

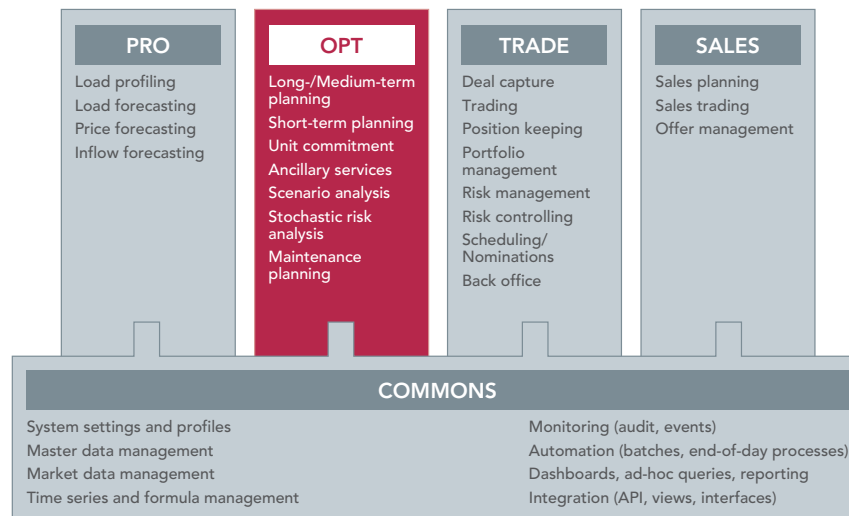
iOPT_OPT



The Optimization System of the iOPT Energy Industry Solution in the Multi-Commodity Environment

- *Efficient utilization planning and optimum use of physical and financial portfolio assets*
- *Hedging against investment risks and maintenance scheduling*
- *Profitability analyses of portfolios*
- *Hedging against risks in trading*
- *Sensitivity analyses for system parameters such as spot market price*

iOPT_OPT: OPTIMIZATION IN TODAY'S ENERGY WORLD



Optimization requirements in the energy sector are becoming more and more complex. The deregulation of the energy market is fueling competition and requires constant adjustments to changing conditions. All these factors make high demands on optimization software for improved flexibility, scalability, and performance. Due to increasing volatility in today's markets, the number of calculations required for optimization is increasing. "Classic" optimization has to be enhanced with methods for sensitivity analysis, risk assessment, and risk hedging.

IRM's iOPT_OPT offers a broad spectrum of functions ranging from the optimization of complex power plant structures and contracts to the consideration of markets and taxes, and additional commodities such as certificates. It also includes the optimization of complex national and international gas systems in the upstream and midstream range, including transport routes, storage, gas blending stations, etc.

iOPT_OPT is the solution for the physical multi-commodity optimization of primary and secondary energy trading as well as for the utilization of physical assets—from power plants to complex gas models including the relevant financial products and ancillary services.

iOPT_OPT encompasses all areas from high-end requirements to the daily scheduling of plants and therefore considers the different demands on an optimization, planning and operation management system. Due to its modular structure, it is used by industrial firms, energy trading companies, utility companies, and public services.

The optimization method used is based on Mixed Integer Programming (MIP), allowing free parameterization of the system, an evaluation of the quality of the solution, and the utilization of standardized solution algorithms.

Benefits

Companies trading in energy or producing/converting energy can use iOPT_OPT's optimization models to maximize revenues and minimize costs.

The solution's multi-commodity ability provides flexibility and transparency, thereby providing for the inclusion of additional commodities in the optimization. A comprehensive library containing ready-to-use model components allows for a quick parameterization of energy systems.

Within the framework of integrated risk hedging, iOPT_OPT provides suggestions for how companies can most effectively protect themselves against quantity, price, and production risks. Based on these results, appropriate strategies can be developed. Monte Carlo simulations generate a probability distribution of the PnL result to determine risk figures such as expected PnL, PaR, and EaR.

The search for stable solutions is strategically important in optimization. With sensitivity analyses, parameters such as prices or supply contracts (also several at once) can be varied and analyzed.

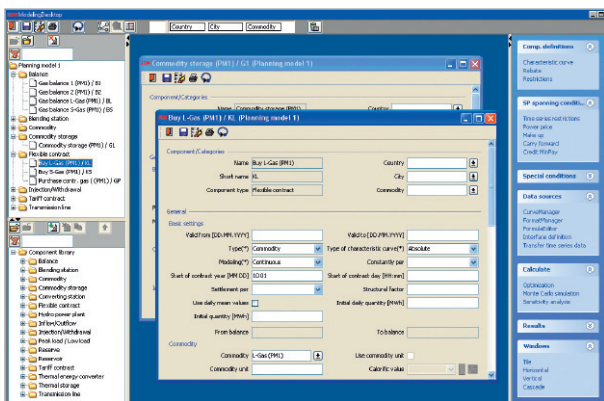
iOPT_OPT covers all time horizons from the day and rest-of-day calculation to yearly and multi-year planning for a wide range of uses. Energy budgets can be created for several years, e.g., for the utilization of power plants, contractual obligations, and dispatchable contracts.

The seamless integration within iOPT provides a comprehensive and efficient energy industry system. For example, forward curves or load forecasts are transferred to optimization and the derived cost and revenue information is supplied to trading and forecasting.



Functional Characteristics

Models are created by parameterizing model components. Among the basic elements are flexible contracts (electricity, gas, district heat, fuels) used, for example, for modeling hubs, spot markets, and long-term contracts, gas and thermal storage, hydraulic and thermal elements, transmission and transport elements as well as balances, e.g., electrical and fuel balances.



With its ModelingDesktop, **iOPT_OPT** provides a convenient and efficient way to manage and edit components. Components, with their basic definitions, are stored in a library. When setting up new models, users can choose the required components from this library or from existing models, saving time and effort.

The integrated TopologyEditor provides for the display of the model topology. Symbols and colors identify the various components and commodities, providing a comprehensive graphical overview that includes complex energy systems. Changes to components can also be made from within the TopologyEditor.

An array of additional restrictions completes the definition of model components. These restrictions are, for example, penalties, maintenance scheduling, reserve conditions, contract conditions with take-or-pay, carry-forward and make-up specifications, logical operating conditions, and power prices.

iOPT_OPT supports the following planning horizons:

- Medium- and long-term optimization (any duration)
- Short-term optimization (up to 2 months) and, as an add-on, intra-day optimization for a maximum of 24 hours

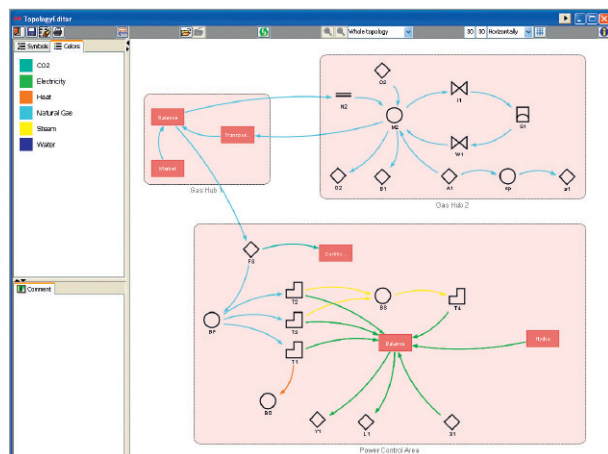
Besides deterministic optimization for identifying the most profitable use of assets, **iOPT_OPT** also provides sensitivity analyses, risk evaluations, and risk hedging.

Sensitivity analyses are, for example, used to verify how long the planned use of optimized resources remains valid when the price is changed on the spot market or on the hub. Values for individual components are varied to form the basis for different optimization runs. These show the influence on optimization results when one or more parameters are changed.

Integrated hedging against risks influences the energy scheduling and the energy trade. Such risks comprise the purchase quantities of large customers, price risks in contracts with links to indices, production risks in relation to inflows or primary energy prices as well as forecast errors in the forecasts for demand, price, and inflow.

In Monte Carlo simulations—similar to sensitivity analyses—several optimization runs are calculated with varied attributes of the model components. In this case, however, the attribute variations are controlled by means of scenarios. Scenarios are generated from curves for individual risk factors (time series or currencies) in the ScenarioGenerator and used both in risk hedging and Monte Carlo simulations.

Results of optimization calculations are displayed as reports or graphs and can also be used in other applications for additional processing. Result data is also available for customer-specific reporting from Customer Views which provide access to the database, thus enabling flexible third-party reporting with external systems.





iOPT_System Solution

iOPT is an integrated system solution for the energy industry which, due to its high degree of flexibility, is used all over Europe. It focuses on the markets for electricity, gas, oil, coal, certificates, foreign exchange, and agriculture / soft commodities.

iOPT is completely customized to the requirements of deregulated markets—the experiences of our customers combined with the extensive know-how of our employees continually flow into further developments.

The modular structure allows **iOPT** to be implemented either as a complete solution or in individual subsystems. Due to this flexible approach, **iOPT** can be used by companies of all sizes—from energy producers, industrial corporations to public services. Every

customer receives an **iOPT** system that is entirely customized to their requirements and that increases the added value of their company.

The **iOPT** energy industry solution provides high flexibility, efficiency, and economic versatility due to its multitude of functions which can be activated on demand, no matter which modules make up the individual profile.

Due to its flexibility, **iOPT** can be customized at optimal costs to the individual requirements of companies of different sizes. Furthermore, **iOPT** supports companies in their effort to enter new markets and to react quickly and efficiently to changed conditions.



IRM is a leading software provider for system solutions in the energy sector. The company, which was founded in 1998 in Vienna, has over 120 employees and more than 60 references in numerous countries.

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