolios from identified alternatives meeting a reliability constraint (e.g., maintain 10% capacity reserve margin).
- Conducts minimum present value revenue requirements (PVRR), or lowest electric rate economic ranking of candidate portfolios dispatched, with an existing and future set of assets.
- Once data inputs are set-up, many different scenarios can be run to test different generation plans very easily and quickly.
- Simple economics based on present worth method - easy to understand and explain results.
- EGEAS is used by many electric utilities and various regional planning organizations.
- Results are easily understood, and well accepted by regulators.

Brief History of EGEAS

- EPRI supported original development of EGEAS in the early 1980s.
- In the 1990s, Stone & Webster Management Consultants Inc. developed a graphic user interface (GUI) to make data input easier
- EPRI released EGEAS v9.02 in 2007.
- In 2013, EPRI reactivated EGEAS v9.02
 - EPRI acquired legal rights to the EGEAS GUI
 - Developed EGEAS licensing agreement with NG Planning
 - Contracted NG Planning to develop “integrated” EGEAS v10.0.
- EPRI released EGEAS v10.0 in April, 2014.
 - New licenses can be obtained from EPRI or NG Planning LLC.
 - EPRI P178/P178b members receive a license at no additional cost.
 - Price for non-members is \$25,000 (or \$5,000 to upgrade from v9.02).
- EGEAS v11.0 is now being developed with MISO support.

EGEAS Version 10 – Features

- Consolidated EGEAS, GUI, DSMLink, and RPWorkstation into one integrated software program.
- Eliminated Finance+ and Riskmin programs as these were no longer supported or being used.
- Updated EGEAS software manuals, including:
 - Capabilities Manual
 - Users Guide
 - DSMLink Manual
 - RPW Users Guide
- At MISO's request, EPRI has made the EGEAS software manuals available online and free to the public.
- Revised EGEAS documentation and manuals with consistent EPRI copyright, logo, and disclaimers.

EGEAS Version 11 – Enhancements

- Two new features to be added:
 1. Dump Energy Penalty Factor
 2. Renewable Portfolio Standard (RPS) Constraint
- Fix any known EGEAS program bugs
- Update software users manuals as necessary
- Designed to operate with Windows Vista, Windows 7 (32-bit and 64-bit), and Windows 8.

Dump Energy Penalty Factor

- “Dump energy” refers to electricity expected to be generated in EGEAS from a proposed generation asset portfolio that is greater than the amount needed to meet forecasted demand.
- EGEAS v11 will incorporate a new “dump energy penalty factor” so the cost of dump energy can be directly “charged” a financial or other type of penalty.
- EPRI and NG planning are working with MISO to define appropriate method to apply the dump energy penalty.
- The current v10 of EGEAS simply notes how much dump energy is produced, and prices dump energy at the cost of the resources producing it for each generation expansion plan developed using the model.

Renewable Portfolio Standards (RPS) Constraint

- EGEAS v11 will include new regional Renewable Portfolio Standard (RPS) constraints.
- EGEAS users will be able to create regional annual RPS constraints directly in EGEAS.
- EGEAS will develop optimized generation expansion plans that comply with the annual RPS requirements over the study period.
- EGEAS v10 does not include endogenous RPS constraints. Current EGEAS users must use Excel or other tools to determine exogenously whether a proposed generation expansion portfolio complies with RPS requirements, and if not, manually adjust portfolios to do so.

EGEAS v11 Development Activities

- MISO provided EPRI financial support to develop EGEAS v11.
- EPRI provided additional funding, and engaged NG Planning to develop v11.
- Project execution includes development and testing of a pre-production “beta” version of EGEAS v11 with MISO.
- EPRI’s Software Quality Assurance (QA) process will be completed for both the “beta” and final production versions of EGEAS v11.
- The EGEAS v11 software user’s manuals will be updated as necessary.

EGEAS v11 Updated Development Milestones

- Dec. 15, 2014 – EGEAS v11 “beta” to be submitted to EPRI for QA testing along with draft updated software user’s manuals.
- Jan. 15, 2015 – Complete development of EGEAS v11 beta, and distribute to MISO for user testing.
- Feb. 15, 2015 – Obtain beta-ftest feedback from MISO.
- March 30, 2015 – Final EGEAS v11 software to be submitted to EPRI for QA testing.
- April 30, 2015 – Complete EPRI final QA testing.
- May / June 2015 – Final release of EGEAS v11.

Collaboration between EPRI and NG Planning

- NG Planning has a commercial software license granted by EPRI that allows it to:
 - Sublicense EGEAS to new users; and,
 - Provide consulting services using EGEAS.
- EPRI engaged NG Planning to develop EGEAS v10 and v11.
- EPRI and NG Planning are collaborating to expand the EGEAS user base.
- NG Planning provides end-user EGEAS software setup, training, maintenance & technical support services. EPRI does not provide these services.
- NG Planning coordinates EGEAS User Group meetings.



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