Energy Management and Optimization for the Process Industries

Optimizing Energy to Increase Profits

Energy Management and Optimization software is ABB’s Industrial IT solution for the process industries to manage and optimize energy operations. For over 20 years ABB has helped its customers in the pulp and paper industry become more competitive by optimizing their energy usage. Today our advanced solutions are also available for the mining and metals, cement, chemical and petrochemical industries.

Energy Management and Optimization software tools can be tailored for one industrial site or the system can be configured to coordinate the energy operations of an entire corporation with several sites in different regions.

Energy Management and Optimization software provides advanced tools to support the energy business from both operational and economic perspectives.

The system has been developed to:

- Forecast electricity, steam and fuel consumption
- Maximize cost efficiency by load scheduling
- Optimize generation versus purchase electricity
- Manage electricity purchase and sales transactions
- Monitor and control peak loads, energy balance and efficiency
- Support decision making with simulation and “what-if” analysis capabilities
Optimization

Valuable Benefits
Energy Management and Optimization provides significant cost savings and increased profits:

- Knowing your energy needs - sophisticated planning tools for forecasting electricity and steam demand and planning energy use
- Meeting your energy needs with minimum costs - resource optimization and production scheduling
- Support for electricity sales and purchase in the open market - timing and pricing of transactions
- Avoiding peak tariffs - load planning, tie line monitoring and load shedding
- Enhanced awareness of energy generation, use and purchases - improved cost effectiveness
- Easy to use - all critical energy parameters are automatically evaluated, monitored and reported in real time 24x7 hours a week

Open System Configuration
The system architecture includes a database server connected to the company's data network and user interface client software in PC workstations. Every user has individual access rights to information.

Open Access to Process Information
Real-time, historical and forecast data is managed by ABB's Real Time Database developed specifically for demanding industrial applications.

All information, including historical values and forecasts, can be shown on the screen in the same view. Users can move data to their desktop applications by cut and paste operations. Data can also be accessed using standard SQL commands.
Planning and Optimizing Operations

**Load Forecasting**
Planning of the energy system operation, based on the forecast need for electricity and heat, can be carried out several weeks in advance. Various forecasting methods are available depending on the type of energy consumer. Load forecasts can be automatically derived from the mill’s production plan.

**Optimal Load Allocation**
The main objective is to optimize the operation of the energy system both from operational and financial perspectives. The energy needs are fulfilled by the most economical combination of the company’s own production resources and purchasing electricity and fuel through bilateral agreements and from the open market.

Service outages and transfer costs can be taken into account in the optimization. The system may also optimize the use of hydro power resources and scheduling of main consumers.

**Electricity Purchase and Sales Management**
The system records purchase and sales agreements with price information and collects the data of purchased and sold amounts to be used for billing. Existing sales and purchase agreements are considered in the optimization calculations.

The system also supports decision making in the open electricity market by simulation of sales and purchase transactions, and by indicating the company’s generation costs relative to the market price. Depending on the market interfaces, bids and offers may be automatically exchanged with the Market Operator.
On-line Monitoring, Control and Reporting

Tie-line Monitoring
Tie-line monitoring is used to track the amount of purchased energy and to provide peak load control. A display shows the integral purchase from the beginning of the monitoring period. It also points out the available purchase contracts and prices, and a prediction of the integral consumption and the marginal price at the end of the monitoring period.

Unimportant consumers can be shed to avoid excess usage of expensive electricity during peak load time.

Process Monitoring
Process information is obtained from various data acquisition systems, including OCS, SCADA and PIMS, or process databases. The communication methods can vary from standard ODBC or OPC interfaces to dedicated interface modules, depending on the system. The data is processed and managed by the Real Time Database.

Existing measurements are normally sufficient, and new instrumentation can be added if needed.

Reporting and Energy Cost Tracking
Real-time monitoring and reporting functions include basic on-line calculations, such as energy balances, efficiencies and other performance figures, consumption of fuels and chemicals, and emissions. Energy balance and consumption data is used for cost tracking to allocate the energy cost to users.

Simulation
By using simulation in combination with the optimization model, the effects of variations in system parameters can be studied. Such parameters may include electricity and steam consumption, prices of electricity and fuels, and availability of fuels and generation units for example.