Introducing GenOptima

Integrated Optimization Tool for Generation Scheduling and Market Bidding

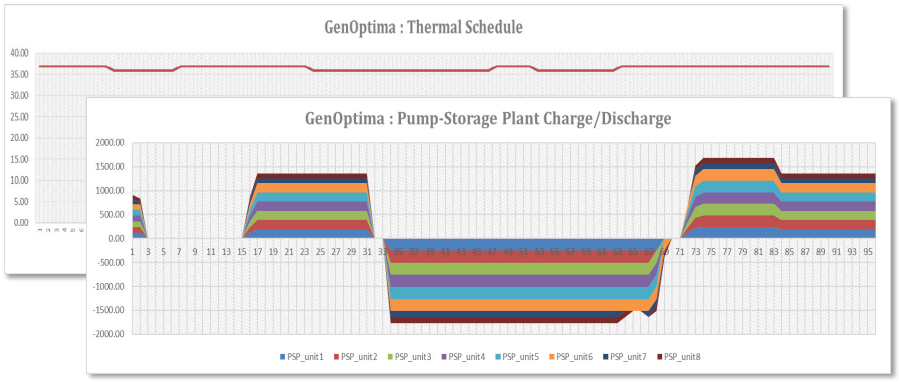
GenOptima

GenOptima is a comprehensive optimization tool designed for power generation companies with diverse asset portfolios—including thermal, renewable, and storage resources. It enables optimal scheduling, dispatch, and market bidding by aligning available capacity with consumer demand, while maximizing value across multiple electricity markets.

The model supports a wide range of contractual structures, such as Round-the-Clock (RTC) and tolling agreements, and fully adheres to gate closure constraints across technologies and contracts. After gate closure, any deviations from planned schedules are managed using available storage assets, with the model optimizing their usage accordingly.

Key outputs include optimal trading schedules and corresponding bid strategies across the Day-Ahead Market (DAM), Real-Time Market (RTM), and Ancillary Services Market (ASM). By accounting for both energy and ancillary services, the tool allows assets to capture all available value streams and respond dynamically to market and demand variations.

Optimized Dispatch, Schedule and Market Bids of Respective Plants (Illustrative Output)



Designed for both commercial strategy teams and control room operators, this powerful optimization engine enhances profitability, contractual compliance, and grid service value in increasingly complex power markets.

Contact for this Information Sheet:

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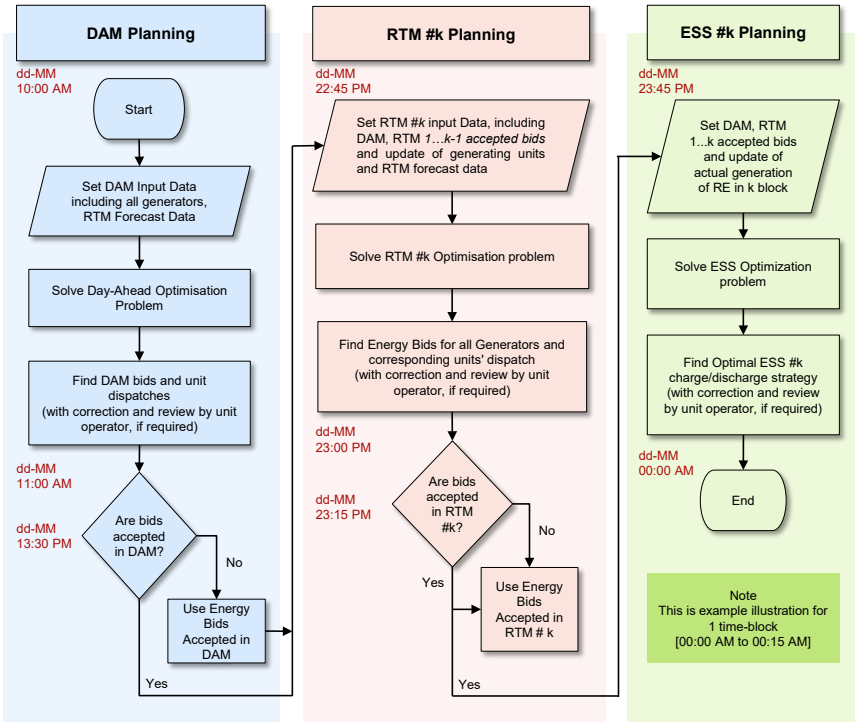
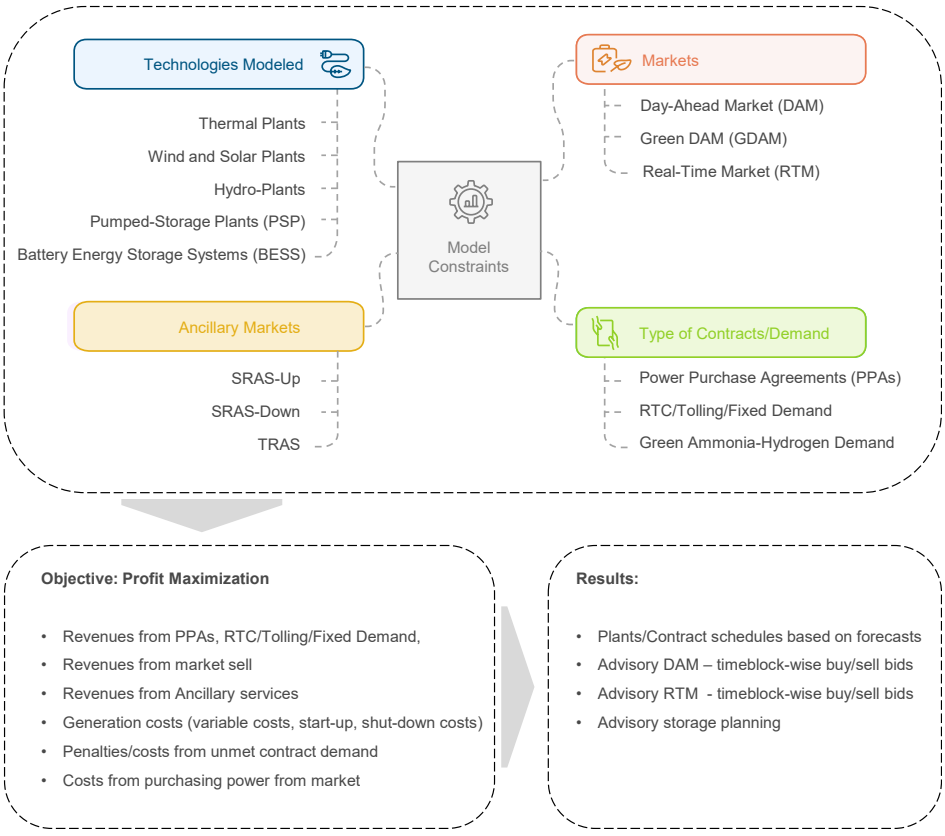
DAM, RTM and ESS Process



Techno-Economic Features of the Model



Objective: Profit Maximization

- Revenues from PPAs, RTC/Tolling/Fixed Demand,
- Revenues from market sell
- Revenues from Ancillary services
- Generation costs (variable costs, start-up, shut-down costs)
- Penalties/costs from unmet contract demand
- Costs from purchasing power from market

Results:

- Plants/Contract schedules based on forecasts
- Advisory DAM – timeblock-wise buy/sell bids
- Advisory RTM - timeblock-wise buy/sell bids
- Advisory storage planning

Day-Ahead Market (DAM) Optimization

On the day-ahead basis (current day: D-1 day) the model will consider the price forecast of DAM (D Day), RTM (D day) etc. Schedules of these markets are generated, and the DAM bids can be submitted. Market clearances are fetched and stored in the system.

The day-ahead model will run for 96 blocks of the day from 00:00 to 24:00, considering price forecasts in DAM and RTM. The model will provide day-ahead scheduling for generators and optimal trading in the DAM, RTM, and Ancillary Services (AS) markets.

Real-Time Market (RTM) Optimization

On a real-time basis (day: D-day), clearances of DAM (for D-day) will be known. Since the DAM schedules are fixed, the model will optimize the scheduling further through markets such as RTM.

Real-Time ESS Operations

Just before delivery (block-wise), battery and storage assets are optimized dynamically to handle - renewable intermittency and DSM (Deviation Settlement Mechanism)/imbalance penalties.

Key Features

The model integrates both technical and economic dimensions to deliver a realistic and actionable optimization of dispatch, scheduling, and market bidding.

Technical Constraints (Asset-Level)

- Thermal Plants: Minimum up/downtime, start-up/shut-down constraints, Ramp-up/ ramp-down limits, Technical minimum loading, linearized heat rate curves
- Renewables (Solar/Wind/Run-of-rive): Forecast-based generation limits
- Energy Storage Systems (BESS): Round-trip efficiency, Charge/discharge limits and ramp rates, State of Charge (SoC) tracking, Storage capacity considerations, Net head constraints for pumped hydro (if applicable)

Economic and Contractual Constraints

- Power Purchase Agreements (PPAs), Tolling Contracts, Market participation rules (DAM, RTM, Ancillary Services)

System-Level Costs and Market Rules

- Transmission losses, Deviation Settlement Mechanism (DSM) / imbalance penalties, Ancillary service obligations and opportunity costs

In conjunction with Gurobi Optimization.

GUROBI OPTIMIZATION

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