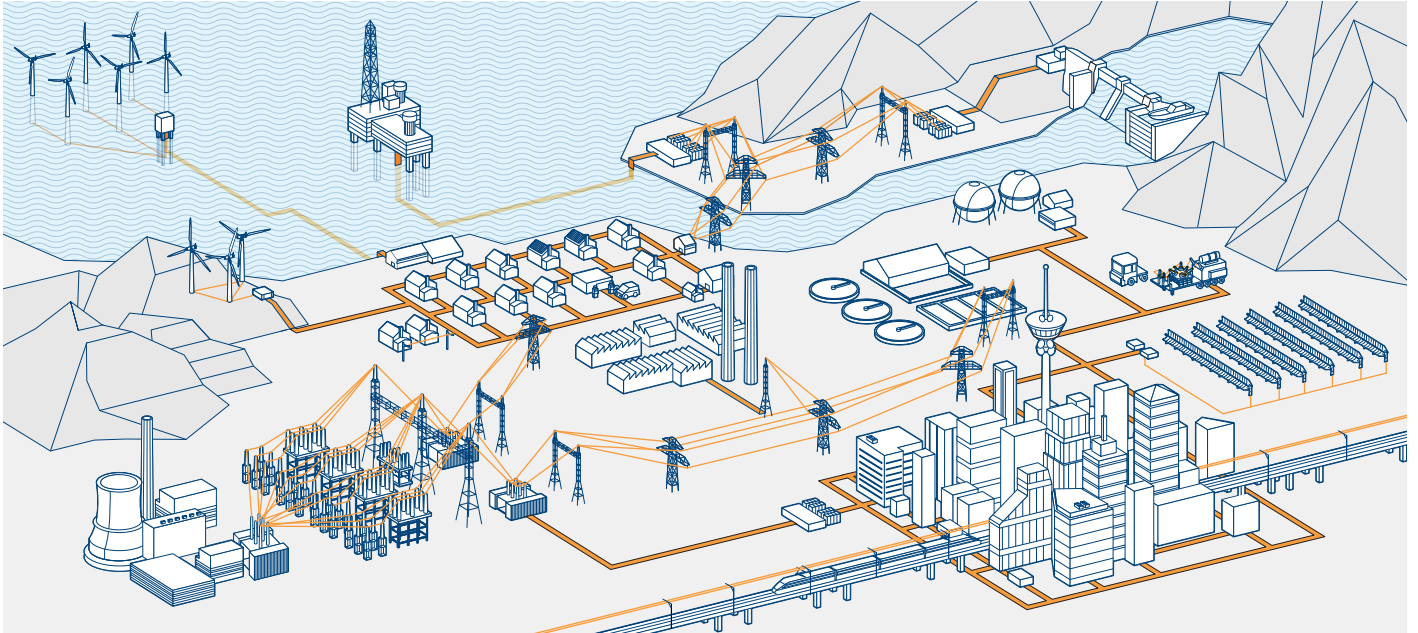


Be flexible and maximize your revenue with grid services and direct power trading in real time

OPTIMAX PowerFit Virtual Power Plants – Unit Commitment – Pooling



ABB's solution portfolio covers the entire spectrum of requirements for operating virtual power plants. As an integral part of this portfolio, OPTIMAX® PowerFit assumes coordinated control of networked generation systems or virtual power plants. The operating points of each connected technical unit and the provision of grid services are optimized in real time while taking the current system constraints into consideration. In this way OPTIMAX® PowerFit allows for bundled trading of power plants, decentralized generation units, energy storages and controllable loads.

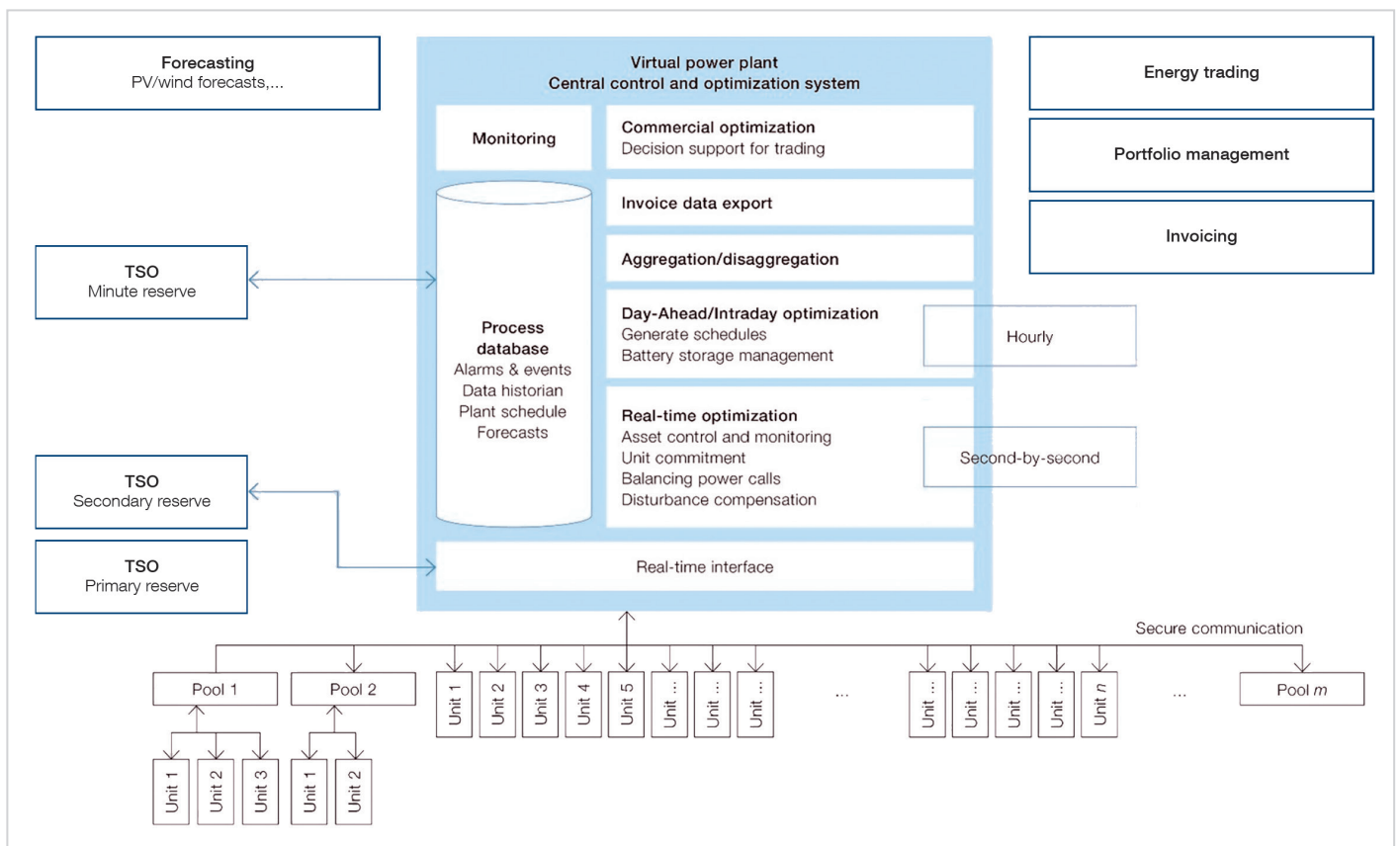
Requirements and market drivers

The energy market is currently in a transition phase brought on by increasing generation from renewable sources. The power market of the future will be more diverse, more fragmented, more volatile and predominantly decentralized. These conditions require intelligent system structures which are supported by the most modern information technologies.

The ever increasing number of regenerative production units means that balancing power is quickly gaining significance as a grid service. Energy companies are making their generation systems more flexible in order to provide balancing power and to take advantage of the lucrative trading opportunities on the balancing energy market. They aggregate decentralized generation and integrate flexible loads and storage systems.

Pooling is the intelligent networking and control of many small units and in this way it enables direct trading on the futures and spot market.

It is possible to further increase the flexibility and profitability of the pool, for example by incorporating power-to-heat / power-to-gas, balancing battery solutions or flexible loads for demand response. ABB's optimization solutions allow for efficient operation of innovative business ideas and lucrative operation of controllable and steerable technical units as a whole.



VPP control and optimization system modules

ABB's OPTIMAX® PowerFit for virtual power plants, pooling and unit commitment

OPTIMAX PowerFit offers a new solution for an energy market which is currently in transition.

OPTIMAX PowerFit employs a mathematical model in order to optimally distribute the power set points to the individual technical units in real time. System limitations, disruptions and deviations from schedules are registered online and are directly incorporated into controlling the use of the system. Therefore, it is possible to flexibly adjust the optimization goals to changing framework requirements. A possible optimization goal may be minimization of generation costs according to the merit order process. Alternatively OPTIMAX PowerFit offers allocation into priority levels and hence it ensures the fair distribution of calls to all units in a level.

OPTIMAX PowerFit is suited for providing secondary control, minute reserve and reactive power for both direct power trading and for schedule management functions such as balancing group optimization, division of overall schedules into single schedules and intra-day optimization.

OPTIMAX PowerFit automates communication between energy management and the technical units via standardized interfaces. Information regarding prognosis, trading, scheduling and invoicing are exchanged with energy management, balancing power calls are exchanged with the transmission grid operators, and real time and system information is exchanged with the technical units. This information is available for diagnosis, analysis and statistics through OPTIMAX PowerFit archiving.

OPTIMAX PowerFit informs the user in a configurable manner regarding alarms and notifications in cases of disruptions and changes in the statuses of technical units.

Operation and monitoring is simple and easy via OPTIMAX PowerFit's intuitive user interface or an already existing control system. The planned and current power values as well as the balancing power calls are indicated directly. Current power and the status of the virtual power plant are always at a glance with the simple display.

OPTIMAX PowerFit is a control and optimization system to automate control of power generation units, storages and controllable loads.

Your benefits

Profitable grid services and direct trading

- Powerful control and optimization system for profitable operation with direct marketing and grid services
- Optimized system for real-time processing of large signal and data sets

Optimal unit commitment and asset steering in one step

- Real-time optimization of set points and provision of balancing power while considering current system constraints and ramp speeds
- Dynamic balancing of deviations from forecasts and disruptions without costly recalculation of individual schedules
- Simplification of superordinate optimization through real-time distribution of pool set points to individual assets without elaborate individual schedules

Scalability, flexibility, availability

- Scalable system architecture, from a few up to many thousands of units
- Simple integration into virtual server architecture in data processing centers
- Easy system expansion by simply adding further instances and modules to the base system
- Continuously redundant system architecture for fully automated 24/7 operation (e.g. virtual machines in geographically dispersed data centers)

Automated communication across all levels

- Comprehensive information basis for fast decisions
- Seamless recording of operations for archiving, diagnosis, invoicing and continuous improvement of the dataset
- Automated communication between energy management and technical units via standardized interfaces

Standardized open interfaces

- Open interfaces to portfolio management, forecasting, trading and accounting

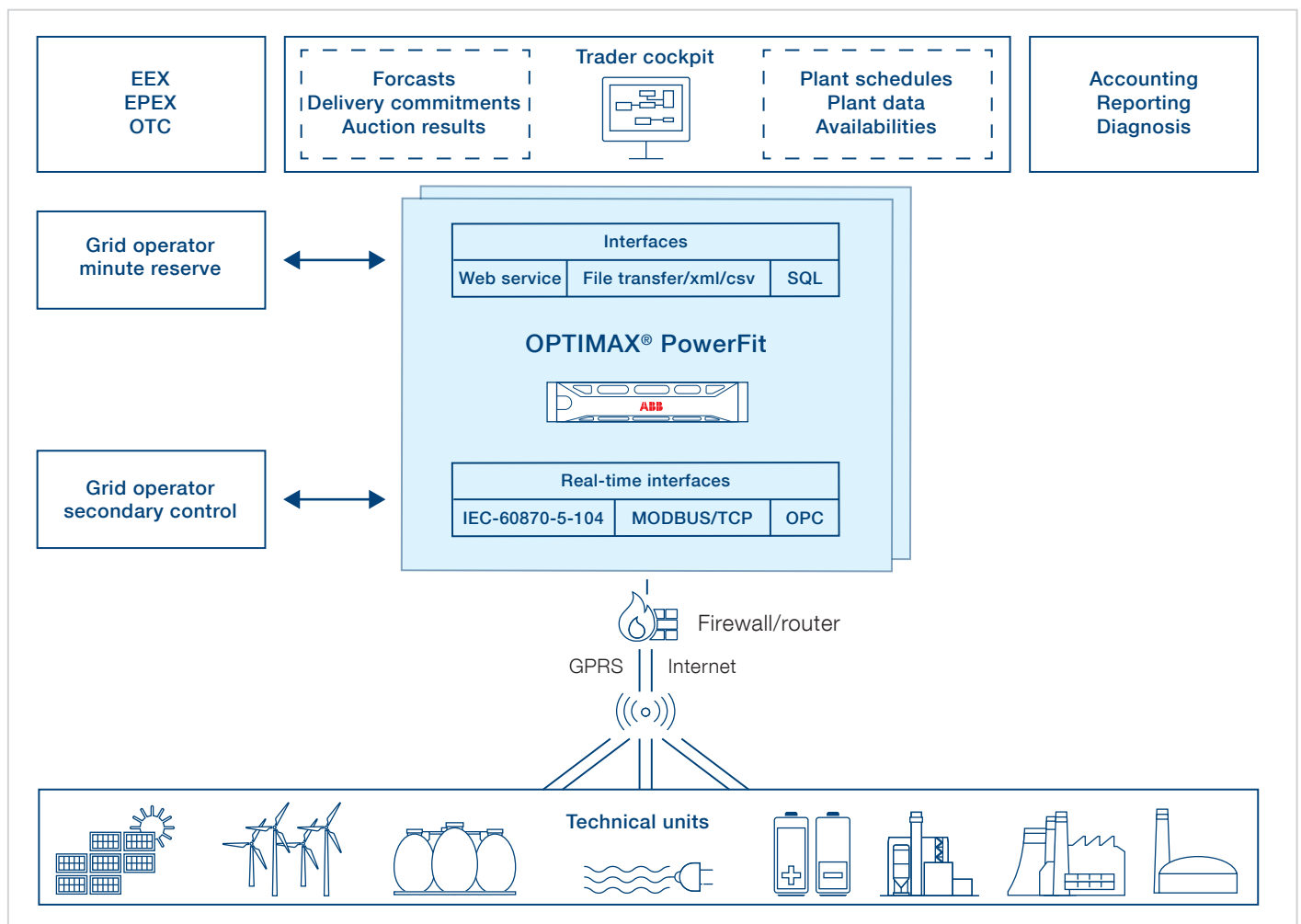
Proven solutions

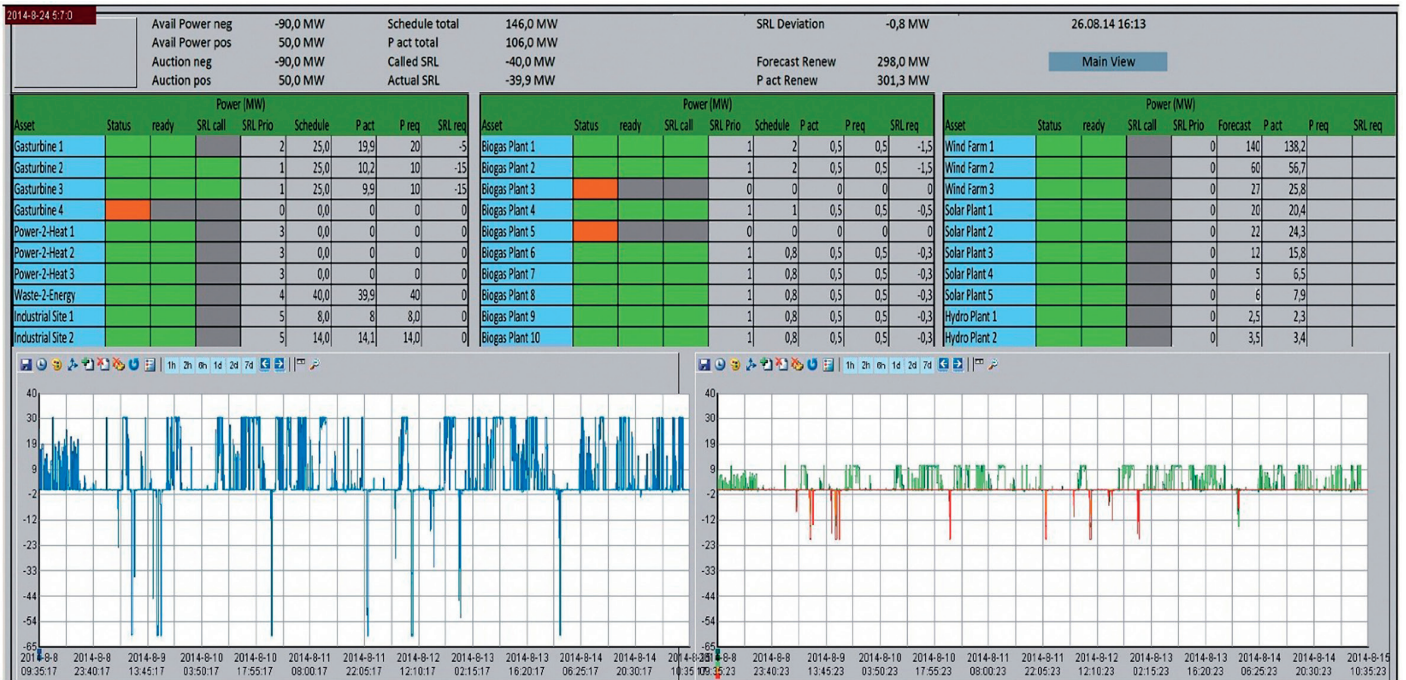
- Many years of experience in power plant automation, substation automation and telecontrol
- References from virtual power plants (> 2,800 assets), conventional power plants, multi-unit plants and municipal power generation

Tailor-made service packages

- Expert team for basic design, engineering, supply and training related to OPTIMAX PowerFit in line with the project-specific requirements of our customers
- Use of ABB's know-how to automate and optimize thermal processes and electrical systems
- Integration into the existing IT landscape and linking of technical units
- Service contracts from software maintenance to user support

Integration of the central control and optimization system into the IT landscape





Balancing power calls are distributed to the available units. Overall balancing power calls (lower left); and positive calls in green and negative calls in red (lower right).

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