Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠️ DANGER</td>
<td>Indicates that death or severe personal injury will result if proper precautions are not taken.</td>
</tr>
<tr>
<td>⚠️ WARNING</td>
<td>Indicates that death or severe personal injury may result if proper precautions are not taken.</td>
</tr>
<tr>
<td>⚠️ CAUTION</td>
<td>Indicates that minor personal injury can result if proper precautions are not taken.</td>
</tr>
<tr>
<td>NOTICE</td>
<td>Indicates that property damage can result if proper precautions are not taken.</td>
</tr>
</tbody>
</table>

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠️ WARNING</td>
<td>Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.</td>
</tr>
</tbody>
</table>

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.
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Introduction

Energy efficiency is playing an increasingly important role in industry. Rising energy prices, increasing pressure to improve profitability and the growing awareness for climate protection are important factors giving need to the introduction of an energy management system.

Reasons for the implementation of an energy management system

Lack of transparency in infrastructure processes, changing cost centers and heterogeneous system environments make an energy management system with a comprehensive range of interfaces necessary.

Energy reporting is time consuming. In many cases, there is no automatic recording of measurement data and supply contracts cannot be optimally negotiated because of the lack of transparency.

Reducing costs and creating transparency

SIMATIC B.Data can meet the current requirements for an energy data management system. The system has a positive influence on consumer behavior, opens up new procurement options and thereby helps to save costs. With its precise automatic energy data acquisition and processing as well as its diverse analytical and projection capabilities SIMATIC B.Data is the ideal tool for energy data management for now and the future.

SIMATIC B.Data system description

In this SIMATIC B.Data system description, you will become acquainted with the energy data management software SIMATIC B.Data:

- Area of application: Where is SIMATIC B.Data used?
- Concept: How is SIMATIC B.Data structured?
- How does SIMATIC B.Data support energy data management?
- Engineering: How are energy data management tasks implemented?

Key features

SIMATIC B.Data offers an integrated system solution ranging from monitoring to automated reporting:

- Monitoring: Monitoring of the current energy situation.
- Accounting: Source-based accounting of energy and material flows and allocation to cost centers.
- Controlling: High flexibility in determining performance indicators through the inclusion of consumption and production data.
- Projection and planning: Optimum budget planning and procurement optimization through accurate prediction of energy requirements. Figures recorded can be used as a controlling mechanism.
- Automatic reporting: Preparation of reports including automatic e-mail delivery.
Range of service

SIMATIC B.Data provides the basis for an economic energy management system that reduces energy costs, increases energy efficiency and creates the following direct advantages:

- Provides corporate-wide transparency through complete energy and material balancing of power generation and energy consumption systems.
- Enables usage-based energy cost allocation and facilitates transition to the accounting system e.g., SAP R/3.
- Provides parameters for solid information for improving the efficiency of power generation and energy distribution systems.
- Provides planning reliability through production-related load and requirement forecasts.
- Supports the energy procurement process.
- Meets the legal requirements for the monitoring and reporting of greenhouse gas emissions (CO₂ emissions).
- Less work through automatic management of internal and external energy reporting.
- It supports customers in the continuous improvement of energy efficiency (e.g. ISO 50001) through integrated project management and definition for energy efficiency measures.

TIA – Totally Integrated Automation

Two strong partners: SIMATIC B.Data and SIMATIC powerrate

With the SIMATIC B.Data energy data management system from Siemens you invest in an innovative, reliable and convenient system. Based on industry technology it responds to the increasing demands for plant-internal energy management. Even for future challenges you are well prepared. This integrated solution provides you with the potential for long-term optimization.

As a component of Totally Integrated Automation and Totally Integrated Power you will benefit from the integration of products and systems, the use of standard components, a uniform operating philosophy and reduced engineering effort, which ultimately leads to increased system flexibility and productivity, cost reduction and quality assurance.

Specifically, this means:

- Intelligent drive systems can reduce energy consumption as early as on the field level. High-precision measuring and field devices deliver consumption values for later evaluation – even for non-electrical energies such as gas or steam.
- SIMATIC powerrate is used on the control and operating level for pooling, standardizing, preprocessing and buffering of measurement data of all connected measuring devices from various bus systems; e.g. PROFIBUS, PROFINET, Modbus, M-Bus or S0-Impulse – for this purpose, SIMATIC B.Data has a single point of access: the SIMATIC WinCC archive. At the same time it ensures that peak loads are distributed or unused consumers switched-off through active load management.
- In the management level B.Data evaluates the acquired data, creates projections and optimizes e.g., the energy consumption of the next month. Furthermore, knowledge can be gained from the data, which in turn influences the lower levels.

The interaction between SIMATIC B.Data and SIMATIC powerrate leads to a continuous improvement process with the goal of reducing costs and saving energy.
Application

SIMATIC B.Data is used in the following fields:

- Process and production industry
- Power plant operators
- Municipal operations

Selected references

SIMATIC B.Data has already been implemented successfully in leading companies. Secure the long-term competitive advantage of your company through improved energy management.

- Infracor GmbH, Location Chemiepark Marl / Germany
  SIMATIC B.Data plays a central role as a collector of data and evaluation platform for users from a wide range of company divisions. A cleverly devised interface management enables seamless communication between SIMATIC B.Data for long-term archiving and existing system EEO for optimization of use, EDIS for energy data accounting and DSIM for steam network simulation.
  Complete reference example (Infracor GmbH)

- Audi AG, Plant Ingolstadt / Germany
  SIMATIC B.Data serves personnel in the area of energy and media supply and those responsible for production costs as a transparent source of information on consumption and operating data.
  Complete reference example (Audi AG)

- Mohn media Mohndruck GmbH, Gütersloh / Germany
  SIMATIC B.Data is based on the factory-inclusive process LAN and forms the gateway to the commercial IT world. After the fully automated acquisition of the operating data from the power plant, building management system and the field area, the data is processed according to a freely programmable energy and material flow model.
  Complete reference example (Mohn media Mohndruck GmbH)

- voestalpine Stahl GmbH, Linz / Austria
  SIMATIC B.Data provides the individual departments and operational areas of the voestalpine steelworks a transparent, plant-wide information source for current and past operational occurrences.
  Complete reference example (voestalpine Stahl GmbH)

See also

Siemens Industry Reference Center
Concept

Architecture and Scalability

Architecture

B.Data based on a client-server architecture that is easily integrated into your corporate infrastructure. Stand-alone solutions are possible as well as multi-user solutions at various locations.

The figure below shows a typical system configuration as an example of a WinCC automation system:
Scalability

B.Data consists of four components that can be installed on one or more PCs depending on the existing infrastructure. The communication between the individual components is automatically set up during installation.

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
<th>Number typically required</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMATIC B.Data database server</td>
<td>Stores the acquired measurement values and all calculated or generated data, such as reports.</td>
<td>1</td>
</tr>
<tr>
<td>SIMATIC B.Data acquisition system</td>
<td>Acquires and processes data such as measurement values.</td>
<td>1 to n¹</td>
</tr>
<tr>
<td>SIMATIC B.Data function server</td>
<td>Establishes communication between B.Data acquisition server and the B.Data database server. Generates reports.</td>
<td>1</td>
</tr>
<tr>
<td>SIMATIC B.Data client</td>
<td>Configuration and operation of B.Data</td>
<td>1 to n²</td>
</tr>
<tr>
<td>Optional: SIMATIC B.Data web client</td>
<td>Operation of B.Data via a web browser; e.g. calling of generated reports or trends and even inputting measurement values or energy efficiency measures.</td>
<td></td>
</tr>
</tbody>
</table>

¹One B.Data acquisition server is required for each acquisition system. Acquisition system refers to a production location for example. ²Is automatically installed with the B.Data acquisition server and the B.Data function detection server.

You can find further information on the system limits of SIMATIC B.Data in the user documentation and the release notes.

Openness through standard interfaces

The data required for successful energy management often exist in different formats or systems:

- Analog and digital measuring instruments
- Data from other production sites
- Previously archived consumption data from the previous year

In addition to the standardized interfaces with Siemens products such as SIMATIC WinCC or SIMATIC PCS 7, SIMATIC B.Data supports the current standards for integration of existing source systems:

- Acquisition of energy and operational data from the field level via OPC.
- Acquisition of data from measurement value archives via OPC.
- Acquisition of data from maintenance, production planning and ERP system databases.
- Import of ASCII data from the company wide file system, such as CSV or XML.
- Manual entry of the measured and metered value readings.
- Structured export of data to the accounting system, such as SAP.

Depending on the interface used, the data is either imported directly into the database or preprocessed in the SIMATIC B.Data acquisition component:
Security and Availability

Security

SIMATIC B.Data has a three-level authorization concept that prevents unauthorized access to sensitive data and excludes accidental misuse:

- Client
- Authority level
- Functional group

"Client" and "authority level" determine what the user sees in SIMATIC B.Data. "Functional Group" determines what the user may do.

With regard to password security, SIMATIC B.Data supports the following properties:

- Scalable password complexity
- Password change after first login
- Automatic user lock after n incorrect entries

Availability

All acquired measurement values are temporarily stored in the acquisition component. If the connection between the acquisition component and the SIMATIC B.Data database should fail, the values will not be lost.

The measurement values that were not transmitted are automatically entered once the connection is reestablished.

Multiple languages

SIMATIC B.Data is delivered in the German and English languages by default. You can select the language when logging on to the SIMATIC B.Data client:
Licensing

Basic package

The following components are contained within the basic package:

- 1 SIMATIC B.Data acquisition system
- 1 SIMATIC B.Data function server
- 1 SIMATIC B.Data database server
- 1 SIMATIC B.Data client

SIMATIC B.Data is licensed with gradings according to "Tags":

- A "Tag" is a value acquired from an external measuring point, which is processed and saved in SIMATIC B.Data. The values can be acquired manually or automatically. With *100 tags* you can acquire measurement values from up to 100 different measuring points at the same time, for example.
- The "PowerPack" increases the tag grading by one level. Can also be employed cumulatively.

<table>
<thead>
<tr>
<th>Product</th>
<th>Machine-Readable Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMATIC B.Data V5.3</td>
<td>6AV6372-1DF05-3AX0</td>
</tr>
<tr>
<td>100 tags</td>
<td></td>
</tr>
<tr>
<td>SIMATIC B.Data V5.3</td>
<td>6AV6372-1DF05-3BX0</td>
</tr>
<tr>
<td>500 tags</td>
<td></td>
</tr>
<tr>
<td>SIMATIC B.Data V5.3</td>
<td>6AV6372-1DF05-3CX0</td>
</tr>
<tr>
<td>1000 tags</td>
<td></td>
</tr>
<tr>
<td>SIMATIC B.Data V5.3</td>
<td>6AV6372-1DF05-3DX0</td>
</tr>
<tr>
<td>30000 tags</td>
<td></td>
</tr>
<tr>
<td>SIMATIC B.Data V5</td>
<td>6AV6372-1DF05-3XX0</td>
</tr>
<tr>
<td>PowerPack</td>
<td></td>
</tr>
</tbody>
</table>

Trial

90-day test version with full functionality, including timetable management (Prognosis & Planning).

<table>
<thead>
<tr>
<th>Product</th>
<th>Machine-Readable Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMATIC B.Data V5.3</td>
<td>6AV6372-1DF15-3AX0</td>
</tr>
<tr>
<td>Trial</td>
<td></td>
</tr>
</tbody>
</table>

Options

The following options can be used from SIMATIC B.Data V5.0:

<table>
<thead>
<tr>
<th>Product</th>
<th>Machine-Readable Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMATIC B.Data V5</td>
<td>6AV6372-1DF55-2AX0</td>
</tr>
<tr>
<td>Web Server, 3 Clients1</td>
<td></td>
</tr>
<tr>
<td>SIMATIC B.Data V5</td>
<td>6AV6372-1DF25-28X0</td>
</tr>
<tr>
<td>Web Server, 20 Clients1</td>
<td></td>
</tr>
<tr>
<td>SIMATIC B.Data V5</td>
<td>6AV6372-1DF35-2AX0</td>
</tr>
<tr>
<td>Client2</td>
<td></td>
</tr>
<tr>
<td>SIMATIC B.Data V5</td>
<td>6AV6372-1DF45-2AX0</td>
</tr>
<tr>
<td>Prognosis &amp; Planning3</td>
<td></td>
</tr>
<tr>
<td>SIMATIC B.Data V5</td>
<td>6AV6372-1DF55-2AX0</td>
</tr>
<tr>
<td>Acquisition4</td>
<td></td>
</tr>
</tbody>
</table>

1 Maximum 3 / 20 simultaneously logged in users.
2 Fully functional SIMATIC B.Data client for the configuration of the SIMATIC B.Data database.
3 Extends SIMATIC B.Data with timetable management for forecasting and planning energy consumption.
4 Additional acquisition servers. By default, an acquisition system records measurement values from measuring points which are located in the same network as the acquisition server. One acquisition server is usually required per location.

SUS (without support)

Automatic delivery of software updates.

<table>
<thead>
<tr>
<th>Product</th>
<th>Machine-Readable Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMATIC B.Data, Basic 100 tags SUS</td>
<td>6AV6372-1DF00-0AL1</td>
</tr>
<tr>
<td>SIMATIC B.Data, Basic 500 tags SUS</td>
<td>6AV6372-1DF00-0BL1</td>
</tr>
<tr>
<td>SIMATIC B.Data, Basic 1000 tags SUS</td>
<td>6AV6372-1DF00-OCL1</td>
</tr>
<tr>
<td>SIMATIC B.Data, Basic 30000 tags SUS</td>
<td>6AV6372-1DF00-0DL1</td>
</tr>
</tbody>
</table>
Energy data management with SIMATIC B.Data

Monitoring

Basics of Monitoring

Definition

An important component of the energy data management system is the illustration and evaluation of operating data and performance indicators in order to formulate fields of action for improvements and to achieve cost and consumption savings.

Options in B.Data

With the monitoring in B.Data, you obtain a quick overview of relevant energy and consumption data and can see in realtime that everything is in order. B.Data provides you with options for illustrating and evaluating operating data and performance indicators:

- Current values from the acquisition component - to illustrate the current situation.
- Historical data from the database - as a basis for comparisons and analyzes.

B.Data has the right tool for every type of application: They can illustrate current and projected values together, for example. Or they illustrate the relationship between produced quantities, consumption and costs. Or they just illustrate actual performance data of a selected measuring point.

For an overview in table form, you can use the tools of manual data entry.

See also

Trend [Page 13]
Visualization [Page 14]
Dashboard [Page 16]
Basics of Data Management [Page 48]
Manual Data Entry [Page 49]
KPI Alarms [Page 52]
Trend

Definition

In trend you display either current data from the acquisition component or historical data from the database. In Trend you can display the values of various performance indicators at the same time as graphs.

The display can be configured for each graph, such as bars, lines or points. You can always keep track of everything by using the zoom function in large displays.

Using the Trend

The Trend controls functions such as automatic scaling, logarithmic display or the highlighting of gaps. In addition to the graphical representation, Trend is capable of analyzing the dependencies of various operating data, such as quantity produced, planned and actual energy consumption.

As an alternative you can use Trend for a quick graphical illustration of the performance data.

1. Virtually the same consumption (red), but different production levels (gray).
2. Dependence on the shift model?
3. How high is the consumption in standby?
4. The key, which is automatically generated, displays the data points with selected values, such as minimum and maximum.
Configuring Trend

For a quick overview, select one or more data points and start Trend from the context menu:

You can create an object type “Trend” if you use Trend frequently. Then you assign the desired data points and configure how they are displayed in Trend. Advantage: The Trend is stored in the Plant Explorer and can be produced monthly and distributed via e-mail through automated reporting.

Trends saved in the Plant Explorer can also be called up using the web client.

See also

Basics of Monitoring [Page 12]

Visualization

Definition

In the Visualization you display current values from the acquisition component or performance indicator information. In the Visualization, you can display values from different data points.
Using the Visualization

Use the Visualization preferably to display energy-related data, raw data or performance indicators. You gain a quick overview of the performance data of a plant component or a production site.

1. Bitmap image in BMP format. You can generate the graphics for example from CAD data from the engineering department.

2. Current value of a data point
Configuring Visualization

In B.Data you create a "Visualization" object type. Assign the desired data points to this object and select the graphics. Define the position of the data points in the visualization editor easily with Drag&Drop.

Visualizations saved in the Plant Explorer can also be called up using the web client.

See also

Basics of Monitoring [Page 12]

Dashboard

Definition

The Dashboard allows you to display an overview of historical data from the database by using predefined display objects.
Using the Dashboard

With the Dashboard, you will never lose track of your production and consumption data: Thanks to the easy navigation, you can easily connect multiple Dashboards for maximum transparency. Detailed illustrations for a production site are possible, just as the combination of several production sites for an even better overview and more control. Typical applications are the display of important performance indicators such as consumption or costs. Overviews of weekly or monthly consumption can also be displayed.

Dashboards saved in the Plant Explorer can also be called up using the web client.

1, 2, 3 Large selection of pre-configured display objects, such as pointer instrument, diagrams or status indicators.
4 Process visualization with dynamic Sankey objects
5 Buttons for navigating between multiple dashboards
Configuring Dashboard

In B.Data create one or more objects of the type “Dashboard” and assign them the data points of the data that should be displayed. The content of each Dashboard is freely configurable in a specific editor: Add the desired display objects from a library to the respective Dashboard and then assign one or more data points to these objects. Finally, add the navigation buttons and assign the desired Dashboard to the respective button.

See also

Basics of Monitoring [Page 12]
Performance Indicators [Page 20]
Controlling

Basics of Controlling

Definition

Effective energy controlling is based on information of **when** and **where** energy is required. This is the only way that detailed information about optimization and potential savings can be provided. Reliable performance indicators also form the basis for issues requiring verification, such as energy efficiency.

Controlling in B.Data

B.Data is the tool that effectively supports your controlling tasks:

- Freely configurable balancing of the energy flows of different media such as electricity, gas or vapor from the main supply up to sub-distribution systems.
- Determination of performance indicators with direct reference to production batches or number of units for evaluating the energy efficiency of production plants.
- Evaluation of the energy purchase invoice of various media by entering counter readings, power and calculation parameters.
- Target-performance-analysis of energy consumption and costs according to predefined reference profiles or parameters.
- Determination and display of statistical parameters such as time lines, distribution of hours or degree day figures.

For the display use the automatic reporting of B.Data: The figures are exported to MS Excel and can be prepared for overview form there; e.g. as a table or diagram. In this way, you generate monthly reports with current figures without additional configuration effort. You can find further information in "Calculation level 3 [Page 56]".
Performance Indicators

Introduction

Performance indicators are an essential component of energy controlling. Based on a few selected KPIs, the energy manager to be able to estimate the overall energy situation.

Generally, a distinction is made between the one-time analysis method and the continuous controlling method during controlling:

- **Analysis:** Calculation of levels of efficiency or efficiency indicators
- **Controlling process:** Comparison of consumption figures, e.g. based on the previous month

Examples of typical controlling reports

The following figure shows a monthly report that compares the costs of the current period with the last period. The period for the previous year is also shown.

The objective of the report is to provide the user with an overview of the costs and to point out any irregularities:

Pure consumption or cost performance indicators can only be checked to approximate accuracy. With B.Data you can illustrate the relationship between consumption and cost performance indicators. In this way, you obtain significantly more meaningful performance indicators, which you can also compare efficiently using various time zones.
The following figure illustrates the energy consumption per ton. The different time zones "week", "since start of the month" and "since start of the year" provide quick information of possible deviations. In this instance, the energy consumption per ton has already exceeded the previous month and year average after one week. Thanks to this overview, measures can be taken promptly; e.g. the technical monitoring of the consumers.

See also

- Calculation of Plant Efficiency [Page 22]
- Specific Performance Indicators [Page 24]
- Dashboard [Page 16]
Calculation of Plant Efficiency

Introduction

Performance indicators on efficiency are important in realizing increases to the efficiency of energy generation and energy distribution systems. Due to the flexibility of B.Data, plant-specific characteristic curves can be illustrated and the performance indicators calculated accordingly in the system can be displayed.

The following figure shows how the efficiency of an air compressor is verified using compressor-specific characteristic curves:

Example of efficiency calculation

With the help of the above figure, one can easily see that two of the three compressors are generating the required compressed air less efficiently. In particular, "Compressor 1" has a very poor level of efficiency; to the extent that replacing it with a more efficient compressor would be very sensible. As the efficiency of "Compressor 3" is in the low range only slightly, monitoring for leaks could be an initial measure.

See also

Specific Performance Indicators [Page 24]
**Benchmarks / Targeting**

**Introduction**

The comparison of data (benchmarking) taking target figures into account (targeting) provides information about one’s own energy situation. Usually plant components or different locations are compared with each other. A location working at an especially high level of efficiency could be defined as a target figure for the other locations, for example. A statement on achieving targets is very important for the energy manager and for the management.

You can find a detailed example of the use of benchmarking and targeting under “Sustainability - Emissions [Page 27]”.

**Example**

The following figure shows a comparison of consumption data for two months taking into account target figures:

---

**Energy Benchmarks**

From: Sep 2011  
To: Oct 2011

<table>
<thead>
<tr>
<th>Key Performance Indicator</th>
<th>KPI Dev. Prev. Period</th>
<th>From</th>
<th>To</th>
<th>Target</th>
<th>Benchmark</th>
<th>Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Electricity</td>
<td>GI/mcig</td>
<td>12</td>
<td>9</td>
<td>18</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Electricity PMD</td>
<td>GI/mcig</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Electricity SMD</td>
<td>GI/mcig</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Electrical Utilities</td>
<td>GI/mcig</td>
<td>7</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Thermal Energy PMD</td>
<td>GI/mcig</td>
<td>7</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Thermal Energy Utilities</td>
<td>GI/mcig</td>
<td>7</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Compress Air</td>
<td>m³/mcig</td>
<td>900</td>
<td>750</td>
<td>1,200</td>
<td>901</td>
<td></td>
</tr>
<tr>
<td>Vacuum System</td>
<td>m³/mcig</td>
<td>900</td>
<td>700</td>
<td>1,000</td>
<td>695</td>
<td></td>
</tr>
<tr>
<td>Wet exhaust air</td>
<td>m³/mcig</td>
<td>7,000</td>
<td>5,000</td>
<td>10,000</td>
<td>7,001</td>
<td></td>
</tr>
<tr>
<td>Dry and heated exhaust air</td>
<td>m³/mcig</td>
<td>8,000</td>
<td>6,000</td>
<td>10,000</td>
<td>8,001</td>
<td></td>
</tr>
<tr>
<td>Conditioned dry exh. Air</td>
<td>m³/mcig</td>
<td>15,000</td>
<td>10,000</td>
<td>25,000</td>
<td>15,001</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>m³/mcig</td>
<td>3</td>
<td>2.5</td>
<td>3</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>Waste Water</td>
<td>m³/mcig</td>
<td>1.3</td>
<td>1.1</td>
<td>1.5</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>kg</td>
<td>40</td>
<td>30</td>
<td>50</td>
<td>41</td>
<td></td>
</tr>
</tbody>
</table>
Specific Performance Indicators

Introduction

Sound information on the efficiency of plants can only be obtained with the help of specific performance indicators. Using these performance indicators you can also compare different levels of production with one another; e.g. low production versus full capacity. The effects of improvements are measurable in this way.

The calculation of plant characteristics, which result from the regression analysis of consumption and production output, can in turn be used as a forecasting model.

Information or projections regarding the energy efficiency of a plant are initially provided through specific data; e.g. by illustrating the relationship between the consumption data and the production data.

Regression analysis as a forecasting instrument

The following figure shows a report in which the energy costs and consumption per unit of production are displayed. The regression analysis in the bottom right shows the relationship between consumption and production:

With the help of the regression analysis, a linear relationship between production and consumption is established. The calculation of plant characteristics can in turn be used as a forecasting model.
Standardization of performance indicators

If climatic conditions such as temperature or air humidity have to be considered, pure performance indicators quickly lose their significance. Without standardization, energy consumption can only be compared in a limited way. B.Data supports the time-independent calculation of performance indicators based on recorded measurement values. Standardization already takes place in B.Data. The results are shown in the display area.

The following figure shows standardization using the "degree day figure", which plays a role in building management, for example. More heat is used in winter than in summer. An examination of the average degree day figure over a year and the related heating costs can provide the necessary arguments for investing in building insulation.

When comparing efficiency the different climate conditions must be considered if production sites are located in different climate zones. Here too, the degree day figure plays an important role as a reference value:
Energy Situation

Reports are often used to provide an overview of the energy situation. The following figure shows an overview of the energy sources used and the level of CO₂ emissions. It is quite clear from this example that electricity has a significant share of the costs as well as CO₂ emissions. However, the consumption data shows that basically only four energy sources are used. With regard to consumption, electricity is relatively expensive. A change of energy supplier could, for example, be a first measure.

See also

Sustainability - Emissions [Page 27]
Batch-related Energy Evaluation [Page 29]
Performance Indicators [Page 20]
Calculation level 2 [Page 56]
Production Planning Based Projection [Page 36]
Sustainability - Emissions

Introduction

Legal requirements often make periodic monitoring and reporting of emissions necessary. Company-wide transparency through continuous balancing of energy and materials with energy production and energy consumption equipment is therefore necessary.

Sustainability

In times of ever-dwindling resources, ever-greater value is attached to sustainability. In addition to pure energy consumption, B.Data can also illustrate environmental characteristics: Carbon dioxide and nitrogen oxide harm the environment. Proper disposal of waste and waste water leads to additional costs. An overview of all emissions is a basic requirement for defining measures to reduce them and to subsequently implement these measures.

The following figure shows the percentage change of energy sources and emissions compared with the previous year. B.Data can illustrate these changes for an individual location up to an entire group of companies:
Example of CO₂ emissions and emissions trading

The emission of the greenhouse gas CO₂ is currently of public interest. Exceeding of legal limits may require the purchase of emissions allowances and thereby resulting in additional costs. A cumulative display up to middle of the year sheds light on the current emission situation:

The analysis clearly shows that, although emissions have decreased over the previous year, they are still well above the targets. Based on this evaluation, the following actions are possible:

- Adjust the production portfolio and quantities to the new framework conditions.
- Promptly purchase emissions certificates.

Conversion to B.Data

The calculation of emissions is performed in B.Data in the following way: Create a parameter for each energy source which contains an emission equivalent. Using a simple multiplication you obtain the amount of CO₂ emitted per kilowatt hour consumed, for example.

See also

Benchmarking / Targeting [Page 23]
Batch-related Energy Evaluation

**Introduction**

If the energy consumption depends on the product being produced, and several product lines are being produced in one plant, an energy assessment of the production facilities based on the quantities or batches produced can be useful.

**Conversion to B.Data**

In B.Data you can analyze batch related production data. The required information must be provided by the subordinate system: Start, end, and the batch ID.

This data is typically transferred to B.Data in 1- or 15-minute cycles. The following figure shows a typical batch report with plant components, batch ID and duration, as well as energy consumption per plant component:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Batch number</th>
<th>Batch period</th>
<th>Duration</th>
<th>Plating Section</th>
<th>Packing Division</th>
<th>Assembly Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>12458 Plating</td>
<td>24.11.2011</td>
<td>06:00 - 09:00</td>
<td>04:00:00</td>
<td>203.20</td>
<td>4.172.00</td>
<td></td>
</tr>
<tr>
<td>12458 Packing</td>
<td>24.11.2011</td>
<td>09:00 - 12:00</td>
<td>04:00:00</td>
<td>21.400.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12458 Assembly</td>
<td>24.11.2011</td>
<td>13:00 - 16:00</td>
<td>03:10:00</td>
<td>888.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12458 Packing</td>
<td>24.11.2011</td>
<td>16:00 - 19:00</td>
<td>03:30:00</td>
<td>5.068.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12458 Assembly</td>
<td>24.11.2011</td>
<td>19:00 - 22:00</td>
<td>03:30:00</td>
<td>23.100.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12458 Packing</td>
<td>24.11.2011</td>
<td>22:00 - 24:00</td>
<td>01:00:00</td>
<td>1.793.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Accounting with cost center distribution

Basics for Accounting with Cost Center Distribution

Introduction

Clear allocation creates awareness for saving energy and regulates accountability. Only those who are charged directly with the cost that they cause will be willing to change their behavior. By allocating costs according to the “polluter pays principle” and through incentive systems, cost center managers can accelerate energy-saving measures.

Application

Heterogeneous system environments or mature corporate structures often stand in the way of source-based energy cost allocation.

B.Data enables usage-based reporting of energy and material flows and allocation to individual cost units or products.

1. Calculation of consumption data of individual media. Energy requirements and losses are also calculated and apportioned according to energy consumption.

2. The recorded consumption values are assigned to a cost center according to percentage consumption keys. The costs are calculated during the breakdown.
PAYG

Introduction

PAYG is usually allocated according to either cost or consumption:

- Costs: Can energy costs be lowered by switching the energy supplier?
- Consumption: Can energy consumption can be lowered by using more efficient equipment?

Example of PAYG according to consumption

In the following example, water and electricity are being consumed. The consumption data is distributed proportionally to three cost centers, RU1 to RU3. In addition to the pure consumption data, the electrical energy for the pump and feed losses should also be apportioned depending on the consumption.

The B.Data report provides an exact breakdown according to media and the plant components. Of course, the costs can be quickly determined based on the consumption figures:
Example of PAYG according to cost centers

In the following example, the energy consumption of two workshops will be allocated to one cost center. Counters 1 and 3 are installed in the factory buildings. Counter 2 is mounted on the main distributor, which supplies both factory buildings with electricity.

The distribution keys are often specified by management and are subject to change during the course of a business year. B.Data saves changes to the billing logic automatically. Access to older distribution keys is possible at any time.

In the report, B.Data provides a detailed breakdown of the costs for the two factory buildings depending on the distribution keys, such as the monthly consumption:
Export of the Data to ERP

Definition

With the ERP interface you transfer the data from one or more cost centers to an ERP system such as SAP. The exchange format of the export file is structured XML including versioning.

Conversion to B.Data

B.Data contains all of the objects you need for configuring your cost centers:

1. Configuration of the cost center with predefined objects, such as “Business Unit” or “activity.”
2. The object “cost center distribution” contains all of the necessary information so that the values in the ERP system can be processed further. Simply place the calculated consumption value underneath the object.
3. Export of B.Data via the Task Management. Thanks to the structured content, the individual entries can be assigned to specific items in the ERP system.
Planning and Projection

Basics of Planning and Projection

Introduction

Planning and forecasting are preconditions for effective and sustainable energy management. This is enabled through the most accurate forecast of energy demands and the load curve for one or more locations, individual consumers, production areas or buildings.

The exact planning of energy requirements for a specific period allows substantial cost savings due to the graded tariff systems of the suppliers.

The highest financial advantage is achieved under the following circumstances:

• The difference between expected consumption and actual consumption within a defined period of time remains as low as possible
• Load peaks are shifted to times when power generation is cheaper.

With B.Data you always have all relevant information at your fingertips.

Requirements for an energy management system

Load peaks in industrial plants are largely determined by production and its shift or product cycles. The forecasting methods can even be distinguished in different plant components: An energy management system must have different methods for forecasting; only then are precise forecasts possible.

• In a pump mill, for example, forecasts are usually made based on production quantities. Hackery and waste paper plants are only in operation when required, which is why forecasts are made here based on production plans.
• By contrast, shift schedules are used for forecasting in the automobile industry.

Conversion to B.Data

B.Data supports the following methods for planning and projection:

• Comparison days and shift model
• Production plans
• Daily consumption values

The projections can be compared with the actual data for subsequent evaluation.

See also

Projection Based on Daily Values [Page 36]
Comparison day principle

The comparison day principle is based on shifts or day types which are observed over a reference period, such as a quarter. The energy demand is calculated depending on the scheduled days and the related operating time of the plant.

- Examples of day types: Workday (8 hours), workday (6 hours), workday (10 hours), holiday
- Examples of shifts: Morning shift, evening shift, night shift, special shift

By default, day types are planned on a weekly basis, a flexible schedule without committing to an entire week is also possible. Holidays and other non-working days are automatically considered.

In order to remain flexible if there are changes, use the calendar: You can change day types or shift them to other days of the week. The projections therefore always remain up to date.

The projection result can be corrected, for example, to compensate for production data or temperature effects which provides a uniform basis for comparison.

The projection is complete when the projection quality is evaluated and compared with the actual data. The result can affect the next projection.

1. Profile definitions based on a calendar week with predefined day types.
2. Calendar for clear display and adjustment similar to the MS Outlook calendar management.
Production Planning Based Projection

Introduction

Energy consumption is calculated based on production volumes or number of units to be produced when a production planning based projection is made. This is based on the condition that a stable relationship exists between the power consumption and number of pieces / volume being produced. The production schedule includes which product is produced in which quantity. Behind each product, corresponding product parameters are defined for each medium. B.Data also supports you in calculating the product parameters.

Conversion to B.Data

You define the production schedule either directly in B.Data or via a predefined MS Excel file. You can of course adopt data from a production planning system; e.g. in "CSV" or "XML" format.

See also

Specific Performance Indicators [Page 24]

Projection Based on Daily Values

Introduction

The projection on the basis of daily values is based essentially on actual figures from the past. In this case, the amount of energy consumed is allocated to each daily production. The projection then calculates the expected energy requirements based on the estimated production volume.

Conversion to B.Data

With the help of the regression analysis, the daily production quantities and corresponding consumption data are analyzed. The parameters for the linear equation \( y = k \cdot x + d \) result from the analysis, which is illustrated in B.Data. After the definition of the planned production quantities, the prospective energy requirements are calculated and are presented in a report.

See also

Basics of Planning and Projection [Page 34]
Projection as controlling mechanism

Introduction

The projection represents a theoretical (ideal) load curve. The energy manager obtains meaningful data when the projected data is plotted alongside the actual values.

Example

The following figure shows how the "Trend" tool can be used as a controlling tool:

- Blue: Forecast
- Red: Actual energy consumption
- Gray: Unit quantities produced
- Green: Percentage deviation between TARGET and ACTUAL (energy consumption)

The evaluation shows that, despite different production figures, energy consumption is nearly the same and is above the consumption figures forecast. Based on this data, the energy manager can respond appropriately and initiate measures.

You can find further information in "Trend [Page 13]".
Energy Efficiency Project Management

Basics of Energy Efficiency Measures

ISO 50001 requires, among other things, the definition of energy efficiency improvement measures and their evaluation. ISO 50001 requires the tracking of energy efficiency improvement measures after they are implemented.

An energy manager very often finds himself or herself having to present estimates of potential energy savings to management: In addition to consumption and costs, emissions savings are very often important.

When considering this across locations, there is therefore often the necessity of evaluating data separately according to locations or business units.

B.Data is the tool for increasing demands: With B.Data, the planned energy efficiency measures can be entered directly on the B.Data client or on the web client. The automatic reporting of B.Data displays the proposed energy efficiency measures clearly.
Definition of Energy Efficiency Measures

Definition

An energy efficiency measure is defined by the following main factors:

• Background: What triggered the energy efficiency measure and what should be achieved?
• Costs / benefits: What are the costs of the measure and how long will it take before it pays for itself?
• State: Who carries out the energy efficiency measure and to what extent has it been implemented?

Managing energy efficiency measures

With B.Data you keep track of all of your company's energy efficiency measures:

• All energy efficiency measures of all of your business locations are recorded centrally in B.Data. Each energy efficiency measure can be assigned to a region, department or even a specific plant.
• Automatic calculation of efficiency based on potential savings and costs of each energy efficiency measure.
• Predefined status for implementation progress of the energy efficiency measures.
• Categorization: Predefined priorities or categories help you to prioritize energy efficiency measures.
Overview of the Energy Efficiency Measures

Create your own views of the energy efficiency measures

Depending on an employee’s position in the company, only certain aspects of the proposed energy efficiency measures may be of relevance, such as the planned CO$_2$ reduction or a specific amortization period.

In B.Data even corresponding views of the measures can be defined and then easily accessed via the Plant Explorer.

Additional advantage: The corresponding views can be used in the automated reporting system and thus output in a report.

The corresponding measures are shown by double-clicking on one of the filters. The filter can be adjusted at any time:

The filters used above shows all energy efficiency measures that have an amortization period of less than two years.

Additional filter options are for example:

- Status
- Region or Business Unit
- Planned savings
- Planned CO$_2$ reduction
- Planned investment costs

Of course, the filters can be combined with each other; the result being an effective analysis tool.
Evaluating Measures

Definition

Predefined modules of the automated reporting of B.Data are available for the evaluation of energy efficiency measures. The energy efficiency measures can therefore be presented both in table as well as graph form. The reports are based on the views created of the energy efficiency measures.

Benefits

Thanks to the predefined modules of the automated reporting, the measures can be quickly prepared and displayed in a way suitable for management. Comparability between the locations or business units with regard to the planned or executed energy efficiency measures is therefore possible.

The generated reports can be used as an overview, as a basis for decision making or as proof of completed measures, for example.

Another evaluation method is the prioritization of energy efficiency measures based on predefined categories. Based on factors such as investment, savings, and planned CO₂ reductions, the results may be quite different – as well as the potential:

Evaluating the Implemented Measures

When an energy efficiency measure has been completed, the cost effectiveness must be calculated. For this purpose a comparison of the planned savings and the savings actually realized based on the actual values is necessary. This data is entered into B.Data directly. The savings are documented in this way and can be output in reports at any time.

See also

- Definition of Energy Efficiency Measures [Page 39]
- Overview of the Energy Efficiency Measures [Page 40]
Plant Explorer as a Navigation Tool

The Plant Explorer is the Windows-based user interface from B.Data, which enables intuitive working. You configure all of the objects you need for energy data management in your organization in the Plant Explorer:

- You configure the objects that contain your operating data, such as data points or parameters. Thanks to the object-oriented approach, you can use an object in several places, such as for the calculation of performance indicators or in reports. Modifications will automatically be reflected in all points of application and are simultaneously recorded in change management - the reproducibility of older configurations is always assured.
- You can evaluate your operational data or performance indicators using reports or Trends or display this data clearly in a Visualization or Dashboard.
- You configure the interfaces that provide you with operating data, such as WinCC, PCS 7 or OPC. This is completed quickly and easily, thanks to a wizard.

The grouped structure and the user-friendly tool tips of the Plant Explorer ensure that you easily get the desired result of your configuration:

---

1. **Title Bar and Quick Access Toolbar**
   Add the buttons that you need in your daily work to the Quick Access toolbar.

2. **Ribbon Command Bar**
   All of the buttons required to operate the system are divided into categories and contained in the ribbon. The main tasks related to energy data management are grouped together under "Start".

3. **Navigation Bar and Quick Search**
   The navigation bar shows the current position in the project tree in text form.
   The quick search is a simple full-text search. The search result is displayed in the display area ⁵.

4. **Project Tree**
   Create objects that you need for energy data management in the default "B.Data" root in the project tree. This is how you can structure the project tree according to location or function.

5. **Display Area**
   The display area will display the search results or full details of the object that you selected in the project tree.
Main Functions of the Plant Explorer

Using and copying objects

Objects are clearly identified by their name in B.Data. Once an object is created, you can use it elsewhere in the project tree, such as in a report or in a calculation. Remove the object in order to cancel its use.

If an object is deleted all points of application are affected.

Cloning creates a copy of the object. Use this option to create a number of similar objects.

Object Properties

Any predefined object properties such as "Created by" or "Department" can be assigned to an object. In addition, you can define your own properties. Properties have the following advantages:

- You can search for these properties.
- You can use these properties in reports.

Search

The "Quick Search" and "Advanced Search" are available in the Plant Explorer.

- The quick search is a full text search. The result is a list of all items that contain the search term. The results are shown in the display area. If you search again, you can refine the search results.
- In the advanced search you use the commands of the database query language SQL. In a form editor, you can define the individual search terms and link to logical or mathematical operators.

Both search methods store the results in the Plant Explorer. Instead of a second search, you can easily re-access a previous search result.
B.Data Web

General Functions

Definition

B.Data Web is a browser-supported user system of the B.Data energy data management system. With B.Data Web you use the Internet / Intranet to provide a predefined group of users, such as the energy managers of individual production areas or operators, a selection of Plant Explorer content for the entry of measurement data.

Navigation

B.Data Web and the Plant Explorer have a similar structure. The window pane on the left displays all available objects of Plant Explorer. The window pane on the right side displays detailed data of the selected object.

B.Data Web is used for the following tasks:

- Viewing reports and generating new reports
- Viewing trends and generating new trends
- Viewing Visualizations
- Viewing and editing matrices
- Accessing documents and loading new documents to the B.Data database
- Viewing and editing energy efficiency measures
- Viewing Dashboards
Authorizations and Security

The user logs on to B.Data Web with his B.Data username and password. This ensures that only authorized users log in:

The administrator can configure additional access restrictions for each user group. For this purpose he simply pulls the desired folder in the "B.Data Web" field:
Display of the Information

Overview

In B.Data Web, you can access previously calculated trends and reports and start new trends for a different period. You can view Visualizations and Dashboards directly from the browser. You can enter measurement data that are not automatically recorded, directly into B.Data Web - including a plausibility check. The energy efficiency measures are also shown in B.Data Web and can be edited.
Full-screen mode

Use B.Data Web for the presentation: Display the Dashboard and Visualization in a separate browser window in full-screen mode.
Data Management

Basics of Data Management

Definition

The basis for accurate energy data management is the quality of the collected data with respect to reproducibility and plausibility.

Options in B.Data

B.Data offers the following options for detecting and correcting irregularities in the recorded data:

- Plausibility checks by using predefined limit values, e.g. during manual data entry or in a regular report on the data quality
- Automatic notification when limits are violated
- Substitute value methods for correcting incorrect values or filling gaps in a series of measurement values
- Automatic logging of all relevant user actions

Furthermore, B.Data has counter management which, in addition to the recording of counter readings, also controls counter overflows or replacements.

Data Validation

Introduction

For precise analyzes and projections correct measurement information is absolutely essential. Normally the data of many measuring points are recorded, processed and transmitted, in an industrial plant. With such a degree of complexity it is not surprising if processing chain errors occur. Energy data management software must be able to recognize errors in a data series so that an energy manager can draw conclusions about the quality of data and take action if necessary.

B.Data offers to two primary methods for this purpose:

- **Reports** provide an overview of the data quality; e.g. the recorded values
- **Substitute value methods** for automatically filling in gaps or correcting faulty values.

Reports

B.Data offers the following plausibility checks with which the quality of data from data points can be checked in a report:

<table>
<thead>
<tr>
<th>Plausibility checks</th>
<th>Delivered Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference data point deviation</td>
<td>The minimum and maximum limit value violation, based on the configured limit values for the reference data point</td>
</tr>
<tr>
<td>Gaps</td>
<td>Number gaps, based on the expected target value, such as four 15-minute values within an hour</td>
</tr>
<tr>
<td>Max. increase</td>
<td>Largest limit value violation based on the configured limit values</td>
</tr>
<tr>
<td>Min Max</td>
<td>The minimum and maximum limit value violation, based on the configured limit values</td>
</tr>
<tr>
<td>Status not OK</td>
<td>Number of entries with this status including timestamp</td>
</tr>
</tbody>
</table>
The plausibility checks can be summarized in a common report:

B.Data offers to the following substitute value methods for this purpose:

- Using the measured value of a different data point
  If a measuring point is designed to be redundant, the measured value of another measuring point is used if there is a gap in the series of measured values.
- Using the last valid value
  If a gap occurs, the last valid measured value of the measurement series is entered.
- Using a constant value
  The value of a “constant” configured data point is entered instead of the gap.

The use of substitute value methods and the related corrections are considered to be a “change” within the definition of change management and are logged and colored accordingly – also in a report.

You have access to the measurement series at different times with activated “Versioning”. This ensures, for example, the reproducibility of the reported results.

If you do not use an automatic substitute value method you can correct incorrect values manually.

**Manual Data Entry**

**Introduction**

In spite of a high degree of automation in the industrial environment, there are still counters in use that are not automatically recorded, because, for example, connection to the bus system requires too much effort. But even with automatic recording, there can be connection failures during data transmission or sensor failures.

In short: There will always be situations where the manual entry of data is required. B.Data provides two tools for this purpose:

- **Measurement value editor** for editing previously recorded measurement values.
- **Matrix** for entering values.

**Measurement value editor**

In measurement value editor to edit the recorded measurement values of a data point. All changes are logged in the B.Data Logging Editor for full traceability. Use the Export in CSV format for more extensive changes: Then you can easily edit the measurement series in MS Excel and then re-import.

For maximum clarity a filter function that allows you to filter for all categories is also available. You can define up to four filters and link them to logical operators.
The measurement editor can be accessed via the context menu of the data point:

Matrix

Use the matrix to enter new values for one or more data points. Typical applications are for example:

- Entering values of a counter that is not automatically recorded
- Entering setpoint values as a basis for comparisons
- Entering production data or comments

A plausibility check is carried out while the data is being entered in order to prevent errors. Incorrect values are color-marked. Historical data can also be displayed in the input screen in order to provide the user with a volume range.

By the way: If you already have the values available in tabular form, you can easily transfer them with Copy&Paste, e.g. from MS Excel.

Of course, you can only use the matrix for the display of measurement values in table form. Lines and columns can be displayed transposed.

The status for recording and correction is stored for each entry. If you edit values, the status is adjusted accordingly.

Note: Automatic value adjustments are assigned a separate status.
Configuring a matrix

In B.Data you create a "Matrix" object type. Just as with a data point, you set query periods and cycle times. Then you assign the matrix the desired data points. Each data point is displayed as a separate column with time stamp. Then enter the desired values for each timestamp:

See also

Data Management [Page 48]
Data Validation [Page 48]
Change Management [Page 53]
KPI Alarms

Definition

You will be notified by an alarm if the configured limit values of measurement values and performance indicators have been violated. Limit value violations are entered in the "alarm list." The notifications can also be sent via e-mail as an option.

Use

Use the alarm function for timely notification of irregularities or significant over / under use of energy consumption. The alarm function is also helpful for monitoring projected consumption figures: Were the projections incorrect or were they too high or too low?

You will be notified in a timely manner if there are significant differences. Then you can also notify the energy supplier and correct energy demands.

Configuring limit value monitoring and the alarm function

The limit values for each data point are defined under its properties. Activate the "Alarm" for each limit value if needed. Addition to setting limit values, you can also use comparative figures, for example, the consumption values of the previous month.

See also

Basics of Monitoring [Page 12]
Manual Data Entry [Page 49]
Change Management

Introduction

In addition to the versioning of measurement values, complete traceability of changes within the framework of auditing compliance is important. The calculation basis may change several times during the course of the year when using cost center-based consumption data for energy accounting. Therefore the reproducibility of the billing logic is also required in addition to the versioning of measurement series. And the logging of user actions is important for purposes of system security.

Tools for change management

The following tools are essentially available in B.Data:

1. Measurement value editor for editing measurement values. All changes are logged in the B.Data Logging Editor for full traceability.

   Further information: Manual Data Entry [Page 49]

2. Logging Viewer for viewing system and error messages. The following events i. a. will be logged:
   - The log on/out of users
   - Changes to objects, such as deleting or creating

   The Logging Viewer can be started from the ribbon command bar under "Administration".

3. Historicization of measurement variables and reports. Changes are logged in the billing model in the Plant Explorer.

   Historicization is important for the reproducibility of evaluations or if verification is required for environmental issues (CO₂ emissions).
   When you assign a derived data point to a billing model, you can also set a validity. When generating reports, simply specify the model date.
   The report is then generated with the billing model applicable at this point in time.
   The historicization can be opened from the context menu of a measurement variable, a derived data point or a report.
Counter Management

Definition
In addition to recording just the consumption data the reading of the counter can also be recorded and stored in the database. The consumption is determined by subtracting the counter readings in B.Data.

Using the counter management
Many different counters with different counting ranges and characteristics are in use in industrial plants. Factors such as counter overflows or counter replacement are considered for correct calculation of the consumption values. Information on installation location and installation date are required in order to carry out maintenance work quickly. All these factors must be considered by energy data management software.

Configuring the counter
Create a data point with the function "counter" so that B.Data can record the counter values. Then configure the counter in the properties of the data point. If the counter has already been operating for some time, simply enter the current reading as the "start value" in B.Data. Even replacing the counter is not a problem with B.Data: simply add the new counter and enter the current reading.

Calculating consumption based on counter readings
B.Data provides the following options for calculating consumption values from counter readings:

- Automatic compression during the measurement value acquisition
  You can generate an additional measurement series based on counter readings while recording is in progress, e.g. compression to hourly values.

- Using measurement functions for calculating the consumption data
  B.Data contains special measurement functions by default for processing counter readings, for example, when used in reports.
Data Processing

Calculation level 1

Definition

"Calculation level 1" means the real time pre-processing of measured values in the acquisition component of B.Data. After the pre-processing, the measured values are entered in the B.Data database.

Principle

The following options are available during pre-processing:

- Compression of measurement values during import
  Use the pre-defined compression functions to create all of the values you need from the recorded values and then use them for subsequent calculations or analyzes.
  Example: The power consumption is recorded in 15-minute increments. Even during recording, the consumption values are compressed to hourly and daily values and the average daily consumption is determined.
  The following compression functions are available:
  - "Maximum," "minimum" or "average"
  - "Hourly values," "daily values" or "annual values"
  - "Counter difference (overflow, change) without range", or "Counter difference with overflow, counter change"

- Processing of measured values in a freely-configurable real-time accounting system
  For example, if fluctuating environmental conditions affect measurement results, use the equation editor for defining and configuring new calculation functions. You can either make use of predefined functions or create your own functions with a simple programming language. The separation of algorithm and parameterization ensures a high degree of reusability.
  Typical applications are for example the heat calculation of boiler plants or calculating the efficiency of cogeneration plants.

Configuration

- Compression of measurement values during import:
  You can easily configure the different compression levels for each measurement point in B.Data:

- Processing of measured values in a freely-configurable real-time accounting system:
  You can configure the allocation with the objects "Prototype" and "Loop." You define the parameters and algorithm in the prototype. You assign a prototype to each loop and then supply it with values. The separation of algorithm and parameterization provides you with a flexible accounting system.
Calculation level 2

Definition

"Calculation level 2" is the object-oriented and time-independent calculation of performance indicators on the basis of the recorded measurement values. B.Data enables energy source-related cost allocation with "Calculation level 2".

Use

Effective energy control is based on information of when and where energy is required. The calculation and allocation of energy costs for plants, customers or cost units according to the polluter pays principle and support of the processes Bottom Up (measurement) and Top Down (allocation) also creates incentives for saving energy within the company:

- Allocation of the energy requirements of departments, plants, customers or cost units according to percentage distribution keys and absolute quantities on a percentage basis.
- Customer or cost center, distribution key and counter-based reports
- Reproduction of hierarchical accounting structure (calculation model)
- Classification of consumption quantities, such as labor cost, service fee or tax.
- Transfer to accounting system, such as SAP R/3

Configuration

Use ready-made database functions which allow you to establish hierarchical accounting structures in the form of a tree in the Plant Explorer for the processing of performance indicators. In this way, the user can understand the billing at any time.

The principle is simple: A database function calculates the result with values provided from parameters. The return value of the database function can be reused as a parameter for another database function or in a report:

1. The two database functions summarize the recorded consumption values of the two measuring points. The respective results are used as input parameters by the database function "m_total_consumption_add".
2. This database function adds the two sums of the calculated consumption values and transfers the total to the database function above it.
3. This database function multiplies the calculated consumption with the price ("m_price_electrical_energy") stored in B.Data. Thereafter, the result is displayed in a report.

See also

Calculation level 3 [Page 56]

Calculation level 3

Definition

"Calculation level 3" refers to the time-independent processing and displaying of measurement values in reports. MS Excel is used for the presentation of the reports.

To prepare the data exported from B.Data, the full MS Excel functionality can be used; e.g. statistical functions such as correlations or regression analyses. Furthermore, the results data can be prepared using graphs or diagrams.
Application

Detailed records and professional presentations of the performance process provide the basis for reaching decisions. In addition, the efficient processing and presentation of information is now a crucial factor in maintaining a competitive edge. The automatic reporting of B.Data supports you in making rapid and logical decisions.

• Efficient creation of company-specific reports for each department and for satisfying any need for information.
• Information related, system-wide picture of different business units for a holistic view of your company.
• The workflow system of B.Data reduces the staff's workload:
  - Automatic and cyclical calculation of performance indicators and accounting results (task management).
  - Automatic generation of standard evaluations for pre-defined periods, such as day, month, shift, day, year.
  - Automatic sending of evaluations to the printer in the company-wide printer network.
  - Automatic sending of evaluations and basis for accounting via e-mail attachment to recipients inside and outside of the business unit.

When generating reports you have access at all times to report configurations from the past (historicization) or different versions of measurement values (versioning).

Configuration

Use ready-made modules for the configuration of the report. The module type defines the appearance. There are the following module types:

• Query module: Returns values without allocation, e.g. measurement values of a month up to the day.
• Balancing module: Returns a value for a time period, such as energy costs of a month.
• Protocol module: Returns values for all intervals of a time range, such as energy costs of a month up to the day.

In a report, you define the time range and add the desired modules. Each module is supplied with values from its assigned measurement variables. After the Excel template has been generated, the final report result is stored in Plant Explorer and can be accessed by double-clicking on it:

You can find additional information about SIMATIC B.Data on the Internet:
http://support.automation.siemens.com/WW/view/eni/59786487