



PLEXOS⁸ | electricity
BY ENERGY EXEMPLAR

Revolutionizing
hydro optimization



PLEXOS 8

Innovations in Stochastic Hydrothermal Coordination Modeling

Just like the systems you optimize, your tolerance for sub-optimal decisions is finite.

Obtaining answers efficiently and accurately is paramount.

PLEXOS 8 was developed with significant focus on overcoming the limitations of convergence found in traditional stochastic dual dynamic programming.

These methodologies utilize decomposition to reduce large amounts of uncertainties into many smaller problems. While these methods are acceptable, today's complex storage elements and high levels of renewable generation require greater accuracy and computing speed.

Energy Exemplar's multi-stage, stochastic hydro modeling functionality solves these challenges by adjusting decisions in stages. Instead of solving many small problems, PLEXOS 8 breaks the problem into a fewer number of larger optimizations using:

- Hanging Branches methodology
- Rolling Horizon functionality

HANGING BRANCHES METHODOLOGY

The Hanging Branches methodology reduces the number of futures to consider using recursive scenario-wise decomposition and the stochastic scenario tree. A full tree has three classifications: full branches, hanging branches and death branches. Once the tree is formulated, a solver calculates the scenarios in one single step.

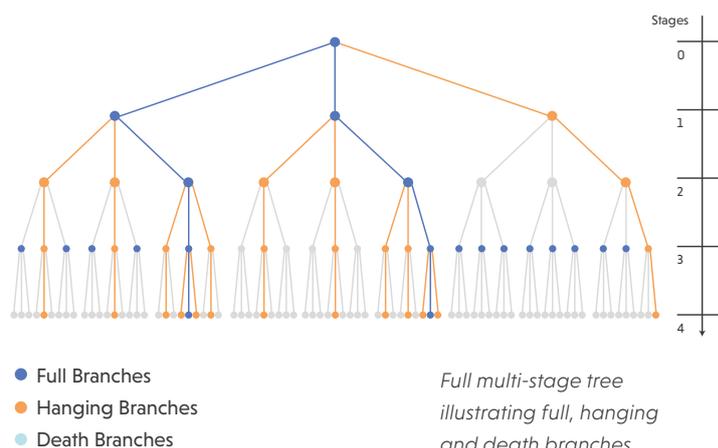
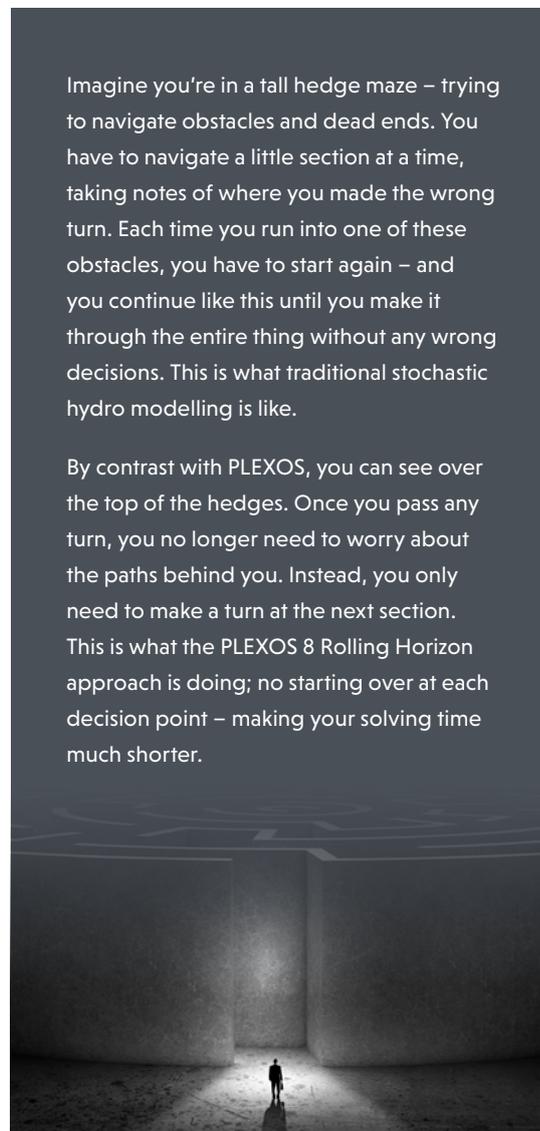
In defining a stochastic tree, there are often many full branches, and PLEXOS 8 can parallelize full branches so that each full branch can be independently modelled. Then, by distributing these branches into the PLEXOS Connect environment, multiple machines can solve a huge number of branches.

ROLLING HORIZON FUNCTIONALITY

After the Hanging Branches methodology, the Rolling Horizon functionality defines a number of stages, and each stage represents a decision point. Once past a particular point, the previous decision factors are no longer pertinent and can vanish. Modern computing power and the speed of mathematical programming codes make this approach much more usable across thousands of uncertainties.

Imagine you're in a tall hedge maze – trying to navigate obstacles and dead ends. You have to navigate a little section at a time, taking notes of where you made the wrong turn. Each time you run into one of these obstacles, you have to start again – and you continue like this until you make it through the entire thing without any wrong decisions. This is what traditional stochastic hydro modelling is like.

By contrast with PLEXOS, you can see over the top of the hedges. Once you pass any turn, you no longer need to worry about the paths behind you. Instead, you only need to make a turn at the next section. This is what the PLEXOS 8 Rolling Horizon approach is doing; no starting over at each decision point – making your solving time much shorter.



PLEXOS 8

| Fully Integrated Co-optimization with Water

NOW WITH HEAT MODELLING

This software release incorporates heat classes, which are useful for desalination, district heating and Combined Cycle Gas Turbine (CCGT). Now you can use PLEXOS to model production, transportation and consumption of heat

resources. PLEXOS is already being used successfully to model desalination water plants; this latest functionality now reaches across any heat and water co-optimization facility such as water treatment plants and other heat-related operations.

| Significant Additions to User Flexibility

PLEXOS has always been highly configurable for users. It offers access to the most advanced algorithms and modelling techniques which provide a real-life simulation experience.

These additional features in PLEXOS 8 empower users with a more flexible experience.

- **Tagged data view:** a new grid shows dynamic properties that have been tagged with select objects while the data grid shows the dynamic properties for the selected objects.
 - **Docking windows:** use docking windows on various panels and functions, such as input and solutions tabs, solution data and charts, solution query history, and more.
 - **Enhanced grids:** both the input and solution interfaces now have better grouping, filtering and performance capabilities.
 - **Improved tree search:** all interface model trees have better search functionality including system, simulation, membership and properties.
 - **Paste error dialog:** displays errors that occurred during the paste operation immediately; also includes a cancel-paste button.
 - **Change review:** a newly implemented model history panel shows the history of changes.
 - **Histogram:** a histogram chart is now available for viewing numerical distribution data. It also includes a bin range feature for analysis.
- **Renaming:** users can now rename existing classes, collections and properties. In addition, solution queries can be saved with user-provided names and categories.
 - **Window view persistence:** PLEXOS recalls the last selected view or configuration for faster work continuation from the last session.

With each new release, the software's processing time continues to improve. A number of enhancements with PLEXOS 8 now make it faster:

- Formulation speed improvements
- Faster transmission modelling
- Multi-sample memory improvements
- Improved model initialization time, including data reading and compilation
- Enhanced memory management – achieving substantially reduced memory footprint for simulations (particularly, stochastic models)

PLEXOS 8

| We Are Here for You

The Energy Exemplar team supports customers across a range of services that complement the software.

IN-REGION SUPPORT

Modelling experts are available via phone or online to answer questions. Customers receive unlimited, in-time-zone support.

TRAINING

PLEXOS includes an online Wiki for self-training, and beginner and advanced trainings are held regionally for more hands-on options. Go to <https://energyexemplar.com/events/> for the latest calendar of training and user group sessions.

IMPLEMENTATION

Our in-house experts can minimize implementation time by customizing dataset builds and back-tests, assisting with modelling for projects, optimizing software for speed and accuracy, and customizing reports that link directly to simulation outputs.

DATASETS

Datasets are important for customers who are beginning their modelling journey. Our dedicated market research and analysis team maintains more than 30 simulation-ready PLEXOS datasets from around the world. They are also available to build additional sets upon request.



| Ready to start working with PLEXOS?

We can answer your questions. Just contact one of our regional offices or request a demo through our website at <https://energyexemplar.com/request-demo/>

| Ready to upgrade?

Your PLEXOS license includes free software upgrades. Log into your account at <https://plexos.energyexemplar.com/> to download.

For more information visit

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Since 1999, our company has been producing the highly advanced PLEXOS® software. The original creators continue to own and run this rapidly growing business which is now trusted by over 1000 users in over 40 countries. We house a highly skilled and passionate global support and development team who are ISO 9001 certified.