GE VERNOVA

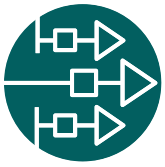
CONSULTING SERVICES

PlanOS

The comprehensive software platform to confidently plan for a reliable, resilient, and stable energy system.

PlanOS* provides a holistic approach to planning for your energy system's most pressing challenges. This platform leverages the robust algorithmic capabilities of our decades-proven planning software (MAPS, MARS, and PSLF) and breaks down traditional planning silos. With PlanOS you can analyze the economics, reliability, and power flow of your system, as well as confidently plan for capacity expansion. With the option to augment your modeling with GE Vernova's robustly mapped power system dataset, you can enhance your analysis capabilities and accelerate model development. Your unified dataset model will seamlessly flow between native single- or multi-function analysis – enabling truly integrated energy systems planning.

Integrated Planning Functions



Steady State Power Flow

Simulates physical behavior of the grid and connected equipment.

Answers the question: Does my transmission system "work"—under stressful conditions will it deliver electricity reliably, protect equipment and people, and comply with regulatory requirements?

Production Cost

Simulate the economic operation of the power system.

Answers the question: What is the most economical way to schedule generation to serve demand, given limitations in the transmission system?

Resource Adequacy

Assesses reliability of supply to serve customers.

Answers the question: Have I built enough generation, storage, and transmission so that I have enough capacity to reliably provide electricity when it is demanded?

Stochastic Capacity Expansion

Helps users develop a plan for building new generation

Answers the question: Knowing what generation we have today, and with estimates of future costs, demand, and regulations, what is the lowest cost reliable and compliant plan for new generation?

www.gevernova.com/consulting/PlanOS

PlanOS

PRODUCTION COST FUNCTION

Formerly “MAPS” software

KEY FEATURES & BENEFITS

- Among the fastest production simulation programs available today. Ready-made for high-performance computing (HPC) clusters via task parallelization, enabling simulations to run in a few hours, rather than days, increasing productivity and giving you the ability to consider more scenarios or a longer study horizon.
- Sub-hourly modeling for better estimation of intra-hour dispatch and reserve needs.
- Graphical user interface for editing and validating data and easy interaction with Excel to export and import data.
- A Python API that lets users manage runs across multiple cores, inspect and change data automatically between runs for iterative simulations, and automate the creation of plots at the end of simulations. The API is a massive productivity enhancer and gives users improved control over runs and reporting.
- Modeling of energy storage and renewables.
- Available high-quality and complete datasets available for EI/WI/ERCOT and over 50 countries provide a starting point for your modeling.

Accurately model the economic operation of the power system for informed economic decisions.

In the rapidly changing world of the electric power industry, one thing has remained constant—the need to accurately model the economic operation of the power system to make informed decisions.

Whether your interest is in assessing the value of a portfolio of generating units or in identifying the transmission bottlenecks that most seriously constrain the economic operation of the system, you must capture the complex interaction between generation and transmission systems.

The Production Cost function of PlanOS provides the detailed modeling your business needs.

A proprietary heuristic linear program for an efficient and scalable nodal security constrained commitment… for even the largest networks.

Flexible detail in modeling inputs and outputs.

Chronological hourly or sub-hourly simulation for better estimation of intra-hour dispatch and reserve needs.

Access ready-to-use datasets available for faster model creation.

MODELING DETAIL – DATA FOR INFORMED DECISIONS

The Production Cost function of PlanOS integrates highly detailed representations of system load, generation, and transmission into a single simulation. This enables calculation of production costs in light of the constraints imposed by the transmission system on the economic dispatch of generation. Generation system modeling details include:

- Multi-step cost curves
- Unit cycling capabilities
- Emission characteristics
- Market bids by unit loading block

The generation units, along with chronological hourly or sub-hourly load profiles, are assigned to individual buses on the system. The transmission system is modeled in terms of individual transmission lines, interfaces (which are groupings of lines), contingencies, phase-angle regulators (PARs), and HVDC lines. Limits can be specified for the flow on the lines and interfaces as well as operation of the PARs. The software models voltage and stability considerations through operating nomograms that define how these limits can change hourly as a function of loads, generation, and flows elsewhere on the system.

Hourly or sub-hourly load profiles are adjusted to meet peak and energy forecasts input to the model on a monthly or annual basis. Information on loads at each bus in the system is required for the software to accurately calculate electrical flows on the transmission system. This is specified by assigning one, or a combination of, several load profiles to each load bus.

In addition to studying all of the hourly or sub-hourly periods in the year, the software can operate on a bi-hourly basis to decrease runtimes. With these modeling options, the Production Cost function of PlanOS simulates loads in chronological order and does not use a simplified and less trustworthy load duration curve method that misses out on modeling path dependent quantities such as minimum up time and storage.

Based on this detailed representation of the entire system, the software performs a security-constrained dispatch of the generation by monitoring transmission system flows under both normal and contingency conditions.

Making the right choices in today's environment requires increasingly more detailed information about the operation of the system. In addition to traditional production costing quantities of unit generation and costs, the Production Cost function of PlanOS also generates the following output data:

- Hourly or sub-hourly, nodal or bus energy spot prices
- Hourly or sub-hourly line flows and congestion costs
- Unit revenues based on MW output and bus spot prices
- Hourly or sub-hourly emission quantities and removal and trading costs
- Identification of companies and generators responsible for power flows on lines

With PlanOS you can plan for

TOMORROW'S GRID, TODAY.

HOLISTIC ASSESSMENTS AND STUDIES

With our inhouse experts, we can provide your team holistic studies that include:

- Power economics assessments and software tools that determine economic feasibility
- Grid stability and integration studies that evaluate the grid, transmission and distribution, and pathways to integrate conventional, renewable and emerging power sources; grid code compliance and specialty hardware products
- Carbon management consulting that inform customers' strategies to lower their greenhouse gas and carbon footprint.

POWER ECONOMICS AND SOFTWARE
Is a project worth building?

GRID STABILITY AND INTEGRATION
Can a project safely interconnect and reliably operate?

CARBON MANAGEMENT CONSULTING
Can you operate sustainably in the future?

WE HAVE
~140
ENERGY EXPERTS

THROUGHOUT
12
COUNTRIES

AND MORE THAN
100
PATENTS

PROJECT LEVEL STUDIES

- Is it worth building?
- Can it safely interconnect?
- Does the investment justify upgrades?
- What is the right technology?

SYSTEM LEVEL STUDIES

- Can the system operate with new projects?
- Can frequency and voltage stay stable?
- What technology is needed?
- What market rules to consider?

Powered by
PlanOS:

Power Flow

Production Cost

Resource Adequacy

Capacity Expansion

For more information, contact:
www.gevernova.com/consulting

GEA35657 (11/2024)

GE VERNOVA