SIEMENS

SIMATIC Energy Management

Energy Efficiency begins with Transparency

SIMATIC Energy Manager V7.2

System description

Edition 10/2019

siemens.com/energymanager

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.

⚠ **DANGER**
indicates that death or severe personal injury **will** result if proper precautions are not taken.
⚠ **WARNING**
indicates that death or severe personal injury **may** result if proper precautions are not taken.
⚠ **CAUTION**
indicates that minor personal injury can result if proper precautions are not taken.
NOTICE
indicates that property damage can result if proper precautions are not taken.

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:

⚠ **WARNING**
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.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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.

Table of contents

Product versions

SIMATIC Energy Manager is available in the following two product versions:

- SIMATIC Energy Manager Basic
- SIMATIC Energy Manager PRO

SIMATIC Energy Manager Basic is a version of SIMATIC Energy Manager PRO with limited functionality. SIMATIC Energy Manager Basic is available in the Web via the Energy Manager Web Client.

SIMATIC Energy Manager PRO includes SIMATIC Energy Manager Basic and the Energy Manager PRO Client, which provides you with some exclusive functions. Energy Manager PRO offers you the full range of functions of the SIMATIC Energy Manager energy data management system.

You can upgrade at any time from SIMATIC Energy Manager Basic to SIMATIC Energy Manager PRO with the respective license.

Range of service

SIMATIC Energy Manager provides the basis for an economical 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 costs-by-cause energy cost allocation and facilitates connection to the accounting system, for example, SAP R/3.
- Generates statistics for well-founded statements about efficiency improvements of energy production and energy distribution systems.

- Provides planning reliability through production-related load and demand predictions.
- Supports the energy procurement process.
- Meets the legal requirements for the monitoring and reporting of greenhouse gas emissions (CO_2 emissions).
- Less work through automatic management of internal and external energy reporting.
- Supports customers in the continuous improvement of energy efficiency through integrated project management and definition of energy efficiency measures, thereby also satisfying the requirements of ISO 50001.

TIA - Totally Integrated Automation

Two strong partners:
SIMATIC Energy Manager and SIMATIC Energy Suite

With the SIMATIC Energy Manager energy data management system from Siemens, you invest in an innovative, reliable and convenient system. Based on industrial technology it responds to the increased demands of in-house energy management. You are also ideally prepared for future challenges. You tap the full optimization potential with this integrated solution.

As a component of Totally Integrated Automation(TIA) and Totally Integrated Power, the benefits offered include the integration of products and systems, the use of standard components, a uniform operating philosophy and reduced engineering workload, which ultimately leads to increased system flexibility and productivity, cost reductions and quality assurance. The ideal product combination for utilizing detailed energy monitoring in the operating area and an efficient decision-making energy management in the management area.
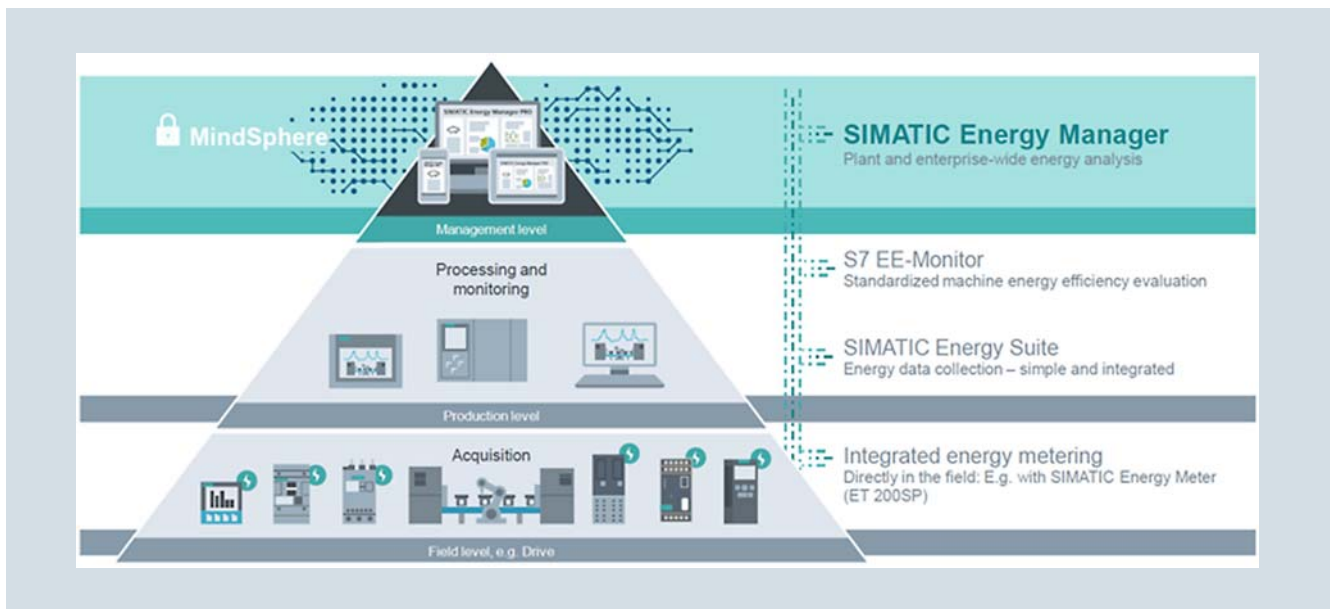
Specifically, this means:

- 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. You can collect more than 200 different electrical measured values and energy values with an Energy Meter. This means you can already create transparency over the energy demand of your production plant at the machine level and determine the efficiency of the plant from the energy values.
- SIMATIC Energy Suite is used for an accurate detailed analysis in the operating environment of the **production level**: Measured variables such as currents, voltages or powers can be measured, standardized, preprocessed and buffered accurately to the second. The measuring data can come from all connected measuring devices from a variety of bus systems, e.g. PROFIBUS, PROFINET, Modbus, M-Bus or S0-Impulse - for this purpose, SIMATIC Energy Suite has a single point of access: the SIMATIC WinCC archive.

- S7 Energy Efficiency Monitor is another product in the TIA Portal that you can use to analyze the status-related efficiency of your machine through processed energy data.
- On the **management level**, SIMATIC Energy Manager evaluates the acquired data, creates predictions and optimizes, for example, next month's energy consumption. Customized processing and straightforward display of acquired data is possible both with full access through a PRO client or via the web browser access by a Web client. This means that reporting and cost center accounting, for example, is supported. The gained insights in turn have an influence on the lower levels.

The interaction between SIMATIC Energy Manager, SIMATIC Energy Suite and the S7 Energy Efficiency Monitor leads to a **continuous improvement process** with the goal of **reducing costs** and saving energy.

Application

SIMATIC Energy Manager is used in a variety of fields, for example:

- Process industry
- Manufacturing industry
- Power plant operators
- Municipal operations

Selected references

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

- Alfred Ritter GmbH & Co. KG, Stuttgart, Germany

  SIMATIC Energy Manager PRO plays a central role in energy management according to ISO 50001. In addition, SIMATIC Energy Manager PRO systematically evaluates a large volume of data from different energy flows and thus provides the basis for continuous improvement in energy efficiency.
  Full reference example (Alfred Ritter GmbH & Co. KG)

- Brau Union Österreich AG, Brauerei Wieselburg, Wieselburg an der Erlauf, Austria

  SIMATIC Energy Manager PRO offers a cross-plant energy management system with a scalable design. This includes providing the data basis for process optimizations to reduce energy consumption and CO2 emissions. In the future, Energy Manager will also provide efficient energy monitoring and management at other Group sites, such as the Zipfer and Gösser breweries.
  Full reference example (Brau Union Österreich AG)

- Bette GmbH & Co. KG, Delbrück, Germany

  The energy data is acquired with the SIMATIC and SENTRON measuring devices integrated with SMATIC Energy Suite. SIMATIC Energy Manager PRO analyzes the energy data and displays the energy flows. In this way, the requirements of the EN 16247 standard are met and the company's own objectives are better implemented.
  Full reference example (Bette GmbH & Co. KG)

See also

- Siemens Industry Reference Center:
  Energy Manager PRO
  B.Data
- **Complete reference example (InfraTec Duisburg GmbH)**
- **Complete reference example (Saint-Gobain Oberland AG)**
- **Complete reference example (GF Automotive)**
- **Complete reference example (Schmitz-Werke GmbH + Co. KG)**

Concept

Architecture and Scalability

Architecture

SIMATIC Energy Manager is based on a client-server archi-
tecture that is easily integrated into your company infra-
structure. Stand-alone solutions are possible as well as multi-
user solutions at various locations. The following figure shows
a typical system structure of a WinCC automation system.
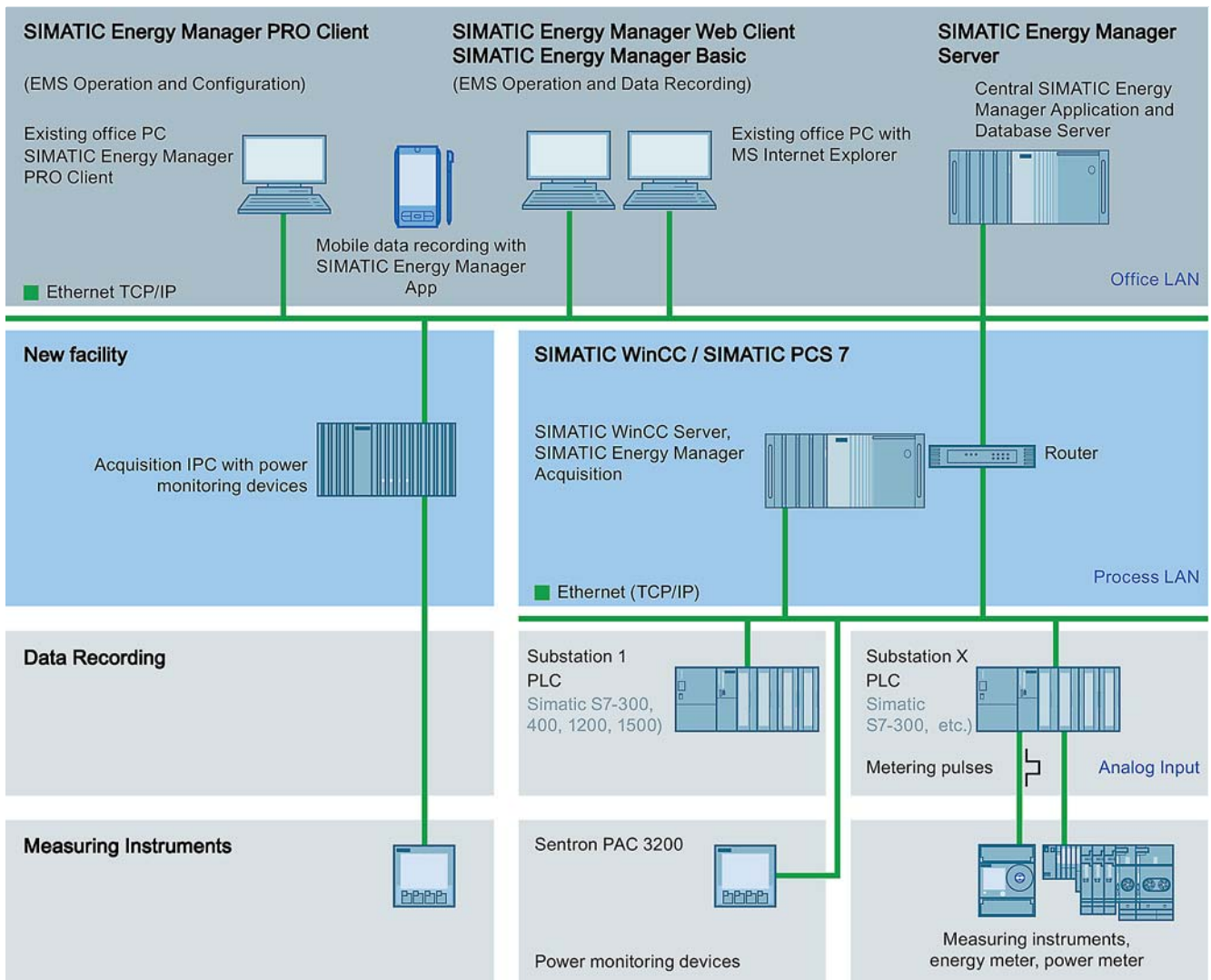
Scalability

Energy Manager consists of multiple components that can be installed on one or more computers depending on the existing infrastructure.

Component	Function	Number typically required
SIMATIC Energy Manager acquisition component	Acquires and processes data, such as measurement values.	1...n[1]
SIMATIC Energy Manager Server with SIMATIC Energy Manager database	Establishes communication between the Energy Manager acquisition component and the Energy Manager database. Performs calculations and generates reports. The database stores the acquired measurement values and all calculated or generated data, such as reports.	1
SIMATIC Energy Manager PRO Client	Configuration and operation of Energy Manager PRO.	1...n[2]
SIMATIC Energy Manager Web client	Platform for operation of Energy Manager Basic and Energy Manager PRO via web browser, for example, call generated reports or charts, input of measurement values, administration of energy efficiency measures, configuration of data sources and data points as well as user-defined information view creation using widget dashboards.	1...n
SIMATIC Energy Manager app	Mobile data acquisition and data transfer to SIMATIC Energy Manager.	1...n

[1] Multiple acquisition components can only be connected in Energy Manager PRO

[2] The client is automatically installed with the Energy Manager Acquisition and the Energy Manager Server.

You can find further information on the system requirements of SIMATIC Energy Manager 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:

- Data from analog and digital measuring devices
- Historical data from different data sources

In addition to the standardized interfaces with Siemens products such as SIMATIC WinCC or SIMATIC PCS 7, SIMATIC Energy Manager supports the current standards that you can use to acquire data from different sources:

- Acquisition of energy and operational data from the field level via OPC DA, OPC UA-DA or Modbus TCP.
- Acquisition of data from measurement value archives via OPC HDA and OPC UA-HA.
- Acquisition of data from S7 controllers via SIMATIC NET OPC Server.

- Acquisition of machine-related energy data through S7 energy efficiency monitor over the machine interface.
- Acquisition of data from maintenance, production planning and ERP system databases via the OLE-DB/ODBC driver.
- Acquisition of building data via Desigo CC.
- Acquisition of energy data via mobile data acquisition of the SIMATIC Energy Manager app for iOS and Android.
- Import of ASCII data from the company wide file system, such as CSV or XML via FTP or sFTP.
- Manual entry of the measured and metered value readings.

The data is pre-processed in the acquisition component and then imported into the SIMATIC Energy Manager database.
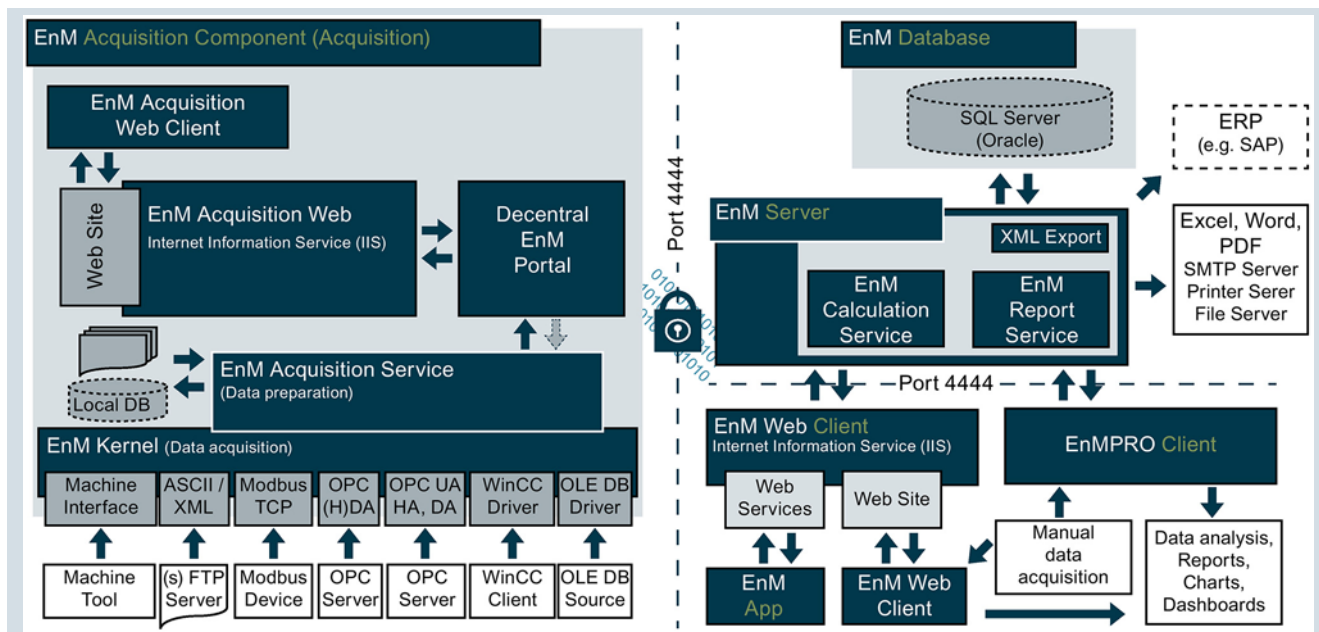
The following table shows the components of Energy
Manager:

Component	Description
Energy Manager acquisition component	The Energy Manager acquisition component is used for interfacing external systems (e.g. WinCC, OPC, ASCII). One or more acquisition components can be installed in an Energy Manager system. This can take place on the local PC or on remote (distributed) PCs. Each PC that serves as an acquisition PC must be set up accordingly and licensed on the central server. A distributed architecture and the installation of multiple acquisition components is only available in Energy Manager PRO. The acquired data are locally pre-processed first by the acquisition component (for example, compression to minute values). The data is then transferred to the database server over the Energy Manager Portal and, if necessary, stored in the database. The Energy Manager acquisition component receives its configuration data through the distributed Energy Manager Portal. The service responsible for data acquisition, which runs on each acquisition PC, is referred to as the "Energy Manager Kernel". The Energy Manager Acquisition Service, which is responsible for data synchronization, also runs on the acquisition component.
Energy Manager database	The SQL Server manages all read and write accesses to the database. Exactly one Energy Manager database with one SQL Server exists in each Energy Manager system.
Energy Manager server	The Energy Manager server bundles and manages accesses and queries to the Energy Manager database. The following functions are, for example, executed: ■ Calculation of the measuring variables (MEVA) ■ Compression of data points ■ Limit monitoring of data points ■ Start of automatic jobs such as report jobs, delete jobs The Energy Manager Server consists of the following different services, which are described below: ■ Energy Manager Portal ■ Energy Manager Calculation Service ■ Energy Manager Reporting Service The Energy Manager Web Server and the Energy Manager database are installed on the Energy Manager Server.
Energy Manager Portal	The Energy Manager Portal serves as middleware between the Energy Manager database and all other components (e.g. client, acquisition component, web). Exactly one Energy Manager Portal exists in each Energy Manager system.
Energy Manager Calculation Service	The Energy Manager Calculation Service is a database-independent service on the Energy Manager server in which all calculation logic is represented. The measuring variables are calculated based on this calculation logic.
Energy Manager Report Server	The Energy Manager Report Server is responsible for loading the calculated data into the Excel report template and, if necessary, for generating a PDF document. In addition, reports are sent via e-mail to printers and stored on the drive.
XML Export	The XML Export interface (DataExport.exe) is used to export the data point name and measurement values from Energy Manager PRO to XML format. The XML data is converted into the selected ASCII format by means of a style sheet.
Energy Manager Web Client	Operation of Energy Manager Basic and Energy Manager PRO Web over an Internet browser. The Energy Manager Web Client is based on the Internet Information Services (IIS) and accesses the Energy Manager server over the Web server website. In the Energy Manager Web Client you can, for example, create and configure reports or charts but also enter measurement values using a matrix; you can administer energy efficiency measures and show user-defined information from your production plant using widget dashboards. You can also configure your energy data system by creating and configuring data sources, data points, parameters and key performance indicators. At least one Energy Manager Web Client exists in each Energy Manager system.

Component	Description
Energy Manager PRO Client	The Energy Manager PRO Client is required to fully configure the system. Measurement values (e.g. meter readings) can be entered manually or subsequently changed. With the comprehensive user management, the operator rights of the respective user (groups) can be limited. Traceability of the changes made is ensured at all times. At least one Energy Manager PRO Client exists in each Energy Manager PRO system, which can be operated locally or remotely.
Energy Manager PRO	Complete range of functions of the SIMATIC Energy Manager energy data management system. Contains the Energy Manager PRO Client and Energy Manager PRO Web.
Energy Manager Basic	Energy Manager Basic is a version of Energy Manager PRO with limited functionality and only available in the web. Several web clients, which only need to be licensed accordingly, can access the web page at the same time.
Energy Manager app	The Energy Manager app for iOS and Android is used for mobile data acquisition of energy data using a mobile device. To do so, you must configure a route for taking the readings in Energy Manager and transfer it to the mobile device.

Data acquisition

Manual data acquisition

You can manually acquire values in Energy Manager with a matrix. You can create and configure the matrices in the Energy Manager Web Client as well as in the Energy Manager PRO Client.

Mobile data acquisition

You can manually acquire operating values or meter readings on-site with an iOS or Android based mobile device or with the SIMATIC Energy Manager app. To use mobile data acquisition, you must configure a route for taking the readings in SIMATIC Energy Manager.

Export of data

Report

You can display or the measurement values that have been acquired in Energy Manager in reports. Energy Manager generates the reports in files in PDF format or in Microsoft Excel and Microsoft Word format. The display of values as a table or diagram is always based on Microsoft Excel functions. This enables customized templates with macro functionality, for example, to be imported as a report template. Reports in Microsoft Word use embedded Excel objects to display values.

XML file

In Energy Manager PRO you can export your configuration data and the measurement values into XML format and import them again.

- The XML Export interface (DataExport.exe) is used to export the configuration data from data points and measurement values from Energy Manager PRO to XML format. The XML data is converted into the selected ASCII format by means of a style sheet.
- Use the "Import / Export" option, for example, to back up your configuration data.

Authorization concept

Data protection

SIMATIC Energy Manager has a three-level authorization concept that prevents unauthorized access to sensitive data:

• Domain
• Authority level
• Functional group

The visibility of Energy Manager objects is specified with the "authority level" and the "domain" membership. The user can only see an element if both have been assigned the same domain and the authority level of the user is greater than or equal to the level of the element.

The configuration options, for example, generating reports, are limited with the "Functional group".

In Energy Manager Basic you only have the option of creating new users and to assign these users to predefined user groups. Creating new mandates, user groups and functional groups are extended functions of Energy Manager PRO, as is the assignment of rights for these functional groups.
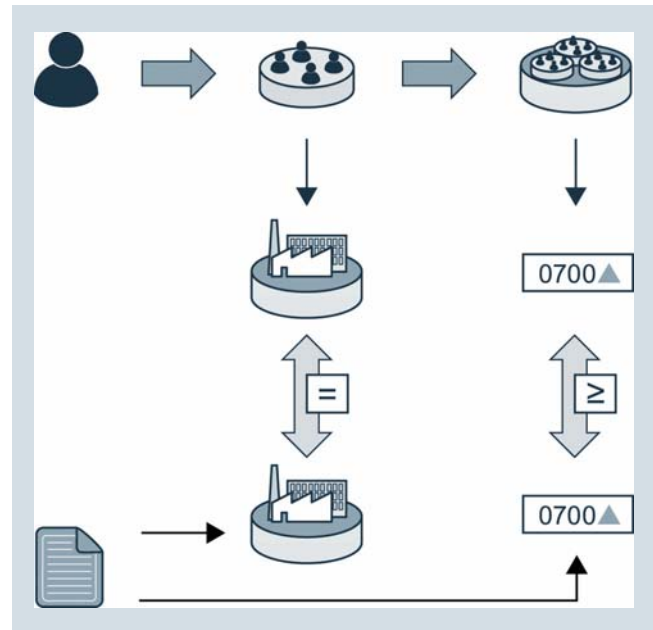
Users

A user can be assigned to one or more user groups and functional groups.

User group

A user group can be assigned to one or more functional groups or domains.

Functional group

The rights and authority level are defined in the functional group. Rights are "create [object]" or "view [object]" for example.

Domain

The domain represents a location of a business for example.

Energy Manager object

An authority level, and optionally a domain, is assigned to each Energy Manager object. An Energy Manager object is, for example, a folder in Energy Manager.

Authority level

The authority level is a value between 0 and 1000. The authority level is assigned to the parent folder, for example, and inherited by the folders below it.

If the authority level of the functional group is lower than that of the Energy Manager object, the object is not displayed to the user.

Communication security

SIMATIC Energy Manager supports major IT security standards for password and login security. The administrator can make the following settings according to the IT security guidelines of a company:

- Increase the complexity of the password with special characters or numbers
- Definition of the minimum password length
- Password change after first login
- Automatic lockout of user after a configurable number of failed login attempts

Login to Energy Manager is possible with a user name or e-mail address. Alternatively, SIMATIC Energy Manager PRO also supports "Single Sign On" and Auto Login using Active Directory.

With the Single Sign On in the functional group you allow a group from the Windows Active Directory to log into the Energy Manager PRO Client as well as Energy Manager PRO Web without having to enter the login data again. As soon as a user of this group has logged into the Windows operating system, the user also has access to Energy Manager PRO. The user can have a temporary password sent to his configured e-mail address.

The security of the data transmission is of utmost importance.

- In order to enable any cross-network communication version in the customer network, the general data communication between the acquisition component and the Energy Manager Server as well as between the Energy Manager PRO Client and the Energy Manager Server is encrypted via the freely configurable port.
  - Energy Manager Web Client supports secure communication with the Energy Manager Server via HTTPS with 256-bit encryption.
  - For data acquisition from an FTP server, the secure connection via sFTP is supported.

Availability

Availability

All acquired measurement values are stored in local files in the acquisition component. These files are retained for 62 days (with 1000 data points) by default. The acquired measurement values are compressed and preprocessed in the acquisition component.

If the Energy Manager Server is not available, the data preprocessed in the acquisition component is stored temporarily. The preprocessed data is automatically added once the Energy Manager Server is available again.

Backup

The backup functionality offers you the possibility to restore the system in the case of a hardware failure. A backup can be started manually, or it can be automated. It is possible to select an incremental backup or full online backup of any weekday or to select no backup. A full backup must be created at least once a week. The storage location of the backup can be defined.

Multiple languages

The Energy Manager Web Client is supplied in the following languages:

- German
- English
- French
- Italian
- Spanish
- Chinese

By default, the Energy Manager PRO Client is supplied in German and English.

The language can be selected when logging on to the corresponding client.

Because SIMATIC Energy Manager supports Unicode, project-specific porting to other languages is easily possible.

The manuals, readme and version information are available in German and English.

Licensing

SIMATIC Energy Manager is licensed according to the number of "Tags" and can be expanded with options. Licensing is always carried out on the Energy Manager Server.

A "Tag" is a value acquired from **an external measuring point**, which is processed and saved in SIMATIC Energy Manager, as well values that are input via manual data acquisition. With the "100 Tags" option, for example, you acquire up to 100 measurement values from different measuring points manually or automatically at the same time.

The basic software package "SIMATIC Energy Manager PRO incl. 50 tags" comes with the following software components:

- 50 tags
- 1 SIMATIC Energy Manager acquisition component
- 1 SIMATIC Energy Manager PRO Client
- SIMATIC Energy Manager app
- SIMATIC Energy Manager Web Server including one SIMATIC Energy Manager Web Client
- Microsoft SQL Server 2017 database
- SIMATIC Energy Manager Server

The basic software package "SIMATIC Energy Manager Basic incl. 50 tags" comes with the same software components except for the SIMATIC Energy Manager PRO Client.

SIMATIC Energy Manager software is available as download or
on DVD with the following article numbers:

SIMATIC Energy Manager V7.2	Download article no.	DVD package article no.
SIMATIC Energy Manager Basic incl. 50 Tags[1]	6AV6372-1DF07-2AH0	6AV6372-1DF07-2AX0
SIMATIC Energy Manager PRO incl. 50 Tags[1]	6AV6372-2DF07-2AH0	6AV6372-2DF07-2AX0
SIMATIC Energy Manager PRO Powerpack[2]	6AV6372-2DF07-2AH3	6AV6372-2DF07-2AX3
SIMATIC Energy Manager Tag Package 50[3]	6AV6372-2DF07-0CH0	6AV6372-2DF07-0CX0
SIMATIC Energy Manager Tag Package 100[3]	6AV6372-2DF07-0DH0	6AV6372-2DF07-0DX0
SIMATIC Energy Manager Tag Package 250[3]	6AV6372-2DF07-0EH0	6AV6372-2DF07-0EX0
SIMATIC Energy Manager Tag Package 500[3]	6AV6372-2DF07-0FH0	6AV6372-2DF07-0FX0
SIMATIC Energy Manager Tag Package 1000[3]	6AV6372-2DF07-0GH0	6AV6372-2DF07-0GX0
SIMATIC Energy Manager Tag Package 5000[3]	6AV6372-2DF07-0HH0	6AV6372-2DF07-0HX0
SIMATIC Energy Manager Tag Package 30000[3]	6AV6372-2DF07-0JH0	6AV6372-2DF07-0JX0

[1] Contains all software components.
[2] With the Powerpack, SIMATIC Energy Manager Basic can be upgraded to SIMATIC Energy Manager PRO.
[3] The tag packages dynamically expand the number of tags. The total tag count is expanded in each case by adding the value of the tag package.

SIMATIC Energy Manager expansions

TThe following expansions can be used as of SIMATIC Energy
Manager V7.2:

SIMATIC Energy Manager expansions	Download article no.	DVD package article no.
SIMATIC Energy Manager, 3 Web Clients[1]	6AV6372-2DF27-0AH0	6AV6372-2DF27-0AX0
SIMATIC Energy Manager, 20 Web Clients[1]	6AV6372-2DF27-0BH0	6AV6372-2DF27-0BX0
SIMATIC Energy Manager, 60 Web Clients[1]	6AV6372-2DF27-0CH0	6AV6372-2DF27-0CX0
SIMATIC Energy Manager PRO Client[2]	6AV6372-2DF37-0AH0	6AV6372-2DF37-0AX0
SIMATIC Energy Manager Planning and Forecast[3]	6AV6372-2DF47-0AH0	6AV6372-2DF47-0AX0
SIMATIC Energy Manager Acquisition component[4]	6AV6372-2DF57-0AH0	6AV6372-2DF57-0AX0

[1] Maximum 3 / 20 /60 simultaneously logged in users. Can also be used cumulatively.
[2] Full-featured SIMATIC Energy Manager PRO Client for configuring the overall system..
[3] Extends SIMATIC Energy Manager PRO by the product-plan-based forecast of the energy consumption.
[4] Additional acquisition component. By default, an acquisition component acquires measurement values from measuring points that are located in the same network as the acquisition component. In case of multiple locations it is recom-mended to use one acquisition component for each location, depending on the network configuration. Additional acquisition components are only available in Energy Manager PRO.

Siemens 2019 copyright.

SIMATIC Energy Manager Software Update Service (SUS)

You can purchase a software update service (SUS) for the basic SIMATIC Energy Manager software, depending on the total Tag count of your licenses (the 50 tags in the basic package are excluded from the total tag count). Owners of a genuine software update service agreement will automatically receive the latest updates for their purchased products or, if the download variant is ordered, can download these once they are available.

SIMATIC Energy Manager Software Update Service (SUS)	Download article no.	DVD package article no.
SUS up to 50 tags and/or 1 consumer package[1]	6AV6372-2DF00-0CY0	6AV6372-2DF00-0CL0
SUS up to 100 tags and/or 5 consumer packages[1]	6AV6372-2DF00-0DY0	6AV6372-2DF00-0DL0
SUS up to 500 tags and/or 25 consumer packages[1]	6AV6372-2DF00-0FY0	6AV6372-2DF00-0FL0
SUS up to 5000 tags and/or 100 consumer packages[1]	6AV6372-2DF00-0HY0	6AV6372-2DF00-0HL0
SUS > 5000 tags and/or more than 100 consumer packages[1]	6AV6372-2DF70-0XY0	6AV6372-2DF70-0XL0

[1] The SUS contract runs for 1 year. Unless canceled three months prior to expiration, the contract is automatically extended by an additional year.

SIMATIC Energy Manager PRO V7.1 to Energy Manager PRO V7.2 Upgrades

You can upgrade SIMATIC Energy Manager PRO V7.1 to SIMATIC Energy Manager PRO V7.2 with the following licenses. When migrating to the current version, you must consider the number of tags in your Energy Manager system.

SIMATIC Energy Manager PRO V7.1 to Energy Manager PRO V7.2 Upgrades	Download article no.	DVD package article no.
Upgrade from systems with up to 50 tags and/or 1 consumer package	6AV6372-2DF07-2CH4	6AV6372-2DF07-2CX4
Upgrade from systems with up to 100 tags and/or 5 consumer packages	6AV6372-2DF07-2DH4	6AV6372-2DF07-2DX4
Upgrade from systems with up to 500 tags and/or 25 consumer packages	6AV6372-2DF07-2FH4	6AV6372-2DF07-2FX4
Upgrade from systems with up to 5000 tags and/or 100 consumer packages	6AV6372-2DF07-2HH4	6AV6372-2DF07-2HX4
Upgrade from systems with > 5000 tags and > 100 consumers packages	6AV6372-2DF77-2XH4	6AV6372-2DF77-2XX4

SIMATIC Energy Manager PRO Consumer

The following licenses provide you with the Consumer Packages, optionally with or without the SIMATIC S7 Energy Efficiency Monitor.

SIMATIC Energy Manager PRO Consumer	Download article no.	DVD package article no.
Consumer package 1 including S7 EE monitor[1]	6AV6372-2DF67-1AH0	6AV6372-2DF67-1AX0
Consumer package 5 including S7 EE monitor[1]	6AV6372-2DF67-1BH0	6AV6372-2DF67-1BX0
Consumer package 25 including S7 EE monitor[1]	6AV6372-2DF67-1CH0	6AV6372-2DF67-1CX0
Consumer package 1 excluding S7 EE monitor	6AV6372-2DF77-1AH0	6AV6372-2DF77-1AX0
Consumer package 5 excluding S7 EE monitor	6AV6372-2DF77-1BH0	6AV6372-2DF77-1BX0
Consumer package 25 excluding S7 EE monitor	6AV6372-2DF77-1CH0	6AV6372-2DF77-1CX0

[1] The license number on the certificate is used to activate the S7 energy efficiency monitor. One license certificate is required for each machine.

SIMATIC Energy Manager TRIAL

90-day test version with full functionality, including production-plan-based forecast.

SIMATIC Energy Manager TRIAL	Download article no.	DVD package article no.
SIMATIC Energy Manager Basic/PRO TRIAL	Download via Customer Support Portal	6AV6372-2DF17-2AX0

Energy data management with SIMATIC Energy Manager

Monitoring

Basics of Monitoring

Definition

An important component of energy data management is the **display** of **operating data** and **performance indicators** as well as the **monitoring** of **limits**. Meaning performance indicators can only be calculated if the data quality is good.

Options in Energy Manager

With the monitoring of Energy Manager, you have a fast and straightforward way to keep an eye on the energy and consumption data of your company. Energy Manager offers the following options for displaying and evaluating operating data and performance indicators:

- Current values for display of the current situation.
- Historical as a basis for comparisons and analyzes.

Energy Manager has the right tool for every type of application: You can, for example, display current and projected operating values together in one chart. Relate produced quantities, consumption, and costs, for example, in a report. Have the relevant data of your company displayed in a widget dashboard. Use online monitoring to monitor the current values of the data points and display these values in a chart.

Implementation in Energy Manager

Energy Manager Basic comprises engineering in the web with limited functions. Energy Manager PRO offers you the full range of functions of the energy management system in the Energy Manager Web Client as well as in the Energy Manager PRO Client.

See also

Chart

Definition

The chart shows current or historical data. The values of different performance indicators can be displayed as trends at the same time.
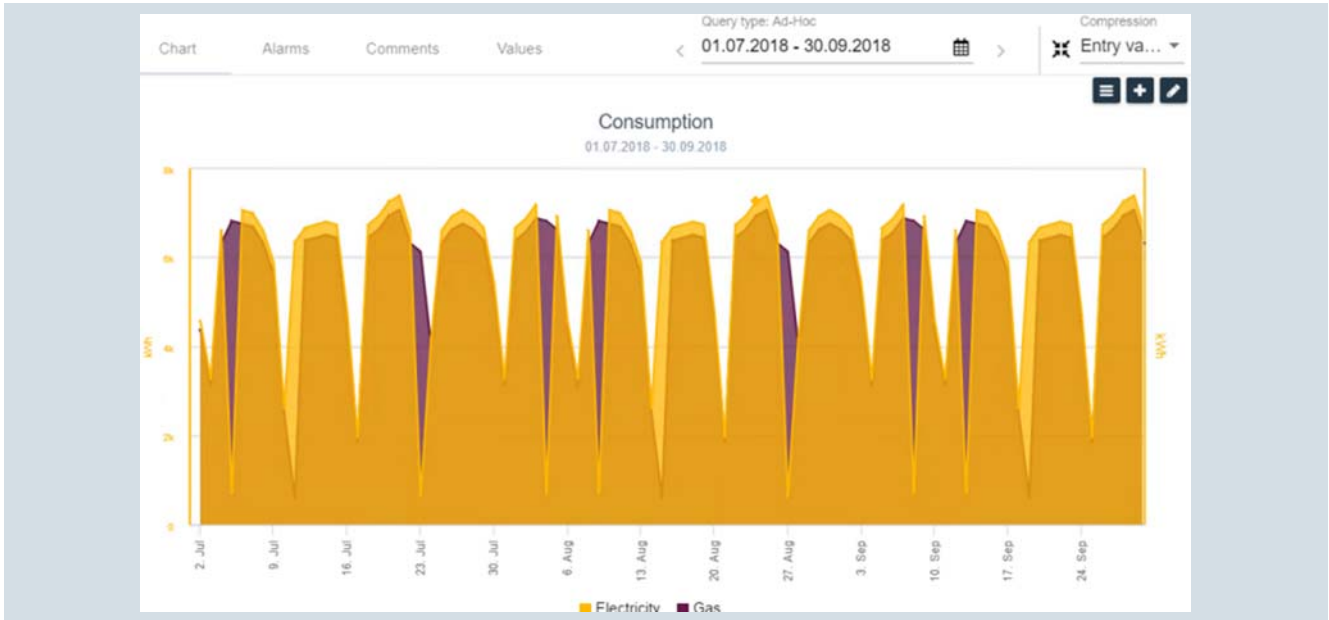
The display can be configured for each trend individually, for example, as bars, lines or points. Two x axes for comparisons over time and up to five y axes are available. The zoom function helps you to keep an overview in case of comprehensive data.

Using a chart

The trends in a chart are scaled automatically and can be displayed on multiple axes. This allows you to easily compare trends from different value ranges. In addition to the graphical representation, the strengths are the ability to analyze the dependencies of various operating data, such as quantity produced, as well as planned and actual energy consumption.

Recommended uses

Use the chart for quick visualization of the recorded measurement values or performance indicators directly in the Energy Manager Web Client (alternatively in the Energy Manager PRO Client). Adapt the time range you want to display with the options at any time. Violated plausibility criteria for individual values (both high and low violations) are indicated directly in the trends. Comment the trends directly in the chart. Export the values of the measurement series as a CSV file.

Additional functions

Charts in Energy Manager have many other functions:

- Comparison of the selected time range with a defined time range or a time range shifted by a fixed time period
- Configuring plausibility criteria for each value series
- List in table form with all values that violate the plausibility criteria.
  Access this list from the "Alarms" tab.
- List in table form with all values that are commented on
  Access this list from the "Comments" tab.
- Display of all values in a matrix
  Access this matrix from the "Values" tab. The matrix for a chart cannot be configured. You can find more information on this in the "Matrix (Page 77)" section.

See also

Basics of Monitoring (Page 20)
Data analysis in the chart (Page 77)
Chart (Page 77)

Widget dashboard

Definition

Historical energy and plant data as well as key performance indicators are shown in the widget dashboard by means of predefined widgets that are clearly arranged on one single page. The dynamic time range selection guarantees full flexibility for the visualization.

Widget dashboards are designed for display in the Web or on mobile devices and can therefore only be configured in the Energy Manager Web Client. You can create multiple widgets in one dashboard and thus combine the widgets into a complete visualization of your production.

Using a widget dashboard

With a widget dashboard, you will never lose track of your production and consumption data: Thanks to the easy navigation and layout, you can easily connect multiple widgets as well as widget dashboards for maximum transparency. Detailed displays for a production location are possible, and multiple production locations can be combined to provide better overview and control. Typical applications are the display of important performance indicators such as consumption or unit costs. Overviews of weekly or monthly consumption can also be displayed.

Configuring a widget dashboard

You create objects of the type "Dashboard" in the Energy Manager Web Client. **The content of each widget dashboard can be configured by using the different widgets:** You select the widget you need for each widget dashboard from a selection of 15 different widgets.

Depending on the widget, you must assign one or more data points to the widget.

Statistics functionality

Dynamic statistical functions enable flexible energy analyses in the widget dashboard (alternatively in the chart object in the Energy Manager PRO Client). The following statistical functions are available:

- Histogram:
  Widget dashboard in the Energy Manager Web Client or in the chart of the Energy Manager PRO Client
- Linear regression analysis:
  Widget dashboard in the Energy Manager Web Client or in the chart of the Energy Manager PRO Client
- Gaussian bell-shaped curve:
  Chart of the Energy Manager PRO Client
- Box plot:
  Chart of the Energy Manager PRO Client
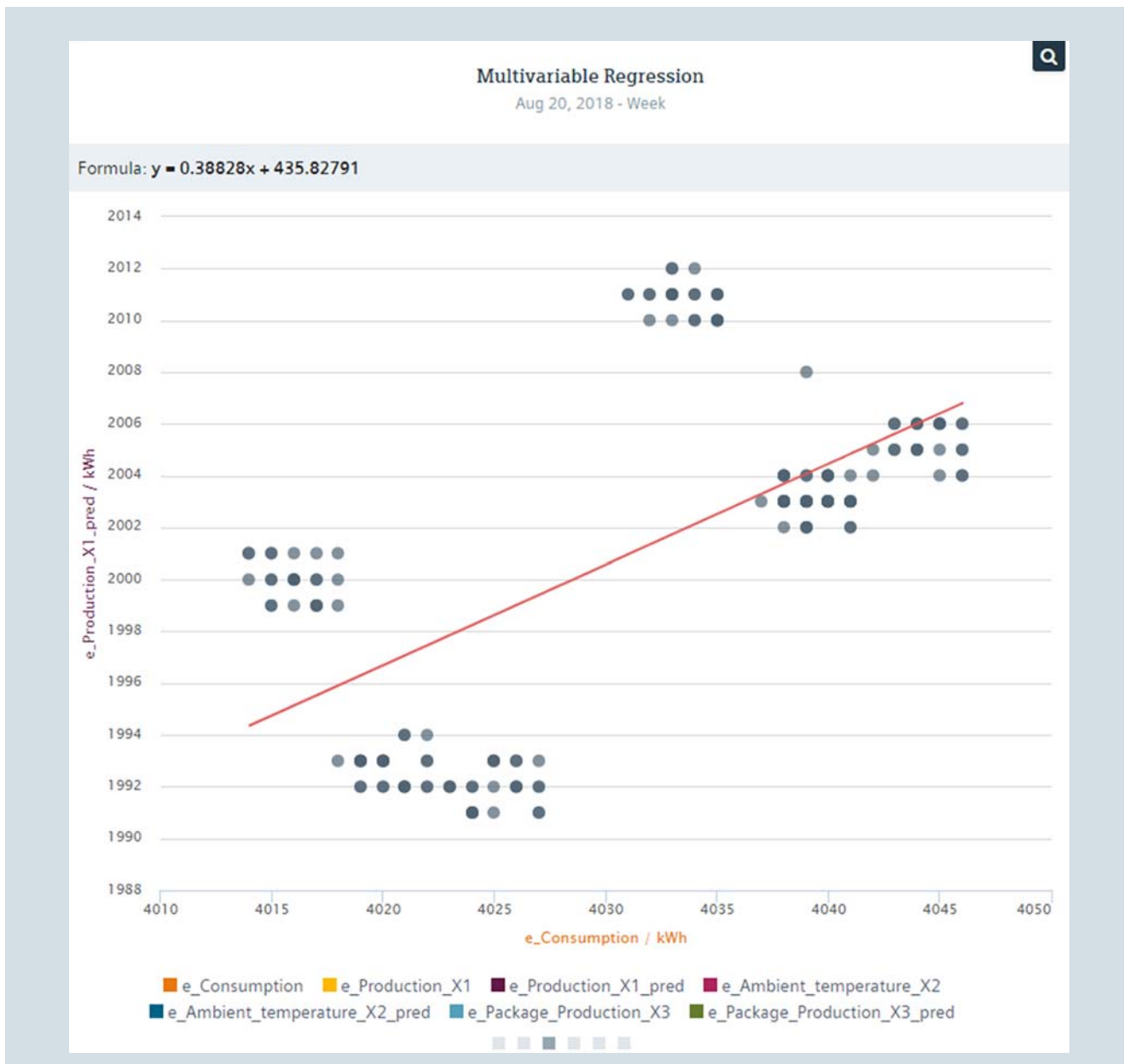
The histogram divides the total value range of the values into 20 equal sized intervals and provides the number of values located within each interval. This yields a frequency distribution of the values. In addition, statistical values such as minimum, maximum, median, average and standard deviation are displayed in the histogram.

As soon as you use multiple data points or key performance indicators in a widget, the histogram and the linear regression analysis are available as separate tabs in the respective widget.

The goal of the linear regression analysis is to establish a linear correlation between the values on the x axis (production) and the values on the y axis (consumption). The x values and their associated y values are displayed in the chart, and a straight line is drawn through this scatter plot in such a way that the quadratic distances from each point are minimal. The linear equation can also be seen.

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. In addition, reliable performance indicators form the basis for reports, such as those required for imple-mentation of ISO 50001 requirements.

Controlling in Energy Manager

Energy Manager is the tool that effectively supports you in your controlling tasks:

- User-configurable balance calculation of the energy flows of different media such as electricity, gas, or steam, from the main supply down to sub-distribution systems.
- Determination of performance indicator values with direct reference to production, for example, batches or quantities for energy-related evaluation of production equipment.
- 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 param-eters.
- Determination and display of statistical parameters such as time lines, distribution of hours or degree day figures.

For the display, you use the automatic reporting of Energy Manager: The information is displayed in Microsoft Excel or Microsoft Word and can be prepared for an overview as a table or diagram. In this way, you generate, for example, monthly reports with current figures in Microsoft Excel, Microsoft Word or PDF format without additional configuration effort. You can find further information in "Calculation level 3 (report template) (Page 91)".

Performance Indicators

Introduction

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

Generally, a distinction is made between a one-time analysis and a continuous controlling process for controlling:

- Analysis:
  Calculation of levels of efficiency or efficiency indicators
- Controlling process:
  Comparison of consumption figures or costs, 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 those of 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 possible irregularities.

SIEMENS

Author: SIEMENS

Key performance indicators

Period: 1/1/2015 To 2/1/2015
Date: 2/2/2015 8:00 AM

Cost allocation

Costs Water
10,375 EUR
13%

Costs Gas
20,100 EUR
24%

Costs
Electricity
52,788 EUR
63%

development of costs ■ Costs Electricity ■ Costs Gas

KPI's		Jan 15 actual period	Dec 14 last period	Jan 14 period in last year	comp. last period	comp. last year
Costs Electricity	EUR	52,788	50,552	53,480	4%	-1%
Costs Gas	EUR	20,100	20,400	19,600	-1%	3%
Costs Water	EUR	10,375	10,450	10,225	-1%	1%
Total costs	EUR	83,263	81,402	83,305	2%	0%

Pure consumption or cost performance indicators can only be checked approximately for correctness. With Energy Manager, you can set the performance indicators for consumption and costs in relation to the production data. In this way, you obtain significantly more meaningful performance indicators, which you can also compare efficiently across various time ranges

The following figure shows the energy consumption per ton. The different time ranges "Week", "Since beginning of month" and "Since beginning of the year" provide quick information of possible deviations. In this instance, the energy consumption per ton has already exceeded the current monthly and average annual value after one week. Thanks to this overview, measures can be taken promptly; e.g. the technical monitoring of the consumers.

SIEMENS

Author: SIEMENS

KPI's batch production

Period: 1/1/2014 To 1/1/2015
Date: 2/3/2015 8:00 AM

Energy consumption

- Energy consumption pump 1
- Energy consumption pump 2
- Energy consumption motor 1
- Energy consumption motor 2

27,383 kWh 29%
14,492 kWh 15%
19,226 kWh 20%
34,608 kWh 36%

Energy kWh/t

|		Week	since this month	since this Year
Number of batches	-	31	113	1248
Total Production	t	21,290	74,160	801,292
Total Material off spec	%	7.15	7.32	7.55
Electrical Energy production	kWh	396,451	1,289,318	14,255,015
Energy consumption pump 1	kWh	27,383	100,052	1,106,199
Energy consumption pump 2	kWh	34,608	126,448	1,398,040
Energy consumption motor 1	kWh	19,226	70,246	776,661
Energy consumption motor 2	kWh	14,492	52,951	585,435
Energy consumption dryer	kWh	760	2,778	30,707
Energy consumption per ton	kWh	18.62	17.39	17.79

See also

Calculation of Plant Efficiency (Page 28)
Specific Performance Indicators (Page 30)
Widget dashboard (Page 22)

Calculation of Plant Efficiency

Introduction

Performance indicator values related to efficiency are important for realizing an increase in the efficiency of energy generation and energy distribution systems. Due to the flexibility of Energy Manager, plant-specific characteristic curves can be generated 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 the compressor-specific characteristic curve.
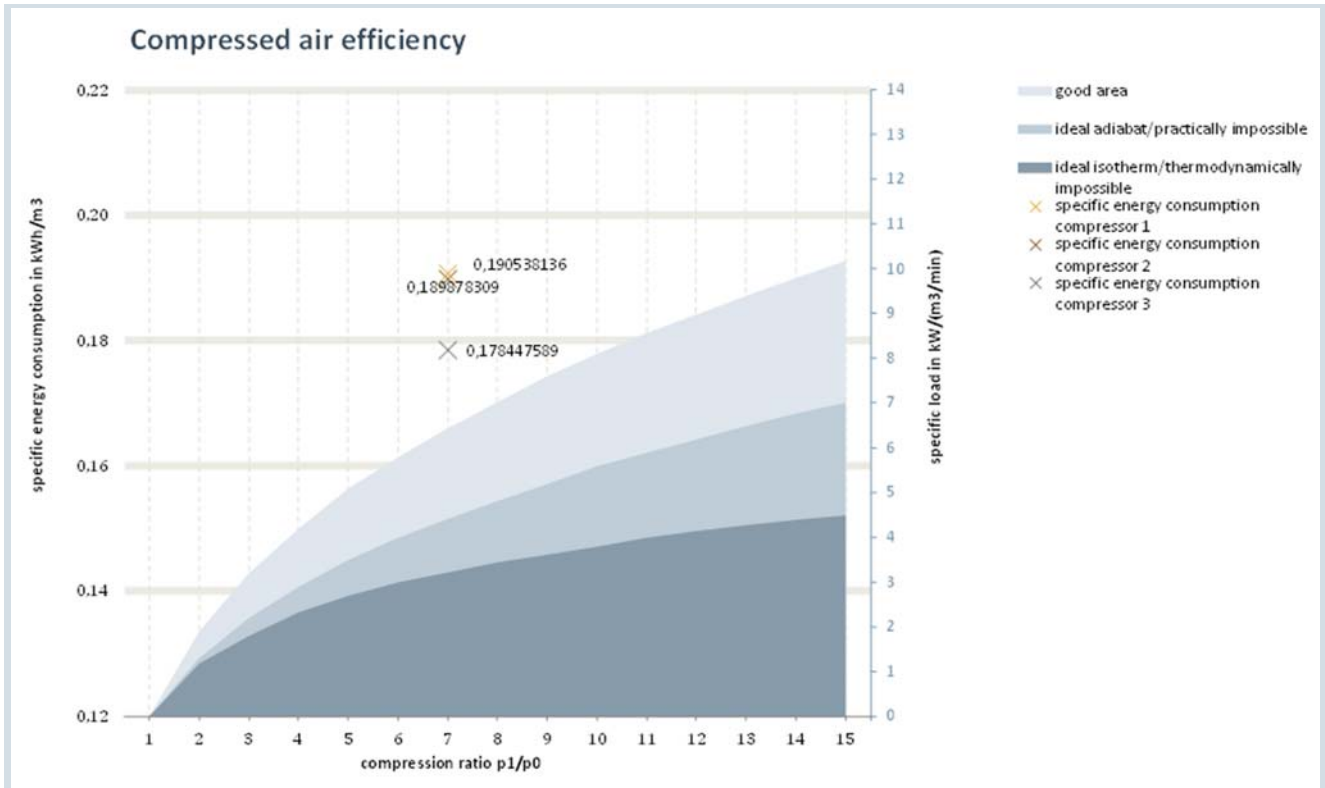
Example of efficiency calculation

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" is very inefficient, such that replacement with a more efficient compressor makes sense. The efficiency of "Compressor 3" is only marginally in the poor range. Therefore, a check for leaks can be performed as an initial measure.

See also

Specific Performance Indicators (Page 30)

Benchmarking / 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.

Example

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

SIEMENS — KPI - Benchmark

Author: Siemens
Period: 1/1/2015 To 2/1/2015
Date: 2/5/2015 1:05 PM

KEY PERFORMANCE INDICATOR		Value		Lower Benchmark	Upper Benchmark
m_Total_electricity_per_mcig	GJ/t	7.00	WARNING!	7.00	14.00
m_Electricity_PMD_per_mcig	GJ/t	4.50	OK	3.00	5.00
m_Electricity_SMD_per_mcig	GJ/t	3.90	OK	3.00	5.00
m_Electricity_utilities_per_mcig	GJ/t	4.00	OK	3.00	5.00
m_Thermal_energy_PMD_per_mcig	GJ/t	4.50	OK	4.00	9.00
m_Thermal_energy_utilities_per_mcig	GJ/t	4.50	OK	4.00	9.00
m_Compressed_air_per_mcig	m³/t	1,000.00	OK	750.00	1,200.00
m_Vacuum_system_per_mcig	m³/t	1,100.00	ATTENTION!	700.00	1,000.00
m_Wet_exhaust_air_per_mcig	m³/t	9,000.00	OK	5,000.00	10,000.00
m_Dry_and_heated_exhausted_air_per_mcig	m³/t	6,120.00	WARNING!	6,000.00	10,000.00
m_Conditioned_dry_exh_air_per_mcig	m³/t	9,800.00	ATTENTION!	10,000.00	25,000.00
m_Water_per_mcig	m³/t	3.00	OK	2.50	3.50
m_Waste_water_per_mcig	m³/t	1.30	OK	1.10	1.50

You can find a detailed example of the use of benchmarking and targeting under "Sustainability - Emissions (Page 34)".
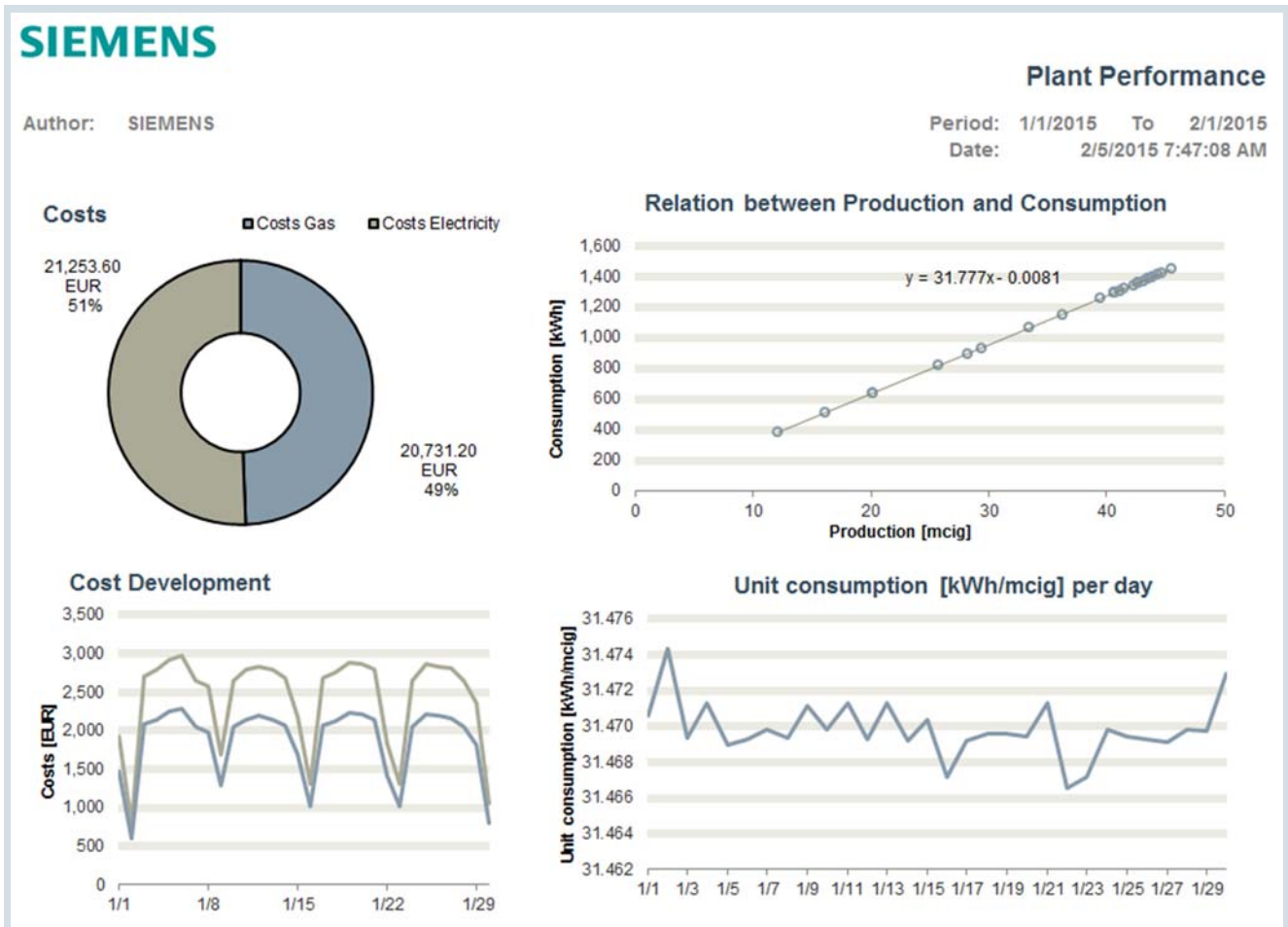
Specific Performance Indicators

Introduction

The calculation of the plant characteristic curve resulting from the regression analysis of consumption and production output can be used both for forecasting and for baseline management.

Specific influencing factors can be taken into account by standardizing performance indicators, through which some performance indicators are only then meaningful.

Baseline and forecasting tool

The following figure shows a report in which the energy costs and consumption per unit of production are displayed. The regression analysis at the top 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 the plant characteristic curve can be used both for forecasting and for baseline management.

Normalization of performance indicators

When climatic conditions such as temperature or air humidity are considered, pure performance indicators quickly lose their significance. Without standardization, energy consumption can only be compared in a limited way. Energy Manager supports the time-independent calculation of performance indicators on the basis of recorded measurement values. Energy Manager performs the normalization. The results are output directly in the report.

The figure below shows the normalization using "Degree days", which plays a role in building management, for example. More heat is used in winter than in summer. An examination of the average degree days 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. The daily temperature figure plays an important role as a reference value.

SIEMENS

Degree Day Normalization

Author: SIEMENS

Period: 1/1/2014 To 1/1/2015
Date: 2/5/2015 1:07:20 PM

Protocol

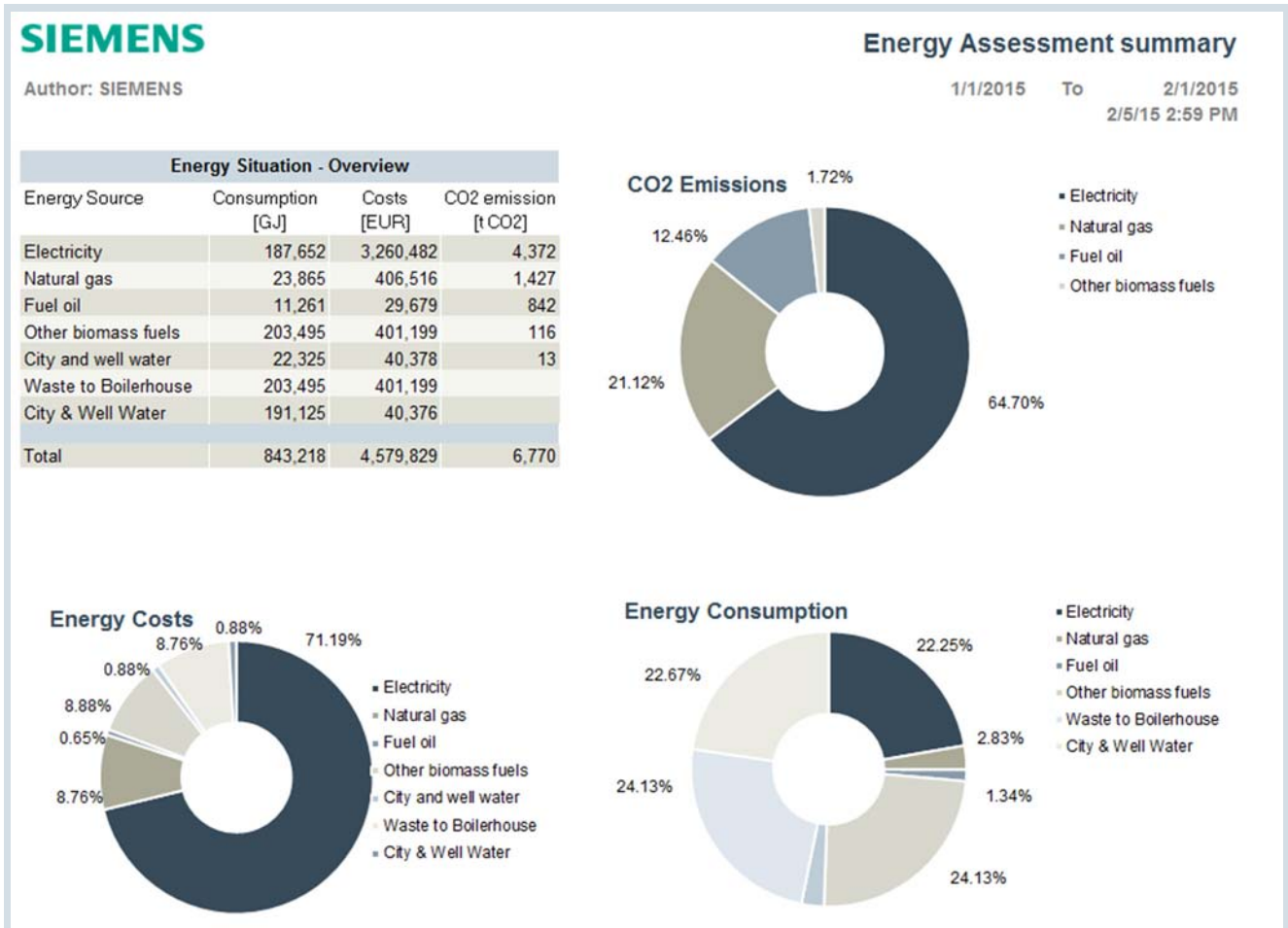| time	Degree days base 20°C	Degree days base 15°C	Long term mean temp	Heat Consumption	Corrected Consumption	Deviation absolute	Deviation %
1/1/2014	687.8	532.8	572	403,786	335,795	67,991	20%
2/1/2014	540.7	400.7	495	374,352	342,680	31,672	9%
3/1/2014	453.2	298.2	429	318,604	301,597	17,007	6%
4/1/2014	76.5	26.5	295	214,502	826,736	-612,234	-74%
5/1/2014	102.5	37.5	141	208,038	286,274	-78,236	-27%
6/1/2014	29.4	4.4	54	198,744	364,460	-165,716	-45%
7/1/2014	5.8	0.8	16	171,631	472,947	-301,316	-64%
8/1/2014	0.0	0.0	16	189,872	189,872	0	0%
9/1/2014	18.0	3.0	112	206,069	1,281,080	-1,075,011	-84%
10/1/2014	310.2	180.2	299	268,074	258,432	9,642	4%
11/1/2014	408.3	258.3	439	292,936	314,931	-21,995	-7%
12/1/2014	593.6	438.6	541	380,125	346,445	33,680	10%
SUM	3,226.12	2,181.12	3,409	3,226,733	5,321,248	2,094,515	39%

SIEMENS

Energy consumption - degree days

$y = 317.42x + 183557$
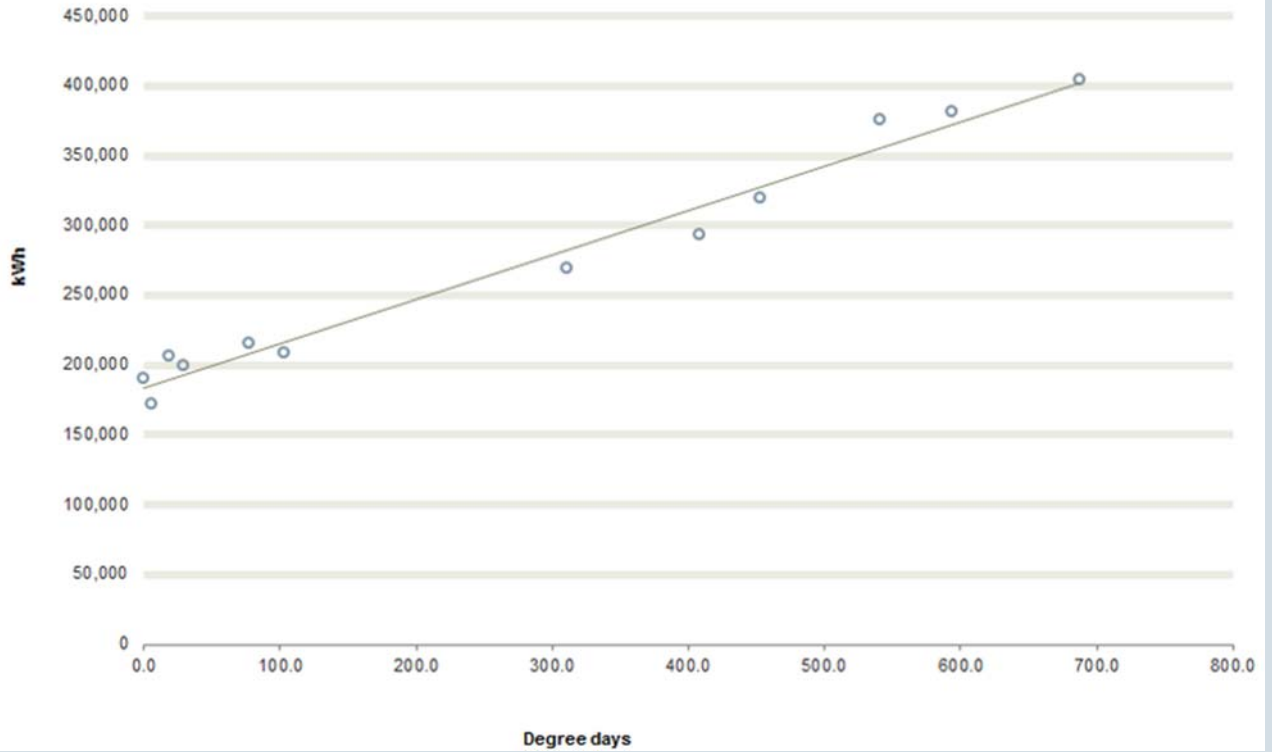
Energy situation

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 CO_2 emissions.

SIEMENS

Author: SIEMENS

Energy Assessment summary

1/1/2015   To   2/1/2015
                   2/5/15 2:59 PM

Energy Situation - Overview			
Energy Source	Consumption [GJ]	Costs [EUR]	CO2 emission [t CO2]
Electricity	187,652	3,260,482	4,372
Natural gas	23,865	406,516	1,427
Fuel oil	11,261	29,679	842
Other biomass fuels	203,495	401,199	116
City and well water	22,325	40,378	13
Waste to Boilerhouse	203,495	401,199	
City & Well Water	191,125	40,376	
Total	843,218	4,579,829	6,770

CO2 Emissions

1.72%
12.46%
21.12%
64.70%

- Electricity
- Natural gas
- Fuel oil
- Other biomass fuels

Energy Costs

0.88%
8.76%
0.88%
8.88%
0.65%
8.76%
71.19%

- Electricity
- Natural gas
- Fuel oil
- Other biomass fuels
- City and well water
- Waste to Boilerhouse
- City & Well Water

Energy Consumption

22.25%
22.67%
2.83%
24.13%
1.34%
24.13%

- Electricity
- Natural gas
- Fuel oil
- Other biomass fuels
- Waste to Boilerhouse
- City & Well Water

It is quite clear from this example that electricity represents a significant portion of the costs as well as CO_2 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 can, for example, be a first measure.

See also

Sustainability - Emissions

Introduction

Legal requirements often make testing or monitoring and periodic reporting of emissions necessary. Company-wide transparency through continuous energy and material accounting of energy production and energy consumption equipment is therefore necessary.

Sustainability

In times characterized by the coming climate crisis and the extinction of species, sustainability is becoming increasingly important. In addition to pure energy consumption, Energy Manager can also acquire additional data for environmental reports. Carbon dioxide and nitrogen oxides pollute the environment, and professional disposal and solid waste and wastewater incurs additional costs. An overview of all emissions is a basic requirement for defining measures to reduce them and to subsequently implement these measures.

The figure below shows the percentage change of the consumption per energy source and emissions compared to the previous year. Energy Manager can illustrate these changes for an individual location up to an entire group of companies.
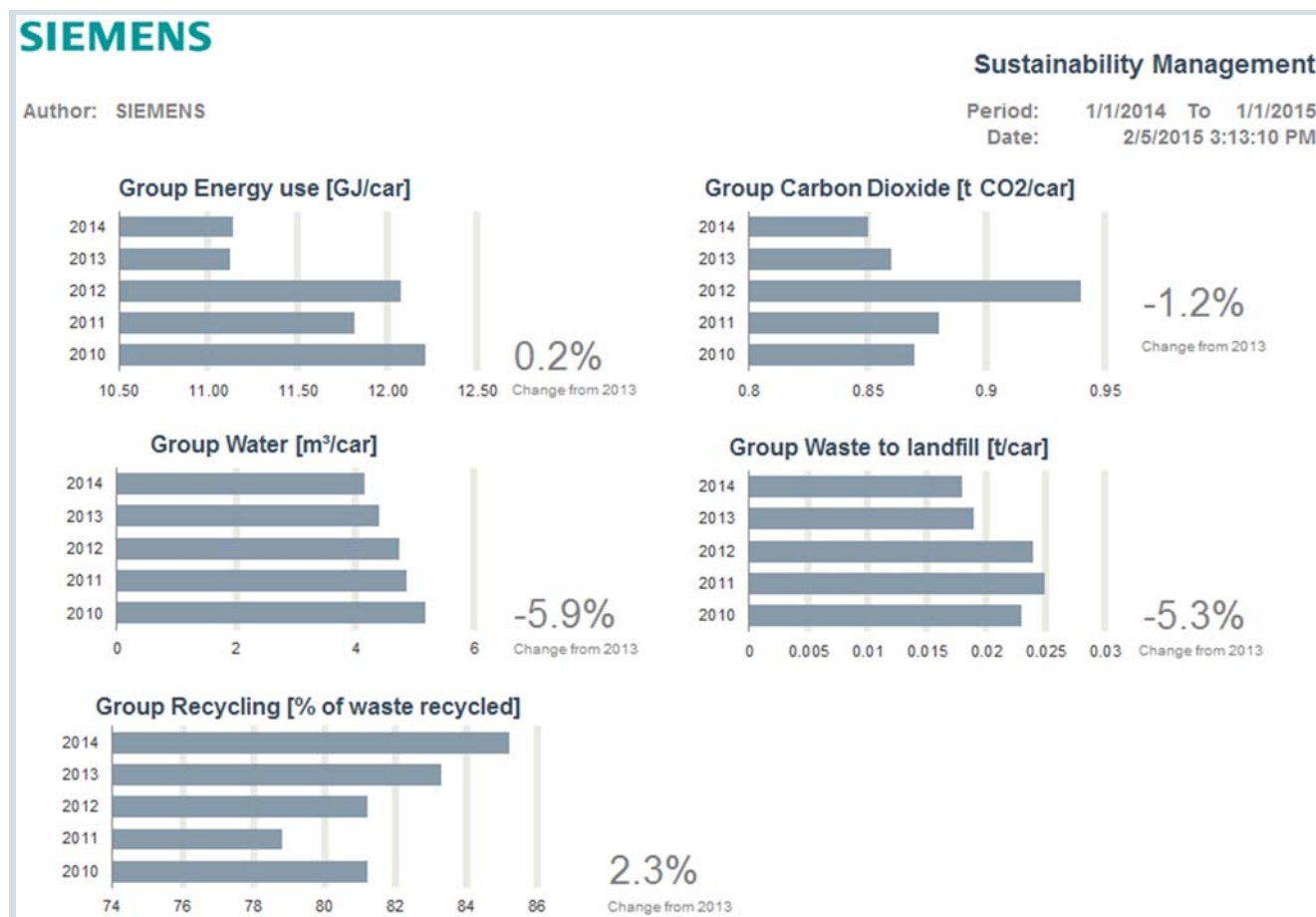
Example of CO_2 emissions and emissions trading

The emission of the greenhouse gas CO_2 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.
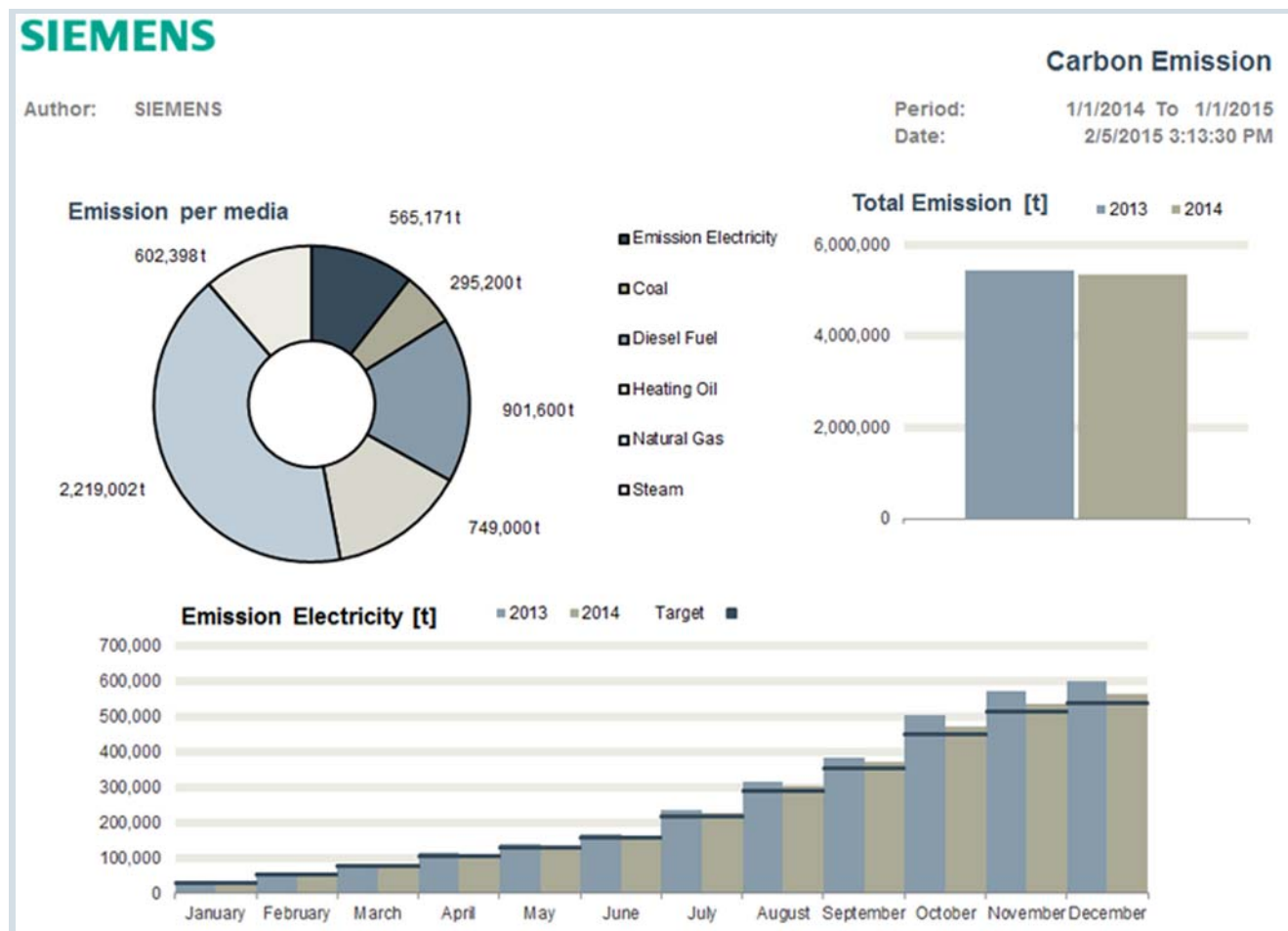
The analysis clearly shows that, although emissions have decreased over the previous year, they are still well above the targets. Based on this evaluation, the following actions are possible:

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

Implementation in Energy Manager

The calculation of emissions is performed in Energy Manager in the following way: Create a parameter for each energy source which contains an emission equivalent. Using a simple multiplication you obtain, for example, the amount of CO_2 emitted per kilowatt hour consumed.

See also

Benchmarking / Targeting (Page 29)

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 equipment based on the batches produced can be useful. With the batch analysis in Energy Manager PRO, you determine the energy consumption of a product per batch - even across multiple equipment units within a production process. You can break down and compare the energy consumption and the associated costs by batch, product, and equipment. Batch-related energy evaluation is only available in Energy Manager PRO.

Implementation in Energy Manager PRO

You map your equipment and define the products and the energy sources involved in Energy Manager PRO. The batch ID must be provided by the subordinate system. Start and end dates are defined by changing the batch ID. This data is typically transferred to Energy Manager PRO in 1 - or 15-minute cycles. You can view the batches in Energy Manager PRO and directly calculate the performance indicators, if required.

The following figure shows a listing of batches for a plant unit in Energy Manager PRO as well as the resulting batch report with plant areas, batch ID, batch duration, and energy consumption per plant unit. Numbers and texts are supported as batch ID.

Status-related energy data management

In the past, energy data management has focused mainly on infrastructure. With status-related energy data management, the focus is on the consumer - the machine.

So that machine efficiency can be increased, it is necessary to examine energy consumption in relation to machine statuses. This is the only way in which conclusions can be drawn about the efficiency of the machine as well as the efficient operation of the machine.

A preliminary calculation of the energy consumption for each status can be made in the upstream system (S7 Energy Efficiency Monitor) as well as in Energy Manager PRO. Status-based energy data management is only available in Energy Manager PRO.

The following figure shows the principle mode of operation.
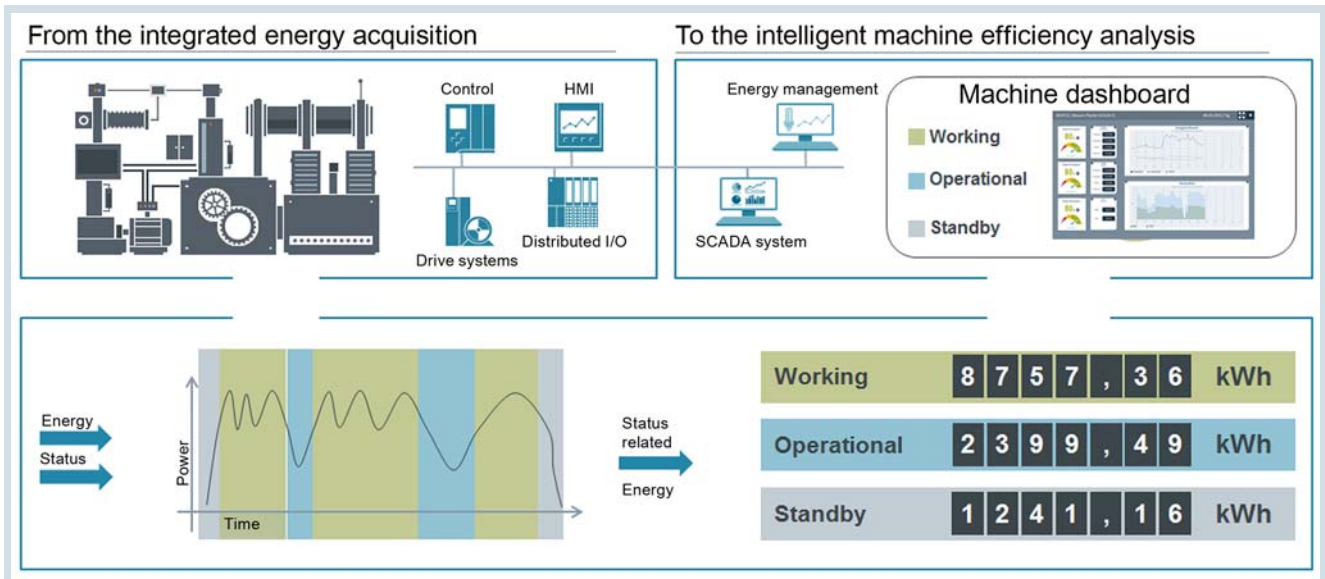
This yields the following advantages:

- Standard, comparable efficiency indicators of machines / lines / PMU
- Display of energy consumption and costs on machine level and cost center level
- Energy consumption and costs per workpiece, shift
- Benchmarking of same machines/workpieces from different manufacturers
- Evaluation of consumption in relation to operating behavior (value adding / not value adding)
- Information on whether a machine is inefficient in a specific operating state (benchmark)
- Basis for optimizing the method of machine operation with respect to energy

Cost-center-oriented accounting

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 costs that they cause will be willing to change their behavior. By allocating costs according to the "costs-by-cause 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 costs-by-cause energy cost allocation.

Energy Manager enables costs-by-cause accounting of energy and material flows and allocation to individual cost units or products.
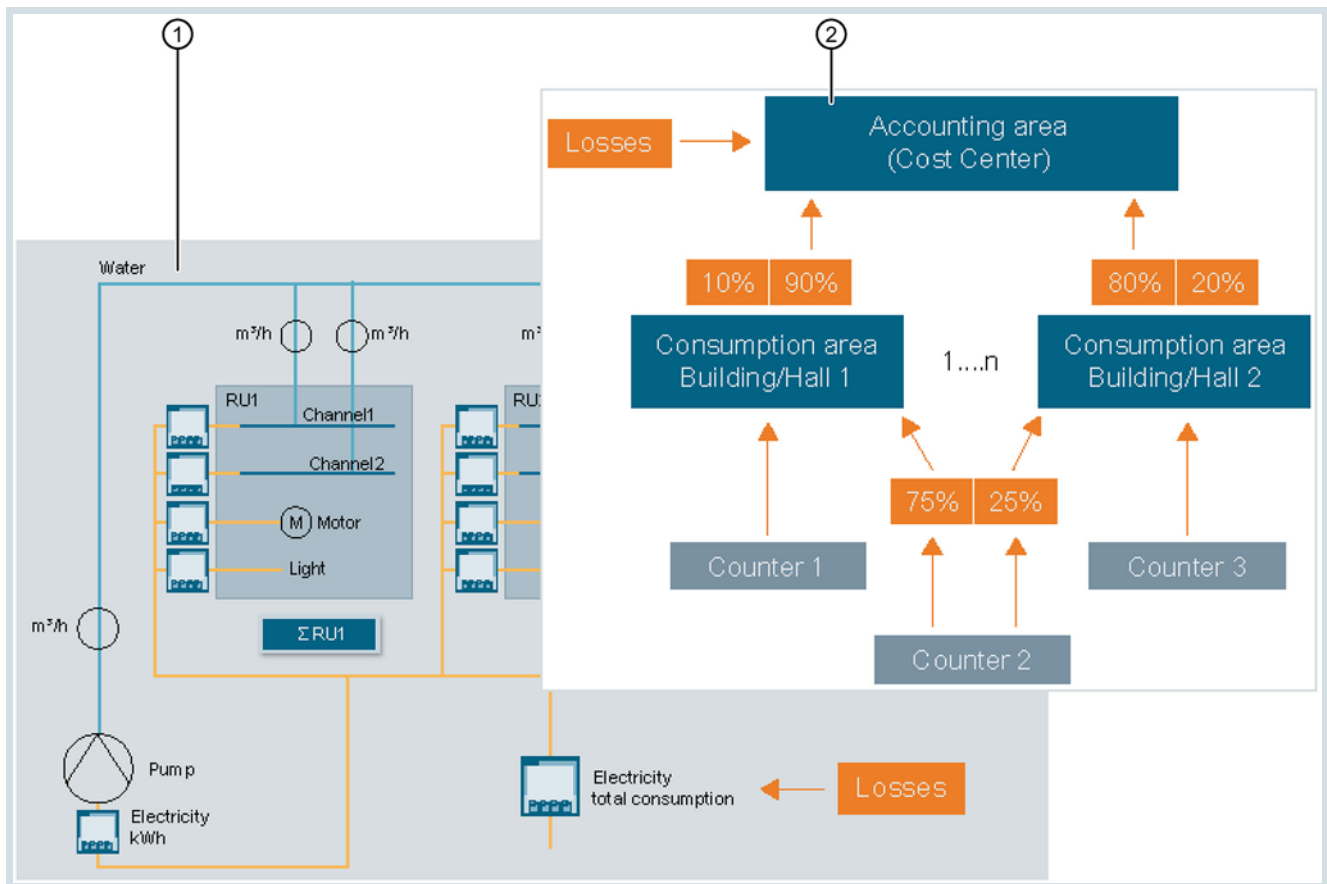
① Calculation of consumption data of individual media. Energy requirements and losses are also calculated and apportioned according to energy consumption.

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

PAYG

Introduction

PAYG is usually allocated according to either cost or consumption:

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

Example of PAYG according to consumption

The following example shows the consumption of water and power. 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.
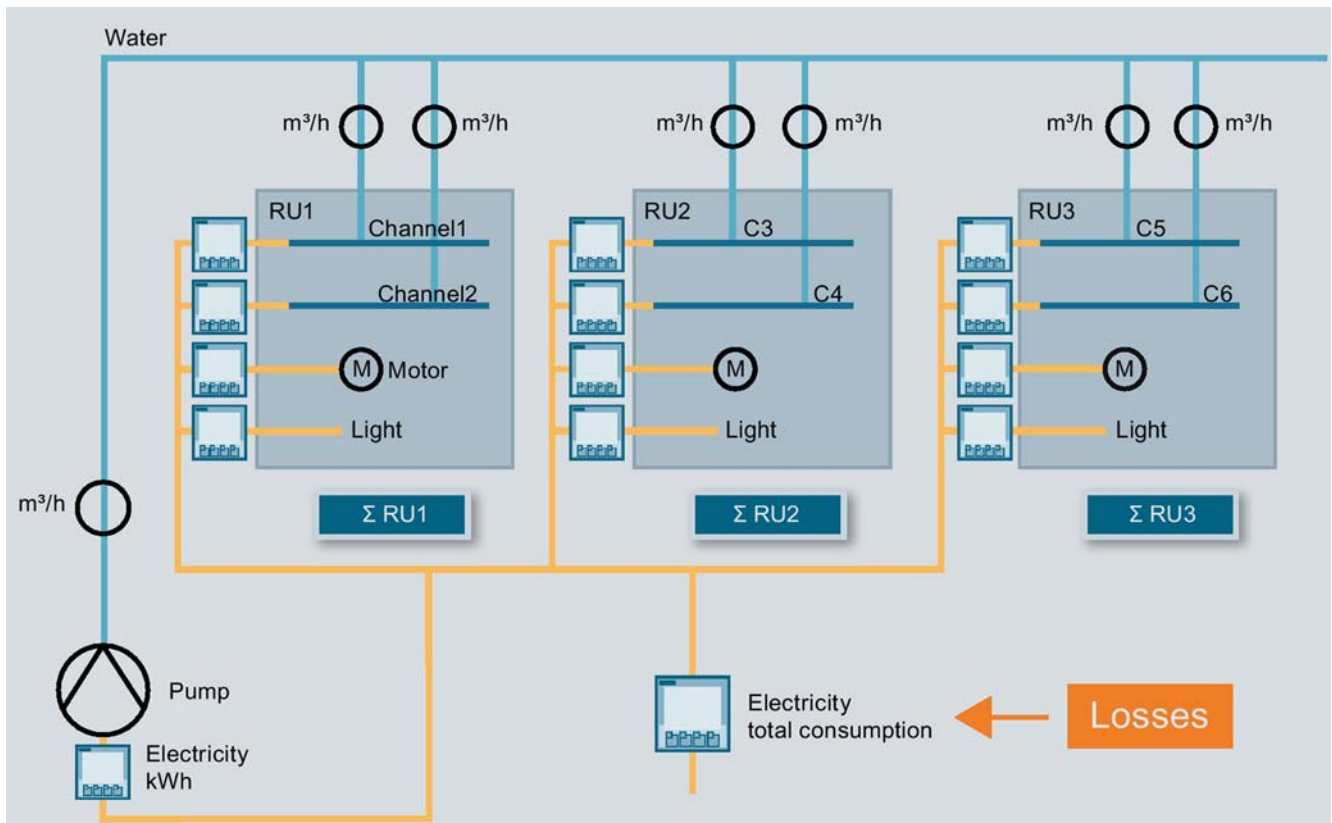
In the report, Energy Manager provides an exact breakdown according to media and the plant components. The resulting costs can be easily determined based on the consumption figures.

SIEMENS — Costs Overview

Author: SIEMENS
Period: 1/1/2015 To 2/1/2015
Date: 2/5/2015 7:44:07 AM

| SIEMENS	Energy Costs	total costs 70,829,424 €	Unit	Administration building	Tank farm	Water treatment	Production 1	Production 2	air decomposer	Rest
CC 100% measured										
Electrical Energy	absolut	57,464,656	€	5,737,315	2,392,838	1,464,065	17,385,802	19,215,889	10,161,547	1,107,199
81.13%	percentage			10.0%	4.2%	2.5%	30.3%	33.4%	17.7%	1.9%
Technical Heat	absolut	11,311,006	€	621,873	160,079	3,196,412	4,305,899	2,193,153	48,688	784,903
15.97%	percentage			5.5%	1.4%	28.3%	38.1%	19.4%	0.4%	6.9%
Room Heat	absolut	1,630,400	€	1,061,127	11,576	308,657	85,811	62,658	5,065	95,506
2.30%	percentage			65.1%	0.7%	18.9%	5.3%	3.8%	0.3%	5.9%
Natural Gas	absolut	17,600	€	1,760	1,467	1,760	3,755	2,933	2,933	2,992
0.02%	percentage			10.0%	8.3%	10.0%	21.3%	16.7%	16.7%	17.0%
Sum Rest I	absolut			338,402	59,718	238,872	597,180	557,368	199,060	1,990,599
Staff Factor I	percentage			17%	3%	12%	30%	28%	10%	
CC <100% measured										
Compressed Air	absolut	131,940	€	397	26,438	39,681	19,345	19,841	19,841	6,399
0.19%	percentage			0.3%	20.0%	30.1%	14.7%	15.0%	15.0%	4.8%
Portable Water	absolut	28,917	€	53	1,285	3,909	9,639	12,852	129	1,051
0.04%	percentage			0.2%	4.4%	13.5%	33.3%	44.4%	0.4%	3.6%
Waste Water	absolut	244,906	€	2,675	2,666	210,461	7,786	11,542	7,594	2,182
0.35%	percentage			1.1%	1.1%	85.9%	3.2%	4.7%	3.1%	0.9%
Sum Rest II	absolut			258,778	159,248	497,650	398,120	398,120	278,684	9,632
Staff Factor II	percentage			13%	8%	25%	20%	20%	14%	
Total Sum	absolut	70,829,424	€	8,022,381	2,815,314	5,961,467	22,813,334	22,474,356	10,723,539	
	percentage			12.44%	48.31%	16.22%	10.03%	3.91%	4.12%	

Example of PAYG by costs

In the following example, the energy consumption of two factory halls is broken down based on cost center. Counters 1 and 3 are installed in the factory halls. Counter 2 is mounted on the main distributor, which supplies both factory halls with electricity.

The distribution keys are often specified by management and are subject to change during the course of a business year. Energy Manager saves changes to the calculation logic automatically. Access to existing distribution keys is possible at any time.
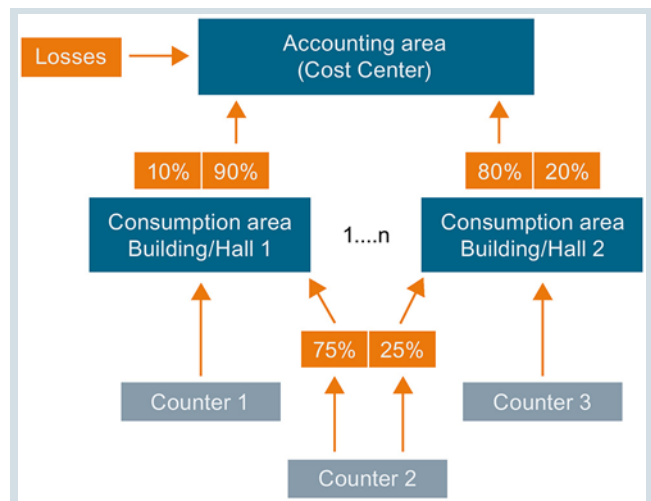
For various reasons, not all consumptions are acquired. The missing consumptions are proportionally assigned to the individual cost centers with the help of a correction factor.

In the report, Energy Manager provides a detailed breakdown of the costs for the two factory buildings depending on the distribution keys, such as the monthly consumption.

Accounting

Author: SIEMENS

Period: 1/1/2015 To 2/1/2015
Date: 2/5/2015 2:21:38 PM

Balance

Consumption Hall 1	kWh	2,050,058
Consumption Hall 2	kWh	1,949,668

Consumption distribution hall 1

Description	Unit	Value	Cost-Center
correction factor		1.0977	
counter sum	kWh	2,050,058	
counter sum corrected	kWh	2,250,409	
40.4	kWh	909,165	CC 3232
24.4	kWh	549,100	CC 3244
35.2	kWh	792,144	CC 5554

Consumption distribution hall 2

Description	Unit	Value	Cost-Center
correction factor		1.1104	
counter sum	kWh	1,949,668	
counter sum corrected	kWh	2,164,900	
25	kWh	541,225	CC 3232
50	kWh	1,082,450	CC 3244
25	kWh	541,225	CC 5554

Export of the Data to ERP

SIMATIC Energy Manager PRO provides the data of one or more cost centers via an XML file for an ERP system, such as SAP. To use the XML file in the ERP system, the XML file must be converted into a compatible format.
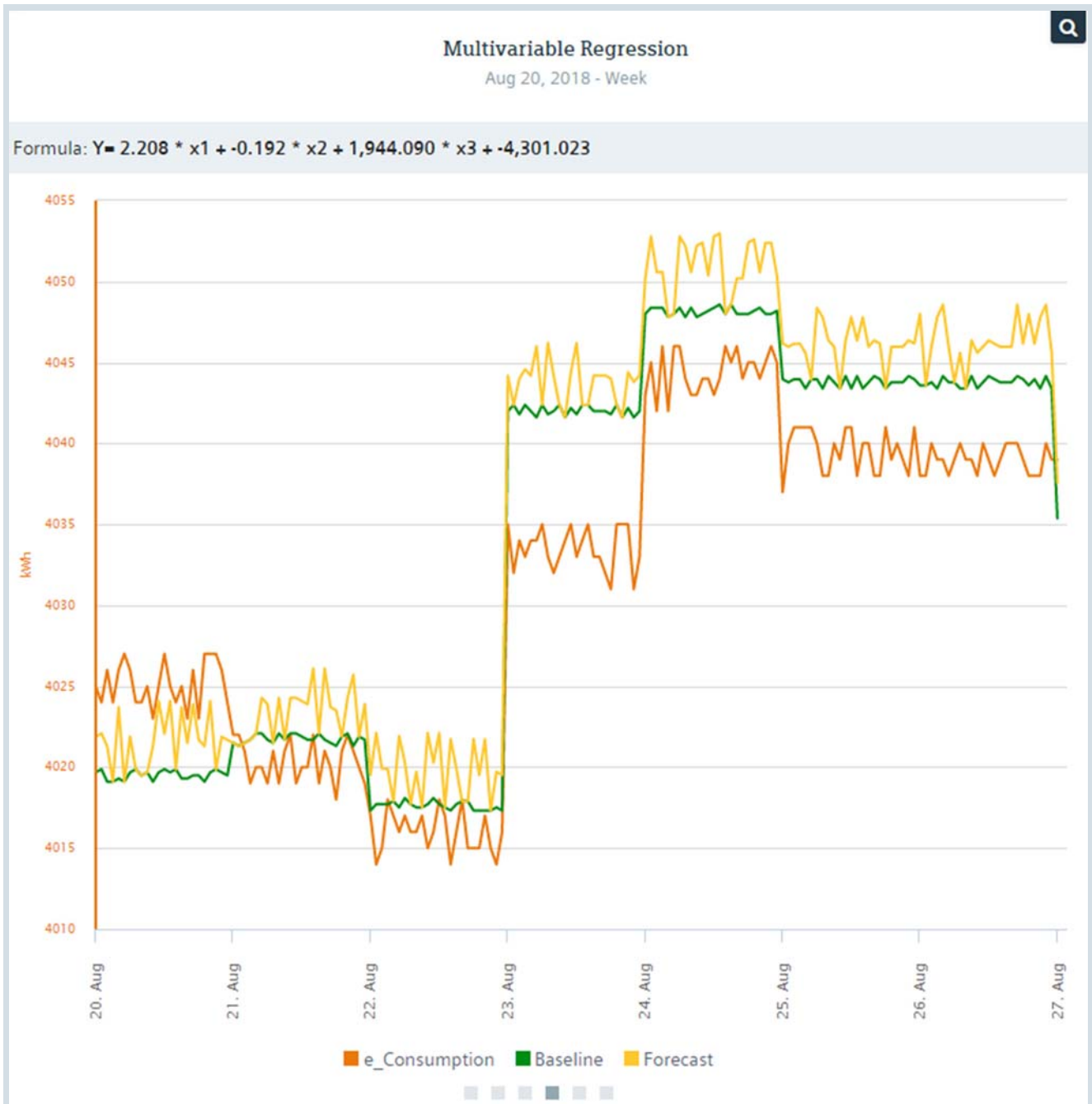
Configure the data required for SAP such as source cost centers, destination cost center, activity type and domain in the Energy Manager PRO Client.

Baseline management

The ability to calculate performance indicators is a core task of an energy data management system. However, even if performance indicators are available, the user often still has to interpret them.

With baseline management, a model is formed based on historical data, which can calculate a theoretical energy consumption (baseline) at any time.

This theoretical energy consumption serves as a default value for energy monitoring or energy controlling. Thus, it is possible for the user to recognize at any time whether the actual energy consumption is above or below the calculated theoretical consumption. If the cumulative deviation of these two values over time is examined, it is possible to recognize whether the efficiency of a plant has deteriorated.

Multivariable Regression
Aug 20, 2018 - Week

Formula: $Y = 2.208 * x1 + -0.192 * x2 + 1,944.090 * x3 + -4,301.023$

Implementation in Energy Manager

The baseline management in Energy Manager consists of two phases:

1. Analysis of data in a past time period

2. Determination of the baseline based on the current actual energy consumption

In the analysis phase, the relationship between the actual energy consumption of a plant and the parameters that influence the energy consumption is established with the help of a regression analysis. The result is a mathematical model that can be used to calculate the theoretical value for the energy consumption.

In baseline management the mathematical model is applied to the current ACTUAL energy consumption, and the current theoretical energy consumption calculates the baseline. The baseline and the real ACTUAL energy consumption can then be compared with each other.

Baseline management is implemented using the "Multi-variable regression analysis" widget. Alternatively, baseline management in the Energy Manager PRO Client can also be implemented conventionally using performance indicators and parameters in a chart, and the results are output in a report.

See also

Multi-Variable Regression Analysis (MV.RA) (Page 68)

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SIMATIC Energy Manager V7.2 system description 43

Planning and Prediction

Basics of Planning and Projection

Introduction

Planning and prediction are preconditions for effective and sustainable energy management. Sustainable energy management is enabled through the accurate forecast of the energy demand and the load curve for one or more sites, buildings, production areas or individual consumers.

The **exact planning of the energy requirement** for a specific time period returns procurement benefits due to the tiered tariff systems of the energy providers. A financial benefit can be achieved under the following circumstances:

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

With Energy Manager you 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 prediction methods can vary in different equipment units: An energy management system must have different methods for predicting; only then are accurate predictions possible.

- In a pulp mill, for example, predictions are usually made based on production quantities. The shredder and waste paper units are only in operation as required, which is why forecasting is based on production plans.
- By contrast, shift schedules are used for predictions in the automotive industry.

Implementation in Energy Manager

Energy Manager supports the following methods for planning and forecasting:

- Linear regression analysis: In the "Multi-variable regression analysis" widget or in the chart of the Energy Manager PRO Client
- Production plans: With SIMATIC Energy Manager PRO Planning & Forecast option
- Comparison days and shift model: Only in the Energy Manager PRO Client

The forecasts can be compared with the actual data in future analyses.

See also

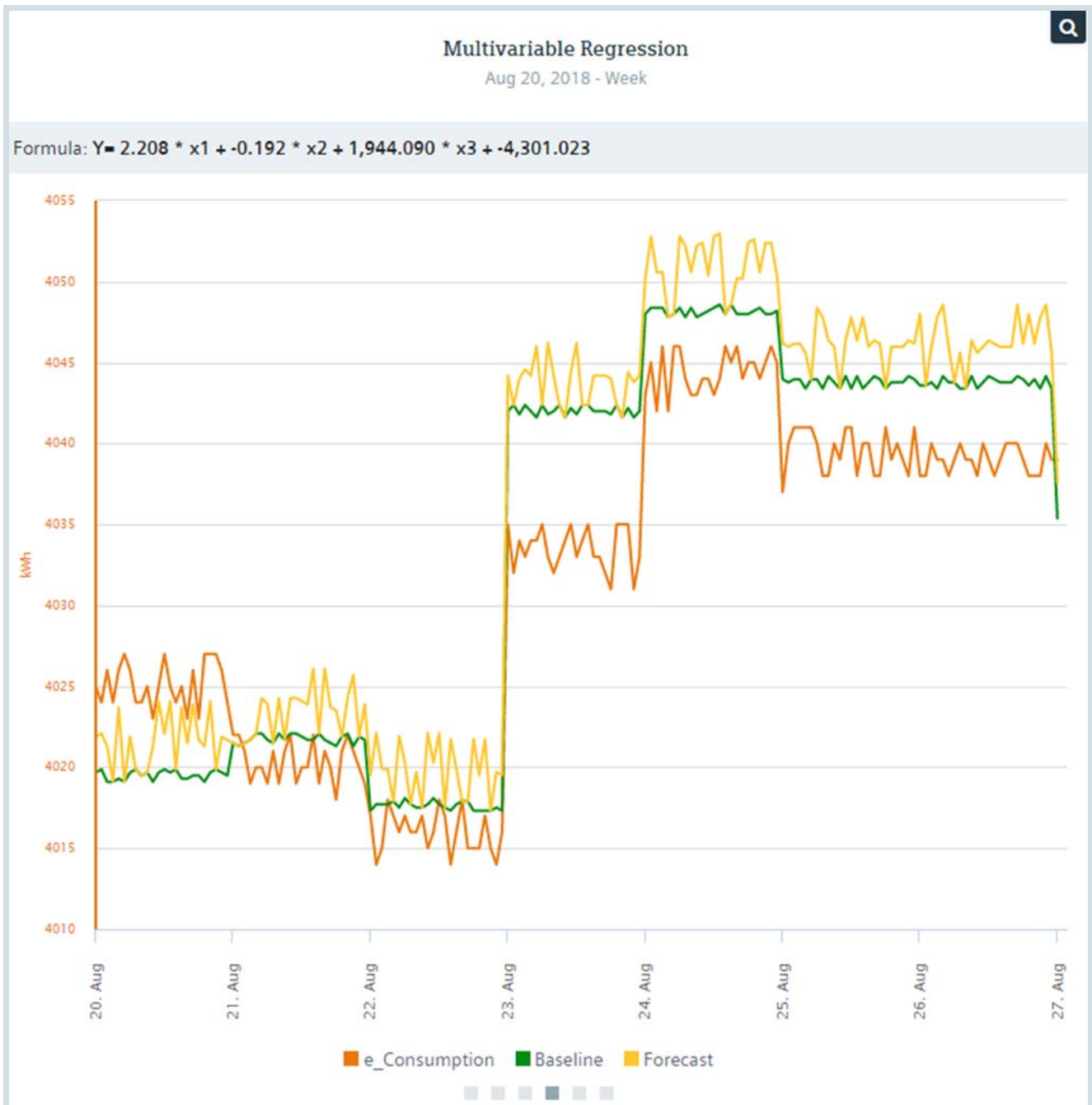**Prediction based on regression analysis**

Introduction

In forecasting based on regression analysis, only the total energy consumption of the overall production is determined. There is no breakdown of the amount of energy consumed by the individual products.

Implementation in Energy Manager

Forecasting based on the regression analysis is implemented as in baseline management with the "Multi-variable regression analysis" widget. The only difference is that in the forecast based on regression analysis, the mathematical model from the analysis phase is applied to future planned values. In the forecast based on regression analysis, the same parameters that influence the current energy consumption also influence the future energy consumption.

Multivariable Regression
Aug 20, 2018 - Week

Formula: $Y = 2.208 * x1 + -0.192 * x2 + 1,944.090 * x3 + -4,301.023$

Alternatively, forecasting based on regression analysis in the Energy Manager PRO Client can also be implemented conventionally using performance indicators and parameters in a chart, and the results are output in a report.

See also

Prediction based on production plans

The production planning-based forecasting method is based on the results of the batch analysis in which you determine the material characteristic via the regression analysis $y = k \cdot x + d$. This requires that a stable relationship exists between the energy consumption and quantity/amount being produced.

You obtain the values for k and d from a batch analysis (material characteristic), x stands for the quantity/amount. y is the future energy consumption.

The production plan defines which product is produced and in which quantity. For each product, corresponding product parameters (k and d value) are defined for each medium. Energy Manager PRO also supports you in calculating the product parameters. Based on the amount to be produced and the duration, you can also determine the amount produced per hour.

The production plan is made available with the SIMATIC Energy Manager PRO Planning & Forecast option.

Implementation in Energy Manager PRO

You define the production plan either directly in the Energy Manager PRO Client or by means of a predefined MS Excel file.

See also

Prediction based on shifts

Forecasting based on shifts or the comparison day principle uses shifts or type days that are analyzed over a reference time period from the past, such as a quarter. In this analysis phase, you determine the average energy consumption per shift or day at a user-definable cycle, for example, 15 minutes or 1 hour.

The energy demand is calculated depending on the scheduled type days and associated plant operating times.

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

Type days are usually 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.

You can always keep the forecasts up-to-date with the help of a calendar, for example, by changing the type days or by moving them to other days of the week.
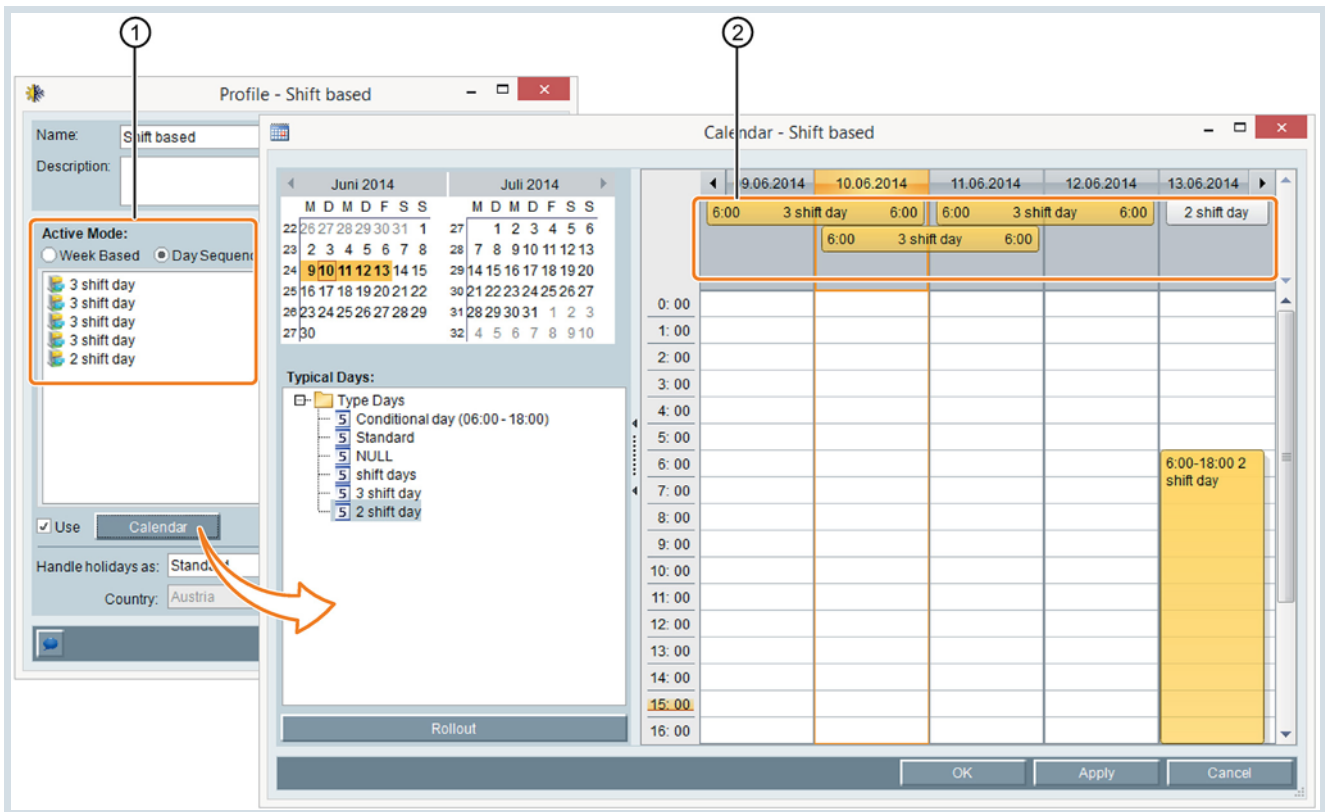
① Profile definitions based on a calendar week with predefined type days.

② Calendar for clear display and adjustment similar to the MS Outlook calendar management.

To provide a uniform basis for comparison, the forecast result can also be corrected to compensate for production data or temperature effects. The evaluation of the prediction quality – the comparison with the actual data – concludes the prediction. The result can affect the next prediction.

Implementation in Energy Manager PRO

You define comparison days and shift models directly in the Energy Manager PRO Client by creating shifts, type days and profiles.
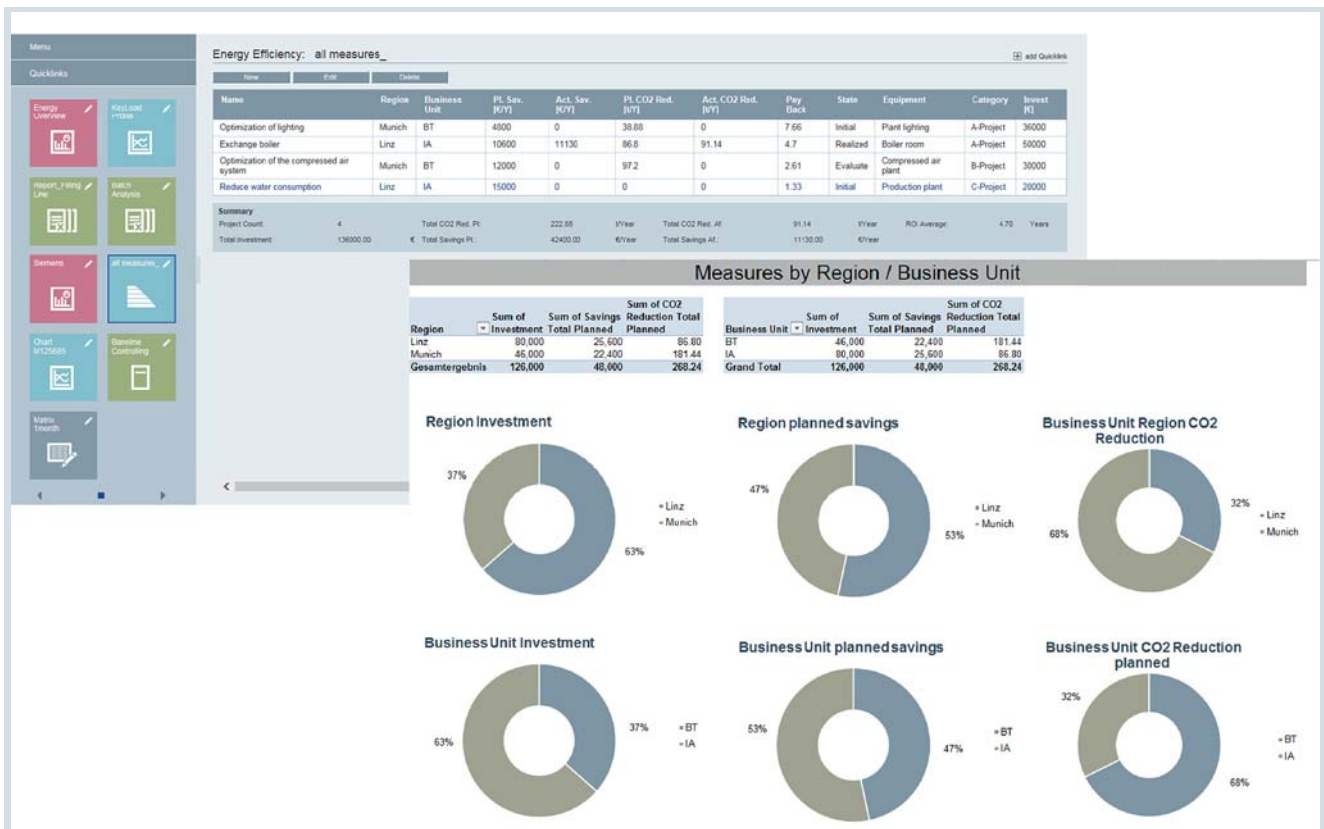
See also

Management of energy efficiency measures

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.

One task of the energy manager is to display the estimated saving potential. With consumption and costs, emission savings are also a relevant factor. For a cross-location analysis, it is therefore often necessary to evaluate measures separately according to locations or business units.

Energy Manager PRO is the tool for meeting the increased requirements: With Energy Manager PRO, the planned energy efficiency improvement measures are entered directly in the Energy Manager PRO Web or in the Energy Manager PRO Client. The automatic reporting of Energy Manager PRO ensures the easy-to-understand, cross-location display of planned energy efficiency improvement measures.

See also

Energy efficiency measures (Page 80)

Implementation in Energy Manager

Views on energy efficiency measures

Depending on their roles in the company, only certain aspects of the planned energy efficiency measures may be relevant to the persons responsible. Examples are the planned CO2 reduction or the payback period.

In order to hide measures that are not relevant for the user, filters (referred to as views) can be created.

The filter options that can be combined include, for example:

- Payback period
- Status
- Region or Business Unit
- Planned savings
- Planned CO_2 reduction
- Planned investment costs

Evaluating Measures

A predefined module of the automatic reporting of Energy Manager PRO is available for evaluating the energy efficiency measures. The energy efficiency measures can therefore be presented in table. The reports are based on the views created of the energy efficiency measures.

Energy Efficiency Project Management

Author:	siemens						Period:	1/1/2015		1/2/2015			
							Date:		2/5/2015 08:35 AM				

Energy Efficiency Measures

Project Name	Category	Savings Total Planned [EUR]	Savings Total After [EUR]	CO2 Reduction Total Planned [t CO2]	CO2 Reduction Total After [t CO2]	Status	Region	Business Unit	Investment [EUR]	Internal Interest	ROI	NPV	Payback
Exchange boiler	A-Project	10,600	11,130	86.8	91.1	Realized	Linz	IA	50,000	0.1%	4.25	94,756	4.70
Optimization of lighting	A-Project	10,400	0	84.2	0.0	Initial	Munich	BT	36,000	0.1%	2.86	63,903	3.50
Optimization of the compressed air system	B-Project	12,000	0	97.2	0.0	Evaluate	Munich	BT	10,000	0.1%	17.25	91,273	0.87
Reduce water consumption	C-Project	15,000	0	0.0	0.0	Initial	Linz	IA	30,000	0.1%	5.00	115,826	2.00

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.
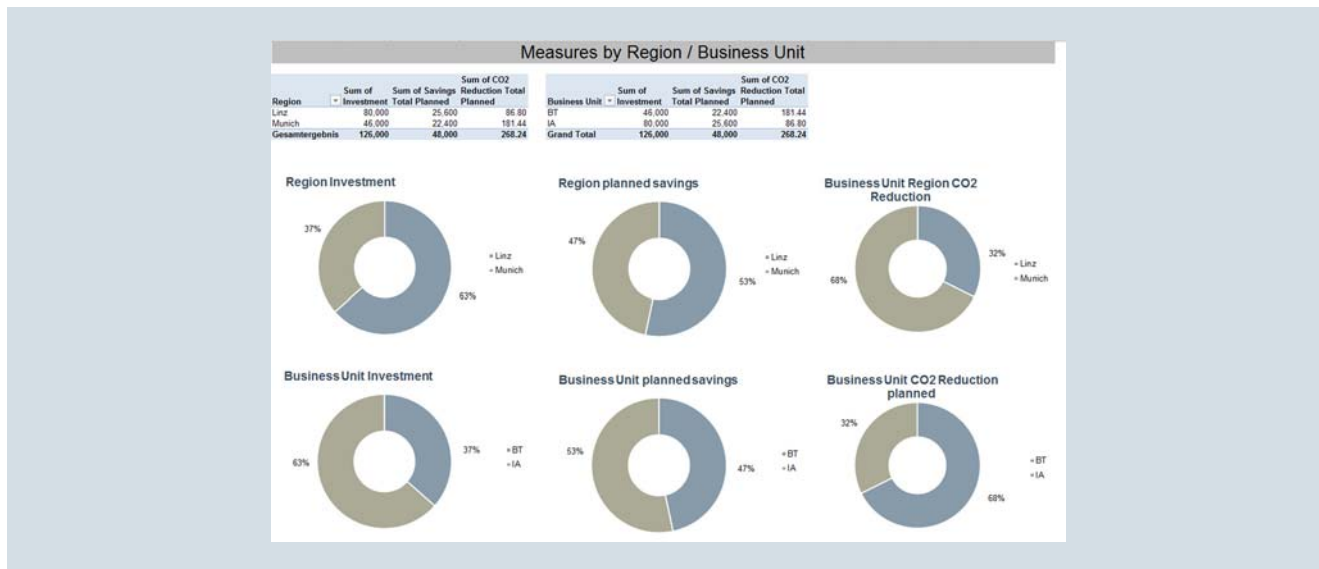
Another evaluation method is the prioritization of energy efficiency measures based on predefined categories. Based on factors such as investment, planned savings and CO_2 reductions, the results may vary greatly - but there may also be some potentials.

Data provider

You can make the data points in your Energy Manager system accessible to other programs and systems. In Energy Manager, you make the data points available via an OPC UA server. The OPC UA server is configured via the Energy Manager Web Client.

Security

You can ensure the security of the provided data with various options.

Various security profiles are available to ensure connections with the OPC UA server:

- Basic 128 RSA 15
- Basic 256

You can also select the "Enable user name user identity" option. If this option is selected, only users who identify themselves as users of their Energy Manager system on the OPC UA server can access the data points.

In this case, the OPC UA server only provides the user with the data points that the user can view in Energy Manager.

SIMATIC Energy Manager Web Client

Comparison Energy Manager Basic with Energy Manager PRO

The Energy Manager Web Client is a browser-based user system of the SIMATIC Energy Manager energy data management system. SIMATIC Energy Manager Basic is a version of Energy Manager PRO Web (Energy Manager Web Client of the Energy Manager PRO) with limited functionality.

The following table gives you an overview of the available functions or restrictions in Energy Manager Basic compared to Energy Manager PRO Web:

Note:
Entries in the Energy Manager Basic column also apply to Energy Manager PRO and are not explicitly listed again.

Function	Energy Manager Basic	Energy Manager PRO Web
Energy efficiency measures	Not available	Creating an energy efficiency measures object Creating and evaluating new energy efficiency measures Generating reports with EE measures
Widgets	All widgets except "Map" and "Multi-variable regression analysis" widget	All widgets including "Map" and "Multi-variable regression analysis" widget
Data sources	An automatically pre-installed data source (acquisition object)	Option to create new data sources
Data channels/interfaces	Creating new interfaces of the type: ■ OPC UA, OPC HDA, OPC DA ■ WinCC ■ Energy Suite ■ Modbus ■ Desigo CC ■ ASCII	Creating additional interfaces, e.g.: ■ Machines ■ sFTP, FTP ■ S7 You can find additional information about the various interfaces in the manual "SIMATIC Energy Manager PRO V7.2 - Operation".
File management	Not available	Adding external files Option to download files from and upload files to the Web Client
Authorization concept	Creating new users and assigning these users to predefined user groups Defining the authorization level when creating new folders	Creating new domains, user groups and functional groups Managing assigned rights
Reports	Creating new reports using five predefined report templates	Creating new reports using all available report modules
Data points	Creating external and manual data points	Creating derived data points and data points of the type "Constant"
S7 Energy Efficiency Monitor	Not available	Connection of the S7 energy efficiency monitor over the machine interface
Planning and forecast	Not available	Forecast based on production plans and shifts
Login	Login with user name and password	Login via "Single Sign On" is possible

You can find additional information on the functionality of Energy Manager Basic and PRO in the user manual "SIMATIC Energy Manager Basic/PRO V7.2 - Operation".

Access to the Energy Manager Web Client

The Energy Manager Web Client can be opened via any standard Internet browser. After entering the URL, the input screen of the Energy Manager Web Client opens.

Users log in to the Energy Manager Web Client with their Energy Manager user name and password. This ensures that only authorized users log in:

General Functions

Energy management made easy This was the motto behind the development of the Energy Manager Web Client and its functions such as the widget dashboard.

After login to Energy Manager Web Client, you are taken directly to the home page defined for you. In Energy Manager Basic each logged in user has the same home page. In Energy Manager PRO Web you provide contents of the Energy Manager PRO Client selected via the Internet / intranet to a predefined group of users, such as the energy manager of individual production areas or to an operator, who enters the measurement data.

A widget dashboard is frequently displayed after the login because it quickly provides an overview of the energy situation of the company.

Navigation

In general, different navigation options are available. In the window pane on the left (navigation area), the available objects are shown either as so-called Quicklinks or as elements in a tree topology. For daily work, the quick links are very helpful because you can retrieve the desired information with a single click. You can create a quick link to reports, charts or dashboards and use them to directly call the corresponding object. The window pane on the right (detail area) displays detailed information of the selected object.

① Navigation area

In the navigation area, select the objects you want to view or edit. Use the menu or quick links to navigate. The navigation options available depend on your user rights.

② Detail area

In the detail area, widget dashboards and objects such as reports or charts are displayed. The selection in the navigation area determines which objects are displayed.

The widget dashboard offers another navigation option in which you can switch between dashboards.

Tasks

You use the Energy Manager Web Client for the following tasks:

- Create and configure dashboards
- Create and configure reports and start new reports
- Create charts and configure charts
- Create and configure manual data acquisition (matrix)
- Create and configure folders

- Customize system structure
- Access documents and upload new documents to the Energy Manager database (Energy Manager PRO)
- Create, edit and view energy efficiency measures
- Create and configure data sources, data points, parameters and key performance indicators
- Configuring your Energy Manager system settings
- Configuration of the OPC UA server for providing the Energy Manager data points

Editing mode

Manage the system structure of your Energy Manager Web Client in editing mode. The editing mode includes the shortcut menu and the configuration tools.

Shortcut menu

You create folders and analysis objects using the shortcut menu. The following objects, including folders, are analysis objects:

• Dashboards
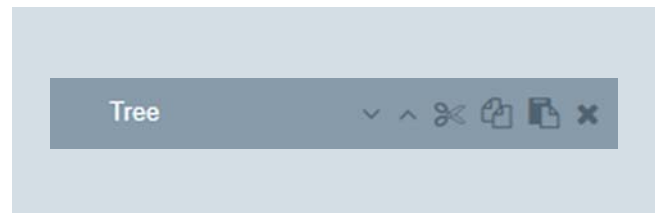• Reports
• Charts
• Matrices
• Folders

To configure the analysis objects, an edit symbol is displayed in edit mode instead of the shortcut menu symbol.

Configuration tools

Move and structure the objects as you wish using the configuration tools. The following functions are available:

• Move up and down
• Cut
• Copy
• Paste

Widget dashboard

Data analysis in the widget dashboard

Plant and measurement data are visualized in the widget dashboards via so-called widgets. To present a desired infor-mation at a glance, the existing widgets can be used in the widget dashboard, depending on the application. You have the option of connecting or linking individual widget dashboards (e.g. location-specific dashboards) to switch between dashboards with just one click.

An analysis function is integrated in the widgets that display values. Because the analysis requires a certain amount of space, the widgets offer a zoom function for the desired object (magnifying glass symbol in the upper right corner). Next to the magnifying glass symbol you can see the link symbol that you use to switch to another widget dashboard.

The same analysis information is available for each type of widget that displays performance indicators or time series as is shown in the figures below based on the Chart widget.
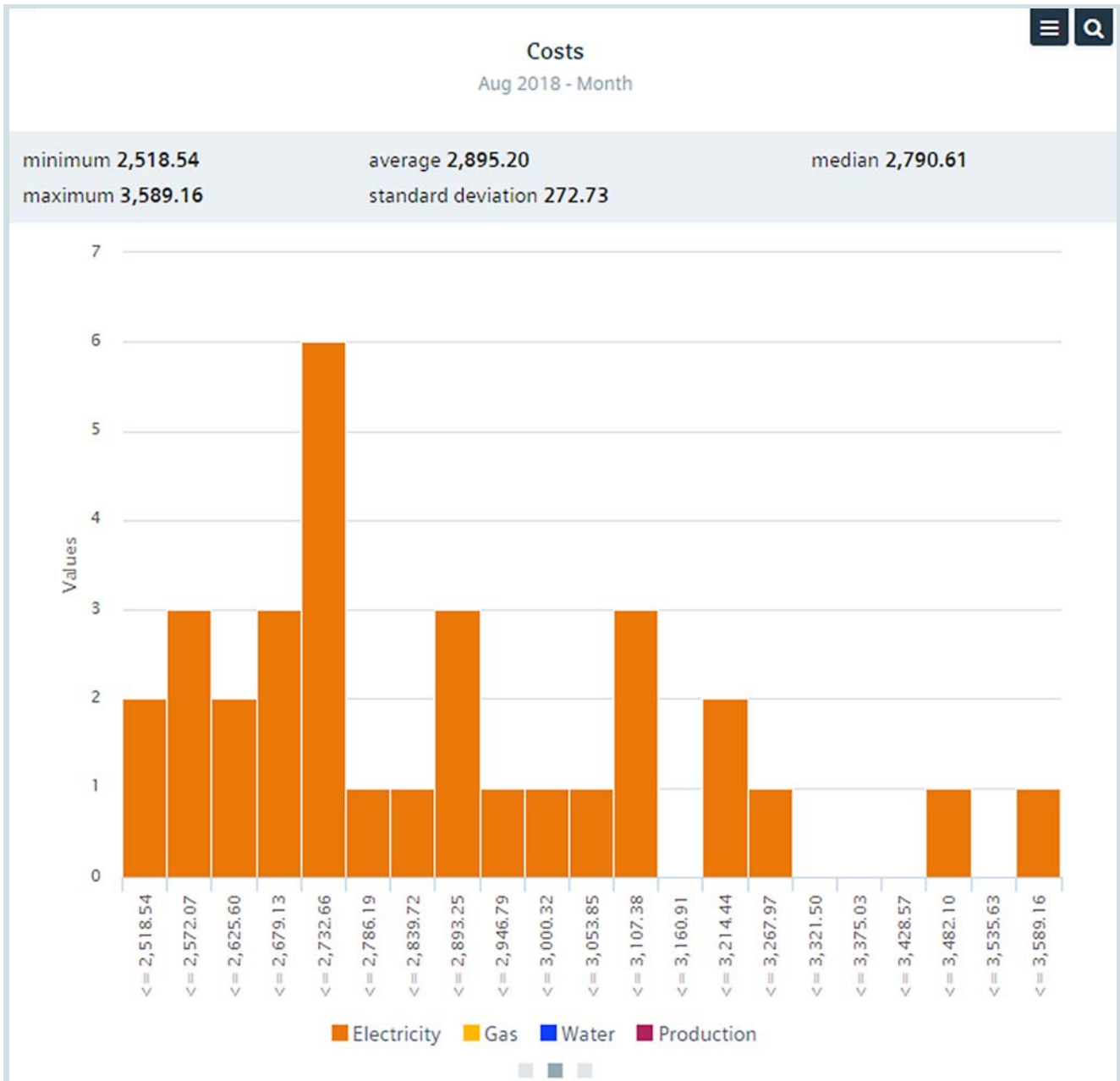
The first available analysis is the frequency distribution (histogram). Here, the difference between the minimum and maximum value of the data point during the analyzed period is divided into 20 areas of equal size, and the number of values is determined for each area.

The following statistics information is also displayed: minimum, maximum, mean, median and standard deviation. The median is determined by sorting the time series by magnitude. The value in the center represents the median. The standard deviation provides you with information on the size of the dispersion of the value. If the consumption is almost constant, the standard deviation is also very low. If consumption fluctuates strongly, the standard deviation is also large.

If multiple data points are configured in a widget, you can switch to the frequency distribution of the desired data point with a single click on the legend.

Costs
Aug 2018 - Month

minimum 2,518.54
maximum 3,589.16
average 2,895.20
standard deviation 272.73
median 2,790.61

Electricity Gas Water Production

Widgets that have at least two configured data points offer a second possible analysis - the regression analysis. Here, the values of two data points are shown in an X-Y diagram. The trend line describes the relationship of the two data points, which can also be represented with the formula $y = k \cdot x + d$.

The k factor describes the increase (e.g. how much more electrical energy is needed if one ton more is produced), and the d factor describes the offset, or the consumption occurring without any production (intersection with y axis).

The assignment of data points to the x and y axes can be easily defined with a click on the data point in the legend.

For widgets that display only one value per data point, such as traffic light, gauge or value, the trend of the performance indicator in the selected monitoring period is shown in the second tab. The third tab also shows the histogram of the performance indicator for these widgets.

Added value of the individual widgets

Gauge / Traffic Light

The advantage of a Gauge widget over the Traffic Light is that limits can also be recognized (color change). The limits and colors can be specified during configuration of the widget, whereby data (if present) from the data point configuration is applied.

With the Gauge widget, the minimum and maximum range can be defined, which forms the display limit. For the color change, the Min, Min Warning, Max Warning and Max values from the data point configuration are applied. If no configuration is available, the data point configuration can be entered in the Gauge element.

The arrow to the left of the Gauge shows the tendency of the displayed value. An upward pointing arrow indicates that the value has risen. A downward pointing arrow indicates that the value is less than the previous value. If the arrow points to the right, the value has not changed.

To the right of the Gauge is the unit that is being applied from the data point configuration.

The value is shown below the Gauge. The number of decimal places displayed can be configured.
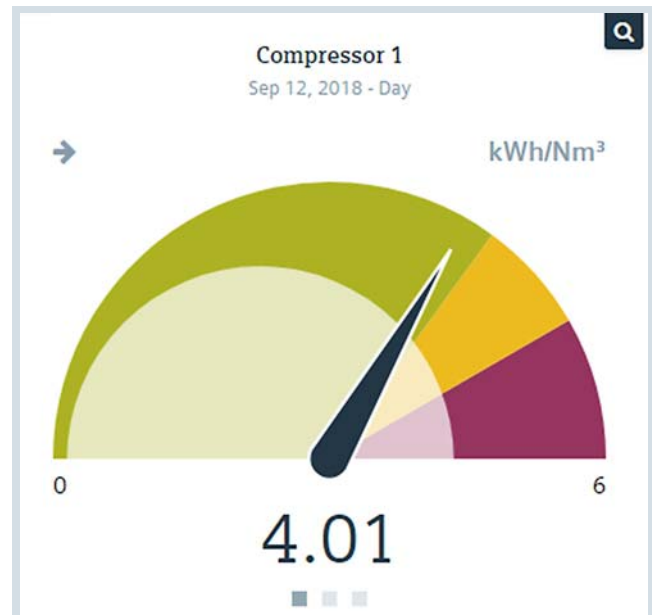
Chart

The widget is particularly useful to display the history of, for example, energy consumption or to recognize relationships.

Additional axes can be created and renamed in the configuration dialog of the Chart widget. It is also possible to specify the value range of the axes.


Up to ten data points on up to five y axes can be displayed simultaneously in the Chart widget. Likewise, the data points for two different time ranges (x axes) can be displayed. Two x axes are used very frequently to compare the current week with the last week.

A zoom function is available: The data can be displayed as a line, bar or area. The histogram (including statistics) and the regression analysis are available in additional tabs. You can also export the widget as an image or export the measurement value series it contains as a CSV file.

Pie chart

A distribution can be easily displayed with the pie chart. The name of the data points or performance indicators can be applied from Energy Manager or changed in the widget. When you click on a segment, this segment is highlighted and the consumption value is displayed. Detailed data and statistics information is available in the other tabs.
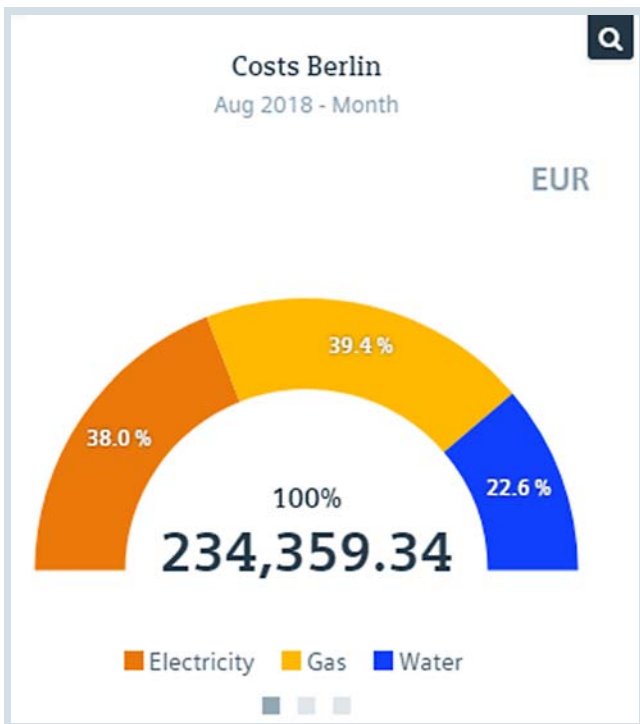
Values

Values can be easily displayed with the Values widget. The name of the data points or performance indicators can be applied from Energy Manager or changed in the widget. Detailed data as well as statistics information and the linear regression analysis is available in the other tabs.
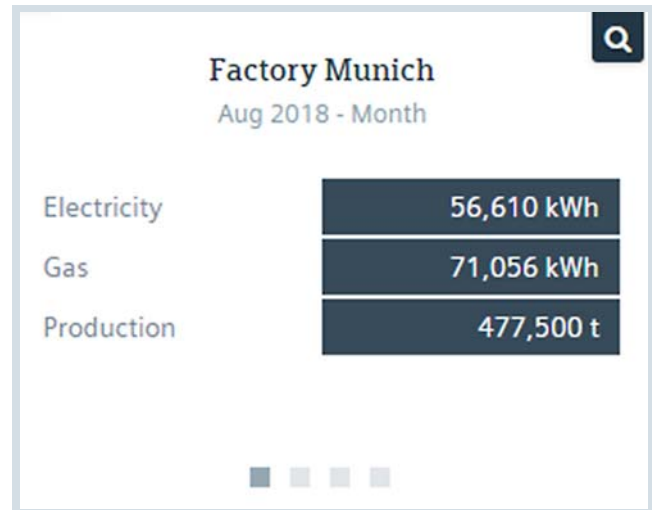
Table

The table is used to display time series with the corresponding values. If not all the values can be displayed at once, the values are available on different pages. If a value is outside its alarm limits, this value is displayed in color. By switching to the next tab you can view the values in the table in a trend, as histogram as well as the linear regression analysis.

| Timestamp	e_Electricity_28 kWh	e_Gas_28 kWh	e_Production_28 t
02/21/2017 00:00:00	2,500.00	1,352.00	8,000.00
02/22/2017 00:00:00	750.00	1,402.00	8,000.00
02/23/2017 00:00:00	2,200.00	1,202.00	7,000.00
02/24/2017 00:00:00	600.00	2,302.00	16,000.00
02/25/2017 00:00:00	1,700.00	2,602.00	18,000.00

Report

So that the user does not have to change to a different view to access an existing report, the report can be called up directly using the Report widget. If multiple query types are configured, the user can select the query types in the widget. The user can change the time period examined with the right and left arrows. If the desired report already exists, the user can easily open the report as an Excel or PDF file. If the report does not yet exist, the user can start the calculation.
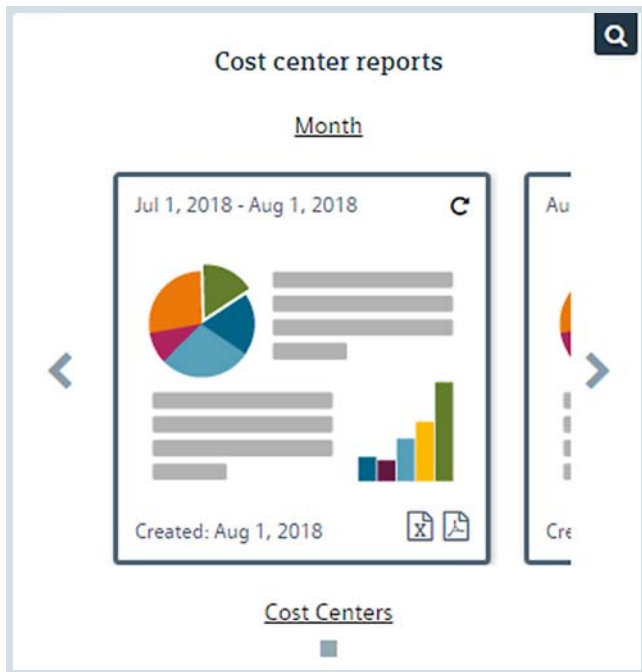
Text / Image

Formatted text can be displayed on the dashboard using the Text widget. Additional hyperlinks can be inserted to go to other web contents.
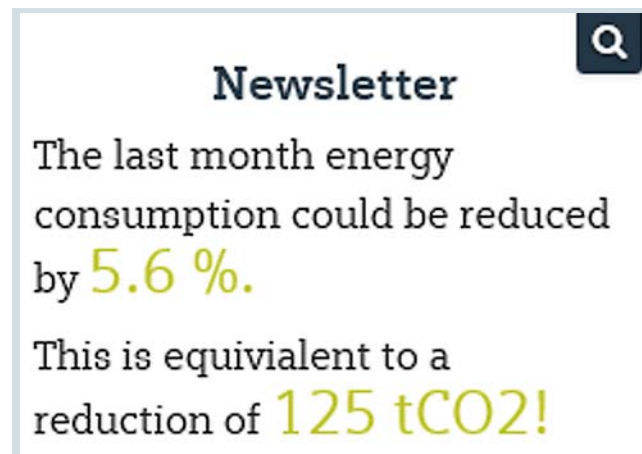
Images can be displayed using the Image widget. If a button is needed, the widget is also used. To place a logo on the dashboard, the Image widget can also be used.

Heatmap

The heatmap is used to visualize the daily recorded data about, for example, a month. Thus, you can easily understand what time of day the maximum and minimum values occur. The display can be optionally configured over 24 hours or over a week.

Consumption Steam
Aug 2018 - Month
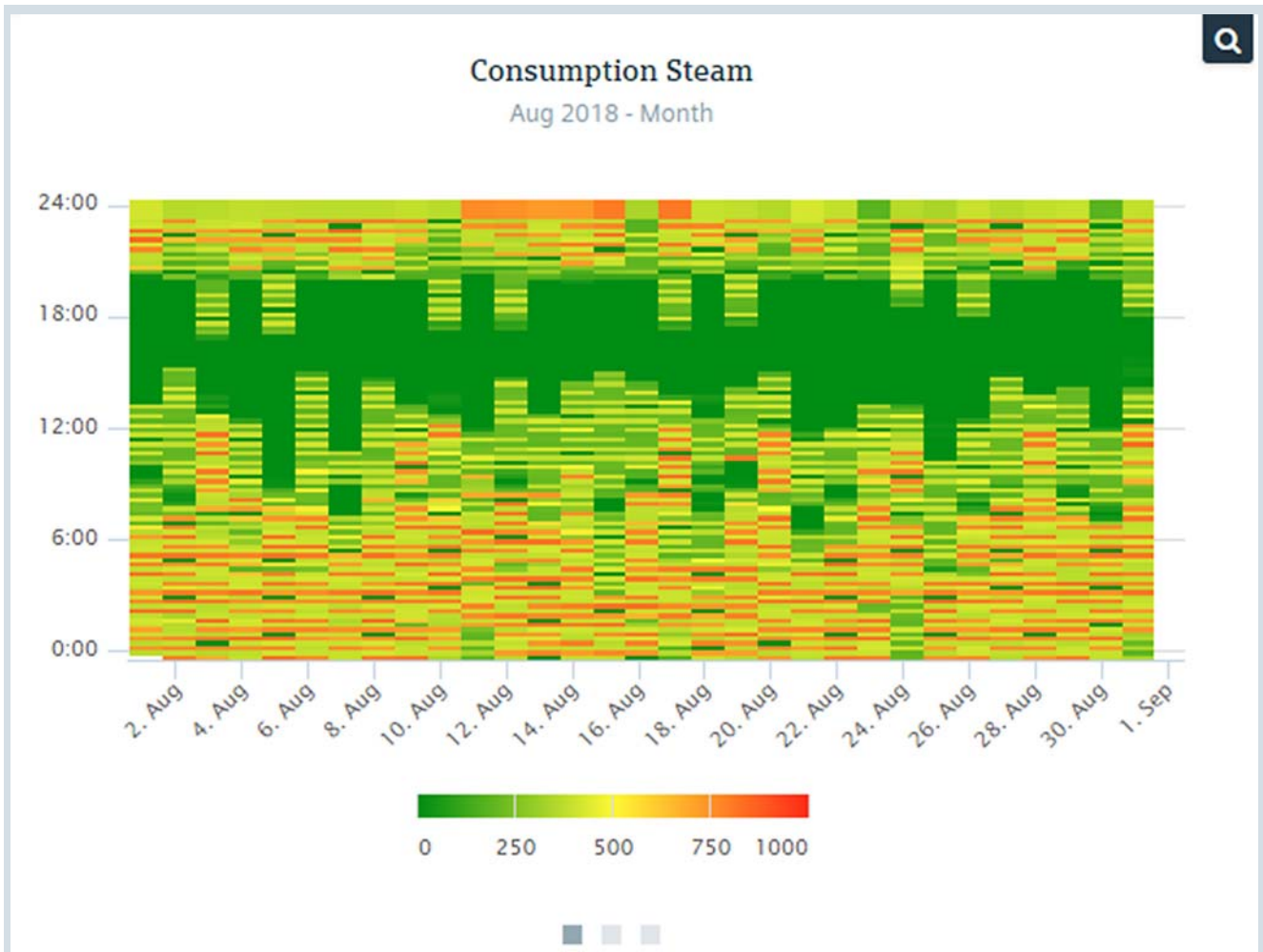
Sankey diagram

The Sankey diagram can be used to show an energy flow diagram, which can be used to create a quick overview of the overall energy situation. In the Sankey diagram, nodes are defined that can be connected via links (data points). On the respective link, a tool tip with the consumption data can be opened by clicking on the tooltip.

In addition to the graphical display, the overview of all of the links with the corresponding values can be displayed in a second view.

Production site - Energy flows

Aug 2018 - Month

Link Name	From Node	To Node	Value	Primary Energy
Net supply	Net Supply	Production	495.654,02 kWh	495.654,02 kWh
Electricity Water Purification	Production	Water Purification	114.616,50 kWh	114.616,50 kWh
Electricity Mixing	Production	Mixing	150.880,06 kWh	150.880,06 kWh
Electricity Filling	Production	Filling	16.064,28 kWh	16.064,28 kWh
Gas Boiler	Gas supply	Boiler	1.068.575,42 kWh	1.068.575,42 kWh
Steam	Boiler	Water Purification	961.347,30 t	961.347,30 kWh
Electricity Chiller	Production	Chiller	252.785,64 kWh	252.785,64 kWh
Produced Energy	PV	Production	61.492,00 kWh	61.492,00 kWh

1 2

In the third display, the user gets an overview of the corresponding nodes with the balance sum of the inputs and outputs, the difference and the relative deviation.

Production site - Energy flows

Aug 2018 - Month

Node Name	Input	Output	Difference	Relative
Net Supply	0,00 kWh	495.654,02 kWh ⓘ	495.654,02 kWh	100,00 %
Production	557.146,02 kWh ⓘ	557.146,02 kWh ⓘ	0,00 kWh	%
Water Purification	1.075.963,80 kWh ⓘ	0,00 kWh	1.075.963,80 kWh	100,00 %
Mixing	150.880,06 kWh ⓘ	0,00 kWh	150.880,06 kWh	100,00 %
Filling	16.064,28 kWh ⓘ	0,00 kWh	16.064,28 kWh	100,00 %
Gas supply	0,00 kWh	1.068.575,42 kWh ⓘ	1.068.575,42 kWh	100,00 %
Boiler	1.068.575,42 kWh ⓘ	961.347,30 kWh ⓘ	107.228,12 kWh	10,03 %
Chiller	252.785,64 kWh ⓘ	0,00 kWh	252.785,64 kWh	100,00 %

1 2

Alarm list

When performance indicators are violated, this is indicated to the user via the alarm list. The user can acknowledge the corresponding messages directly in the widget.

Data points that have violations in the selected time window are listed in the overview display. In addition to the data point identifier, the number of warnings and the number of deviations are also displayed. The user can acknowledge all messages in this overview.

Plant Alarms
2017 - Year

Name	Violation:	Warning:
d_PR_amount_ST_Water_Treatment	40029	
d_PR_cons_E_Water_Purification		3056
a_PR_compressor1_Eff	14	
e_Electricity_01	6	1
e_Gas_01	3	4
e_Electricity_02	4	1
e_Gas_02	3	4

✔ Acknowledge all

Clicking on a data point identifier opens the detail window. The detail window provides the user an overview of the individual deviations. Each individual message can be acknowledged.

e_Electricity_01
Electricity

Acknowledge	Alarm class	Value	Value timestamp	Message	Insert timestamp	Generation timestamp
✔	⚠	2,500	12/22/2017 00:00:00	Value of 2500 violates Upper Limit of 2000.	01/23/2017 16:29:52	01/23/2017 16:29:52
✔	⚠	2,200	12/24/2017 00:00:00	Value of 2200 violates Upper Limit of 2000.	01/23/2017 16:29:52	01/23/2017 16:29:52
✔	❶	2,000	12/27/2017 00:00:00	Value of 2000 exceeds warning Upper Limit of 1800.	01/23/2017 16:29:52	01/23/2017 16:29:52
✔	⚠	2,200	12/28/2017 00:00:00	Value of 2200 violates Upper Limit of 2000.	01/23/2017 16:29:52	01/23/2017 16:29:52
✔	⚠	2,200	12/30/2017 00:00:00	Value of 2200 violates Upper Limit of 2000.	01/23/2017 16:29:52	01/23/2017 16:29:52
✔	⚠	2,300	12/31/2017 00:00:00	Value of 2300 violates Upper Limit of 2000.	01/23/2017 16:29:52	01/23/2017 16:29:52
✔	⚠	2,500	01/01/2018 00:00:00	Value of 2500 violates Upper Limit of 2000.	01/23/2017 16:29:52	01/23/2017 16:29:52

✖ Cancel   ✔ Acknowledge all

Maps

In particular, the Maps widget is well suited for managing multiple locations in a system. The important performance indicators can be called up and the corresponding location dashboards can be linked directly on the map.

The focus of the map is always selected in such a way that all of the locations are visible. The zoom functionality can be used to increase the level of detail.

The Open Street Map is used, which requires an Internet connection.

Note

The "Map" widget is only available in Energy Manager PRO Web.

Multi-Variable Regression Analysis (MV.RA)

The added value of the multivariable regression analysis is that the baseline - the theoretically calculated value of the energy consumption of a plant, for example - can be determined using simple means. Thus, the user is always able to evaluate the current energy situation taking into account the ambient conditions and to take appropriate measures in the case of deviations.

The widget also allows a view into the future. The ability to predict energy needs is indispensable, particularly if the goal is to optimize energy purchasing.

When the energy consumption is significantly dependent upon known variables and the relationship can be determined by a linear regression analysis, the baseline of an energy consumption can be calculated with the widget. If such a relationship exists, this model can be used to calculate the theoretical energy consumption. In addition, the energy consumption can be forecast for the future using the same model. The influencing factors for the future must be available for this.

A deviation of the actual energy consumption from the baseline can be displayed directly in the widget. The deviation can be displayed both as an absolute value and as a cumulative value.

Basically, the multivariable regression analysis widget is an extension of the Chart widget. The functions of the Chart widget are also available in this widget and expanded to include additional analytical options.

The first three tabs correspond to the Chart widget.

The baseline and the actual consumption are displayed in the fourth tab. If forecast is enabled, the forecast based on the forecasted data of the influencing factors is also displayed.
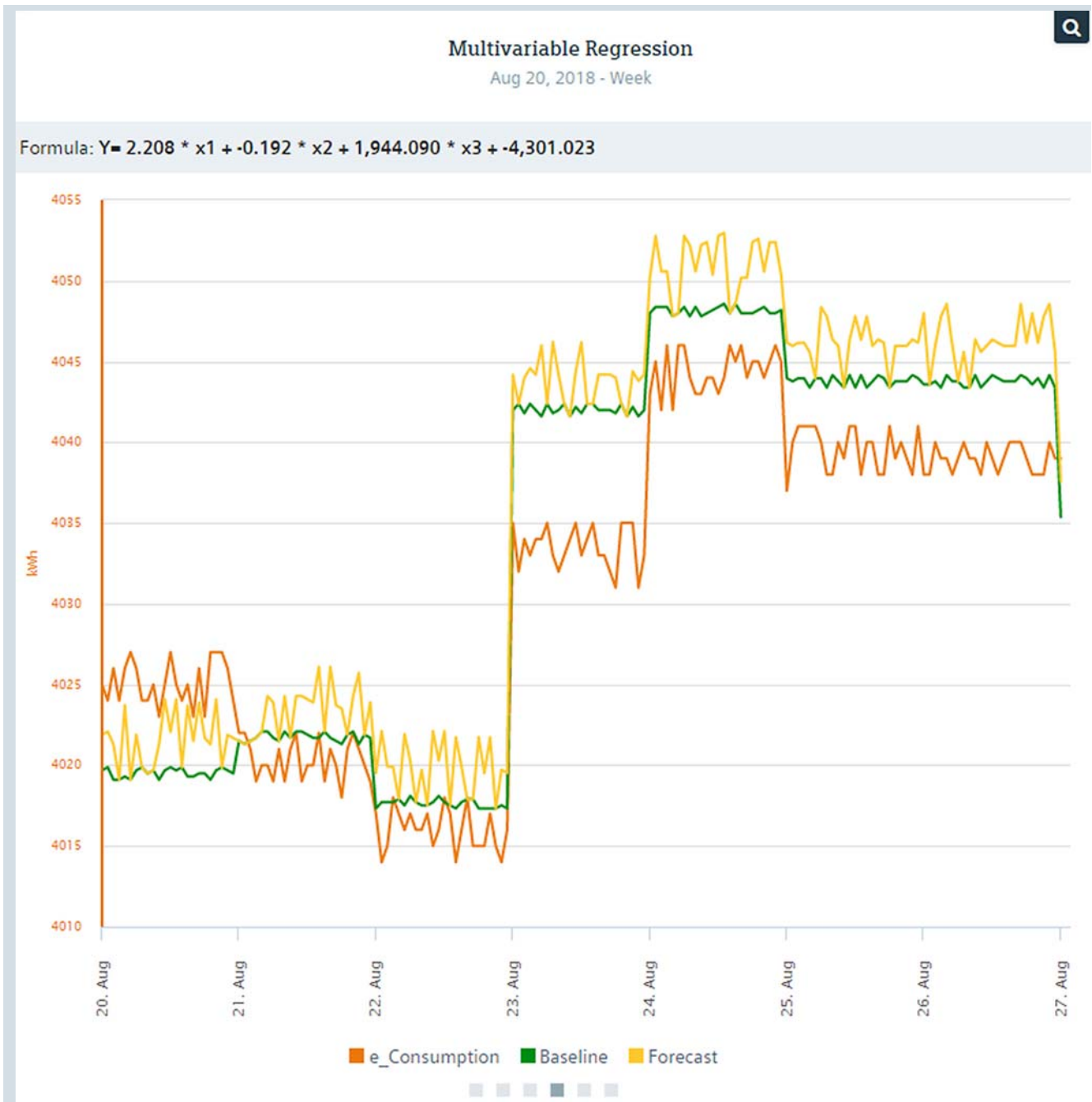
The deviation between the baseline and the actual energy consumption is displayed in the fifth tab. In this tab, too, if the forecast is active, the deviation of the forecast from the actual consumption is displayed.

Multivariable Regression
Aug 20, 2018 - Week

Formula: $Y = 2.208 * x1 + -0.192 * x2 + 1{,}944.090 * x3 + -4{,}301.023$
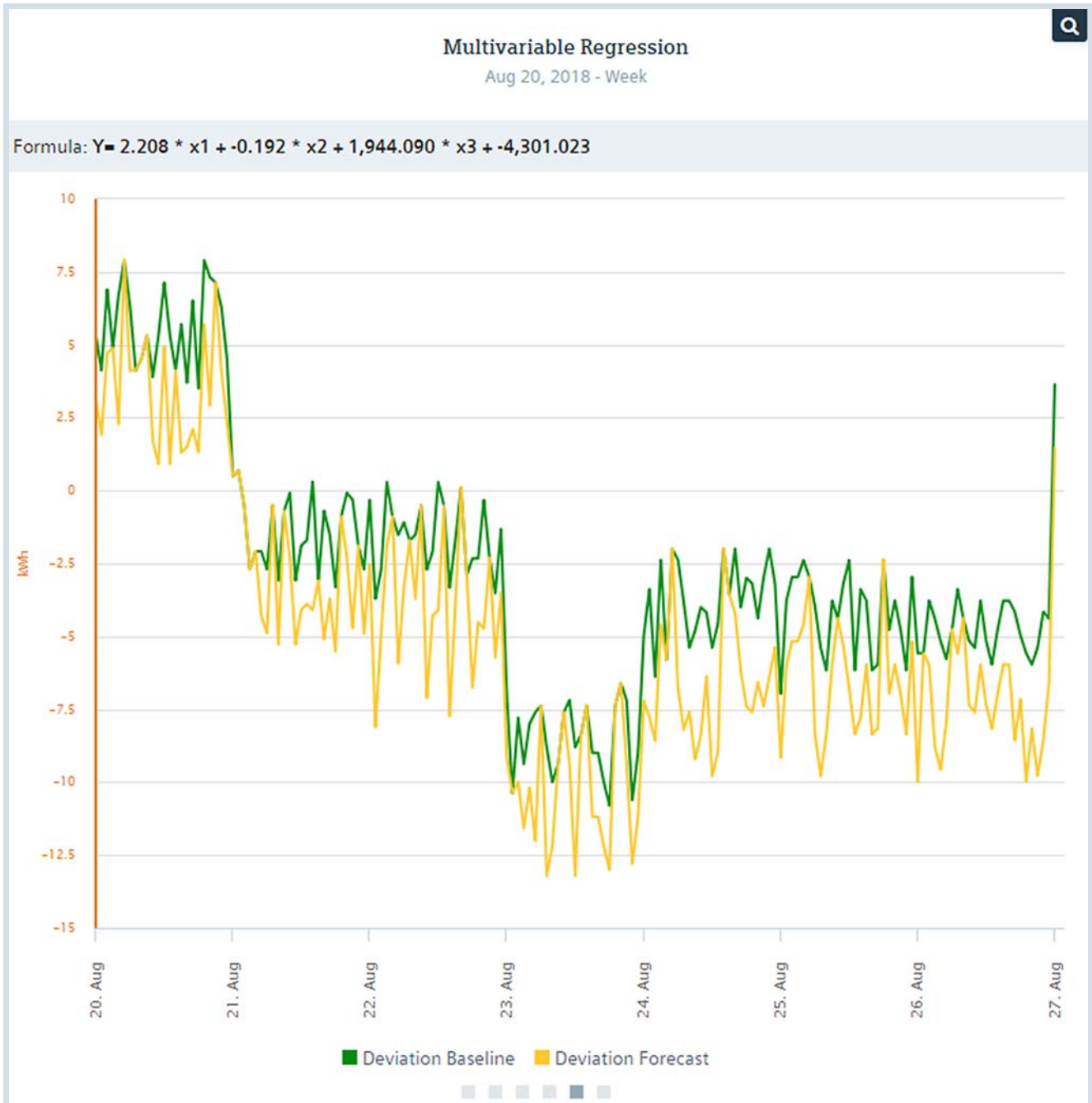
The deviation of the baseline and, optionally, of the forecast is displayed cumulatively on the sixth tab.

Multivariable Regression
Aug 20, 2018 - Week

Formula: $Y = 2.208 * x1 + -0.192 * x2 + 1,944.090 * x3 + -4,301.023$

cum. Deviation Baseline   cum. Deviation Forecast

In addition to the information display, the data points or measuring variables derived in Energy Manager PRO Client are automatically created directly below the dashboard.
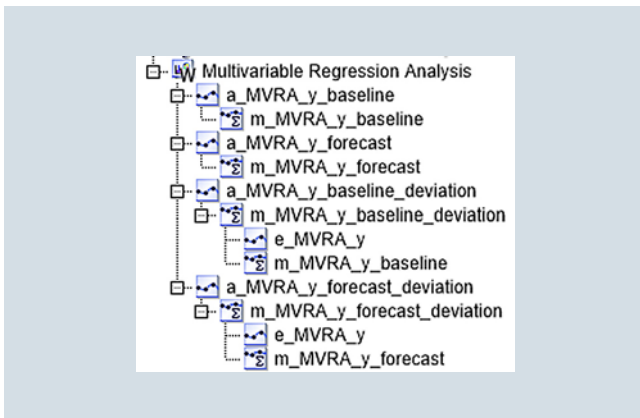
A derived data point with the ending "baseline_deviation" and "forecast_deviation" is created for the baseline and for the forecast. This data point represents the deviation of the actual value from the baseline or from the forecast value.

The baseline and the forecast value with the ending "baseline" and "forecast" are created as measuring variables.

Duration curve

The "Duration Curve" widget, or also duration line, displays the measurement values in descending order in a sorted load curve. Three types of duration curve are available, divided into the individual tabs.

The first tab shows a duration curve sorted by values. The duration curve shows the course from the highest to the lowest values in the observation period. The total consumption and the workload / utilization hours are displayed in addition to the usual statistics. The utilization hours are calculated from the ratio between total energy consumption and maximum output.

Production site - Duration curve
Apr 2018 - Quarter

minimum 23.20 · average 3,231.60 · standard deviation 1,316.33 · maximum 7,797.51 · median 3,156.19 · consumption 7,057,806.30 kWh · workload 905.14 h
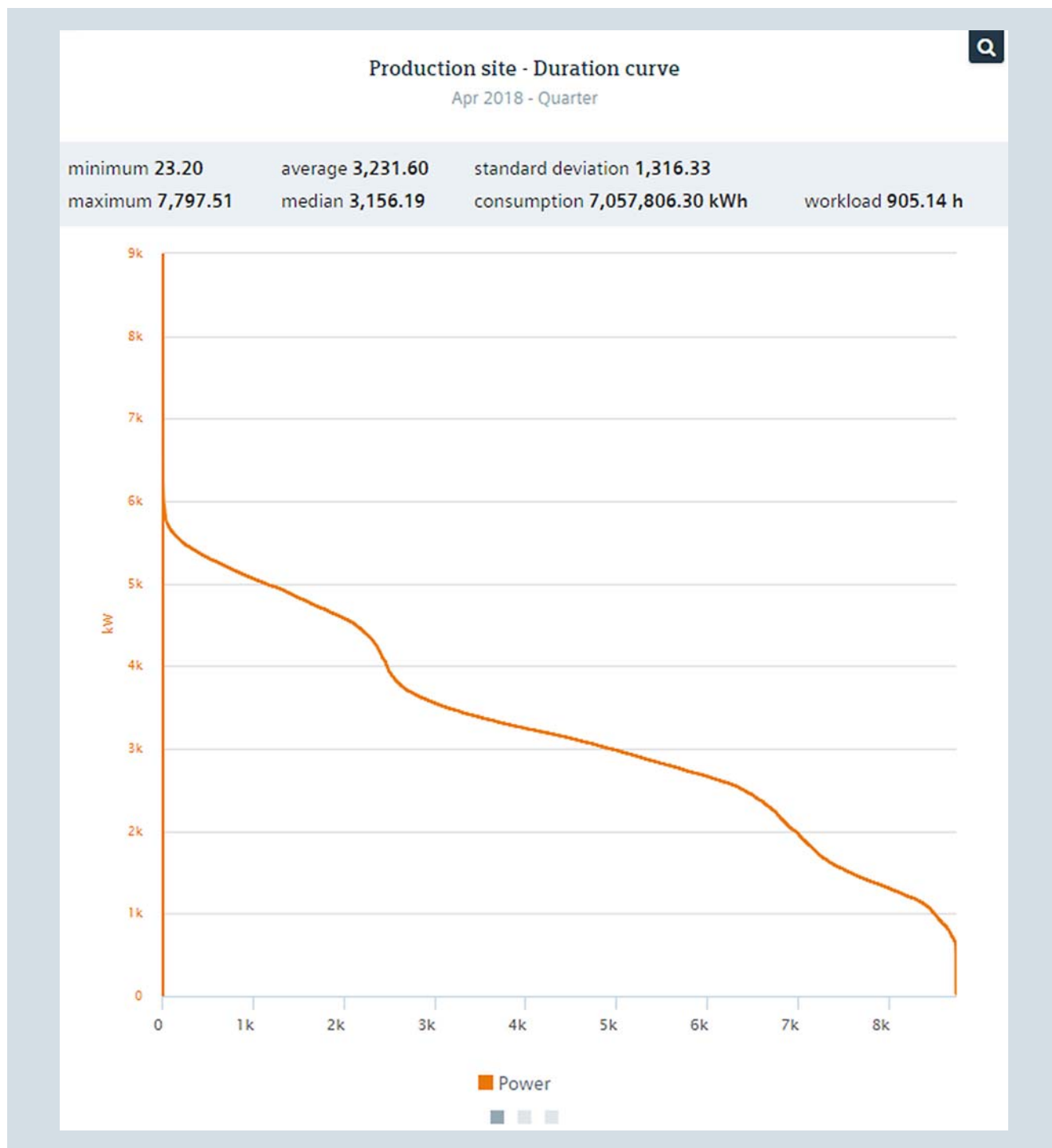
In the second tab, the duration curve of the n-highest values is shown in the observation period. The number of the n-highest values is configured individually in the widget configuration dialog.
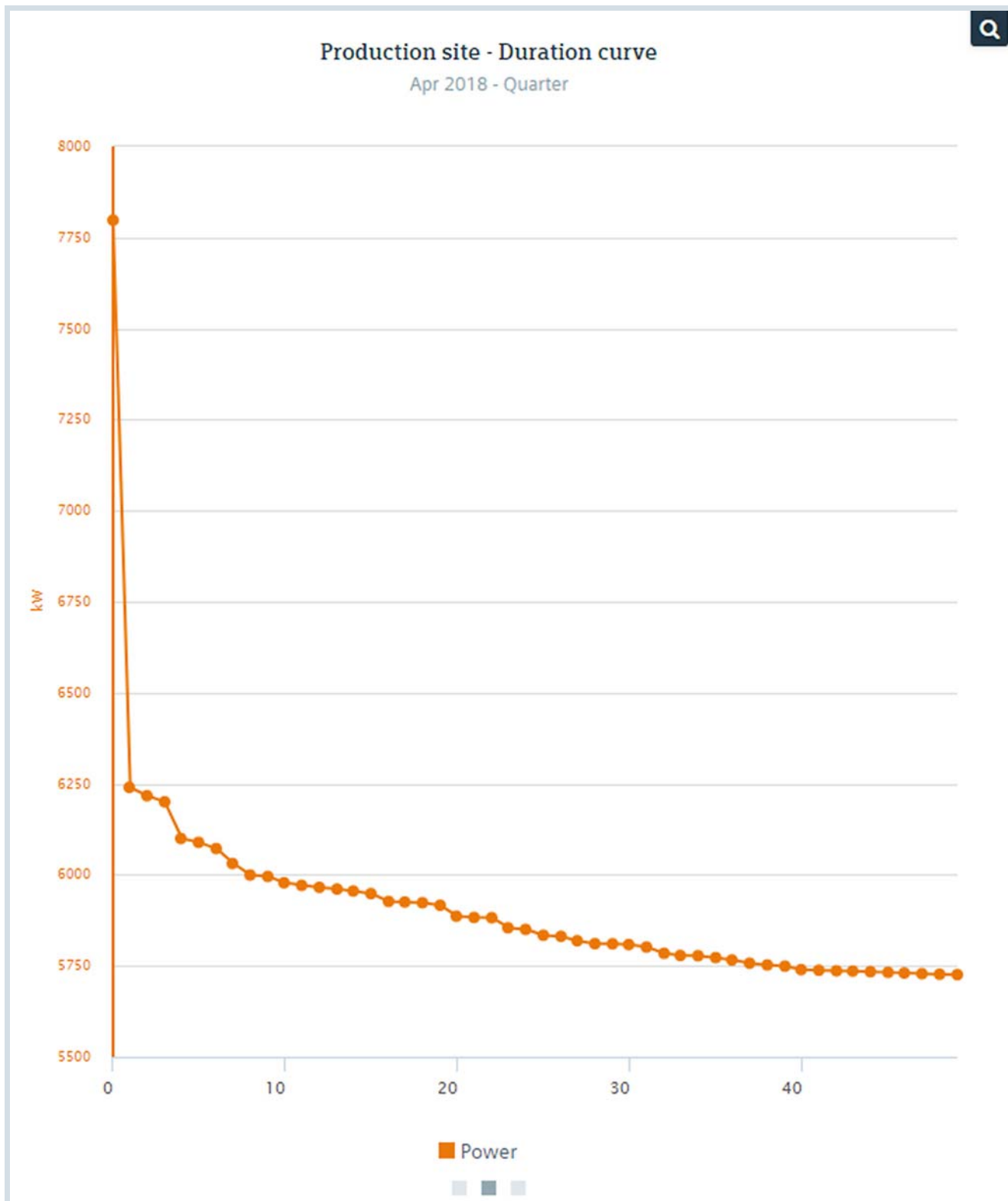
In the 3rd tab, the n-highest values are shown hour-based throughout the day. The user can thus determine at what time of day peaks occur.
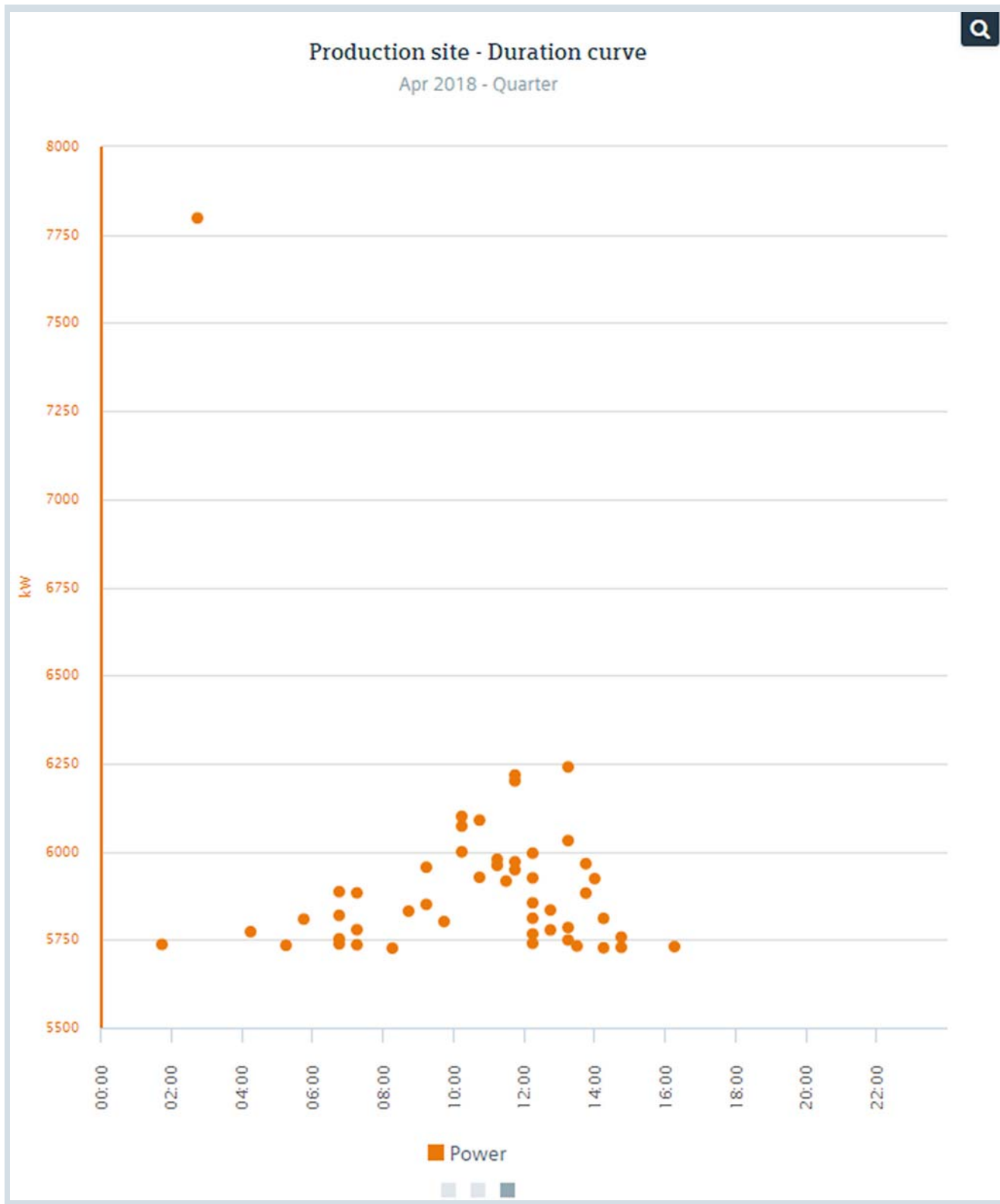
Report

Data analysis in the report

The Energy Manager Web Client gives you access to previously generated reports, which you can display directly in the browser as PDF preview or download as a file. You can also generate new reports, for example, from a different time range or with a different query type.

Creating a new report

You create new reports in the shortcut menu. When creating the report in the Web Client, you can choose from five report templates that are supplied automatically:

- Balance
- Balance comparing
- Protocol
- Protocol with from/to
- Duration curve

Chart

In the Web Client, you can quickly and easily map the course of a performance indicator in charts or compare the progress of the performance indicator with the history of another performance indicator in a specific period of time. You can adapt configurations at the charts individually to meet your needs, for example, add additional axes or change the type of chart.

You can find more information on charts in Energy Manager Web under "Chart (Page 21)" in the "Energy data management with SIMATIC Energy Manager" section.

Matrix

Matrix for manual data input

With the matrix you input or output data directly in the browser for a time range configured under "Options". Input values are automatically transferred to Energy Manager and the configured limits are checked. Deviations are highlighted in red and their number is displayed as well. The permitted limits are shown when you move the mouse pointer over the red icon. You can also import existing measurement values from a file and display the result immediately.

				Query type: Month		Compression
Values	Chart	Alarms	Comments	< 01.08.2018 - 01.09.2018 📅 >		⟩⟨ Entry va... ▼

Timestamp	e_energy [kWh]	e_gas [kWh]
02.08.2018 00:00:00	6.868 ✎	6.571 ✎
03.08.2018 00:00:00	7.195 ✎	6.884 ✎
04.08.2018 00:00:00	713 ✎	6.821 ✎
05.08.2018 00:00:00	6.933 ✎	6.633 ✎
06.08.2018 00:00:00	4.579 ✎	4.381 ✎
07.08.2018 00:00:00	3.271 ✎	3.129 ✎
08.08.2018 00:00:00	6.606 ✎	6.321 ✎
09.08.2018 00:00:00	713 ✎	6.821 ✎
10.08.2018 00:00:00	7.064 ✎	6.759 ✎
11.08.2018 00:00:00	6.999 ✎	6.696 ✎
12.08.2018 00:00:00	6.606 ✎	6.321 ✎
13.08.2018 00:00:00	5.887 ✎	5.632 ✎
14.08.2018 00:00:00	2.616 ✎	2.503 ✎
15.08.2018 00:00:00	6.345 ✎	607 ✎
16.08.2018 00:00:00	6.672 ✎	6.383 ✎
17.08.2018 00:00:00	6.737 ✎	6.446 ✎
18.08.2018 00:00:00	6.803 ✎	6.508 ✎
19.08.2018 00:00:00	6.737 ✎	6.446 ✎
20.08.2018 00:00:00	4.775 ✎	4.568 ✎

The matrix in Energy Manager offers the following functions:

- Editing the values in the matrix
- Selection of the displayed time period
- Selection of the displayed cycle
- Comments on the values
- Plausibility check of the values
- Insertion of values using the SIMATIC Energy Manager App
- Option of transposed display of data
- Representation of the values in a chart;
  Access this chart from the "Chart" tab. The chart for a matrix cannot be configured. You can find more information on charts under "Chart (Page 21)".

- List in table form with all values that violate the plausibility criteria;
  Access this list from the "Alarms" tab.
- List in table form with all values that are commented on;
  Access this list from the "Comments" tab.

Mobile data acquisition via SIMATIC Energy Manager app

With the SIMATIC Energy Manager app you can manually read the counter readings with a mobile device and then transfer them to the Energy Manager for further analyses. The measurement values are synchronized via encrypted communication (https) with the Energy Manager. To acquire count values in the Energy Manager app, you need a configured reading route. You configure this reading route in the Energy Manager.

To configure the reading route, you must create the following objects in the Energy Manager:

- Matrix as quick link
- Data point of the "Counter" category
- Valid counter

After logging into the Energy Manager app, the app downloads the approved reading routes from Energy Manager and displays these reading routes. The app also applies the appropriately configured data points as well as their main plausibility settings. You can also define an existing folder structure as a route for a reading operation.

See also

Mobile data acquisition (Page 89)

Folders

Files and objects are created in the Web Client in folders in the navigation area. When you open a folder in the navigation area, its contents are displayed in the detail area. To view the content of a folder, the folder must be released for you or you must have the necessary authorization.
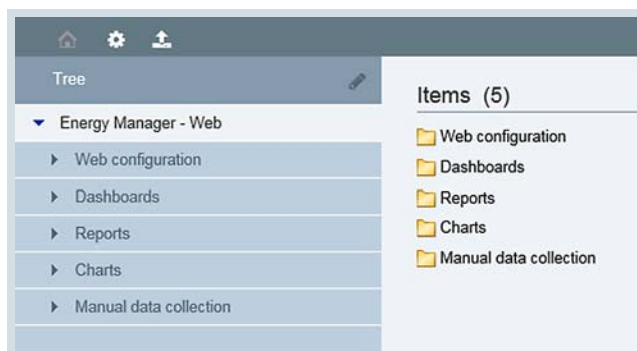
Files

The browser gives you access to the document management of Energy Manager PRO at any time. This way you can download, for example, operating instructions, circuit diagrams or tariff information of the energy supplier. If required, you can upload new documents or update existing documents.

Data management in the Energy Manager Web Client requires that the corresponding files are created in the Energy Manager PRO Client. If you want to download a PDF document from the Energy Manager Web Client, for example, you must first have created it in the Energy Manager PRO Client.
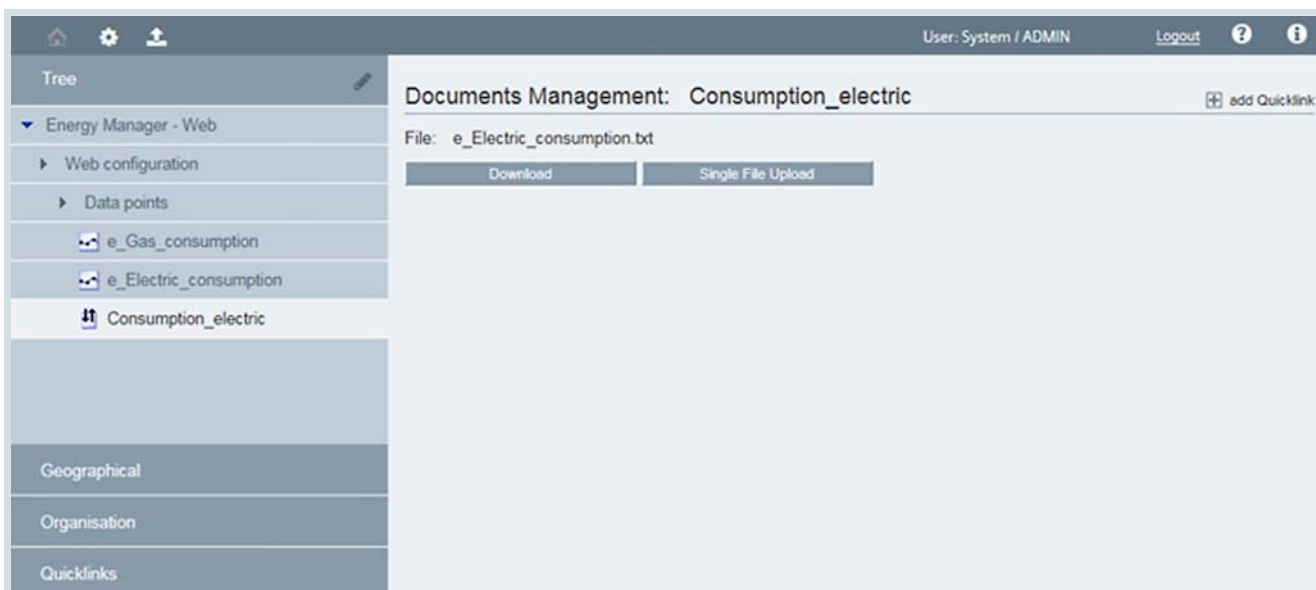
Energy efficiency measures

Management of energy efficiency measures is not available in Energy Manager Basic.

The planned energy efficiency measures can be viewed and edited. The measures can be quickly accessed with the quick links ① . First you see a summary of the individual measures ② .

You create the energy efficiency measures object in the Energy Manager PRO Client. If you have created the object in the Energy Manager PRO Client, you can also add energy efficiency measures in the Energy Manager Web Client. When adding new measures, you have the same setting options as in the Energy Manager PRO Client.

Managing energy efficiency measures

With Energy Manager PRO you keep track of all of your company's energy efficiency measures:

- All energy efficiency measures of all locations of your company are recorded centrally in Energy Manager PRO. Each energy efficiency measure can be assigned to a region, department or even a specific plant.
- Automatic calculation of efficiency based on savings potential and costs of each energy efficiency measure. The following key figures are calculated:
  - -Return on investment (ROI)
  - -Net present value (NPV)
  - -Payback period

- Predefined status for implementation progress of the energy efficiency measures.
- Categorization:
  Predefined priorities or categories help you to prioritize energy efficiency measures.
- Calculation of the energy savings, media and CO_2 emissions

Evaluating implemented measures

When an energy efficiency measure has been completed, the cost effectiveness must 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 directly in Energy Manager. The savings are documented in this way and can be output in reports at any time.

## See also

Basics of Energy Efficiency Measures (Page 48)

Project configuration

The project configuration provides you with an overview of the acquisition and processing objects created in your Energy Manager system. The objects are displayed in the detail area as tiles as well as in the navigation area.

Create the following objects in the project configuration, which you can also reconfigure:

- Data sources
- Data points
- Parameter
- MEVAs / KPIs
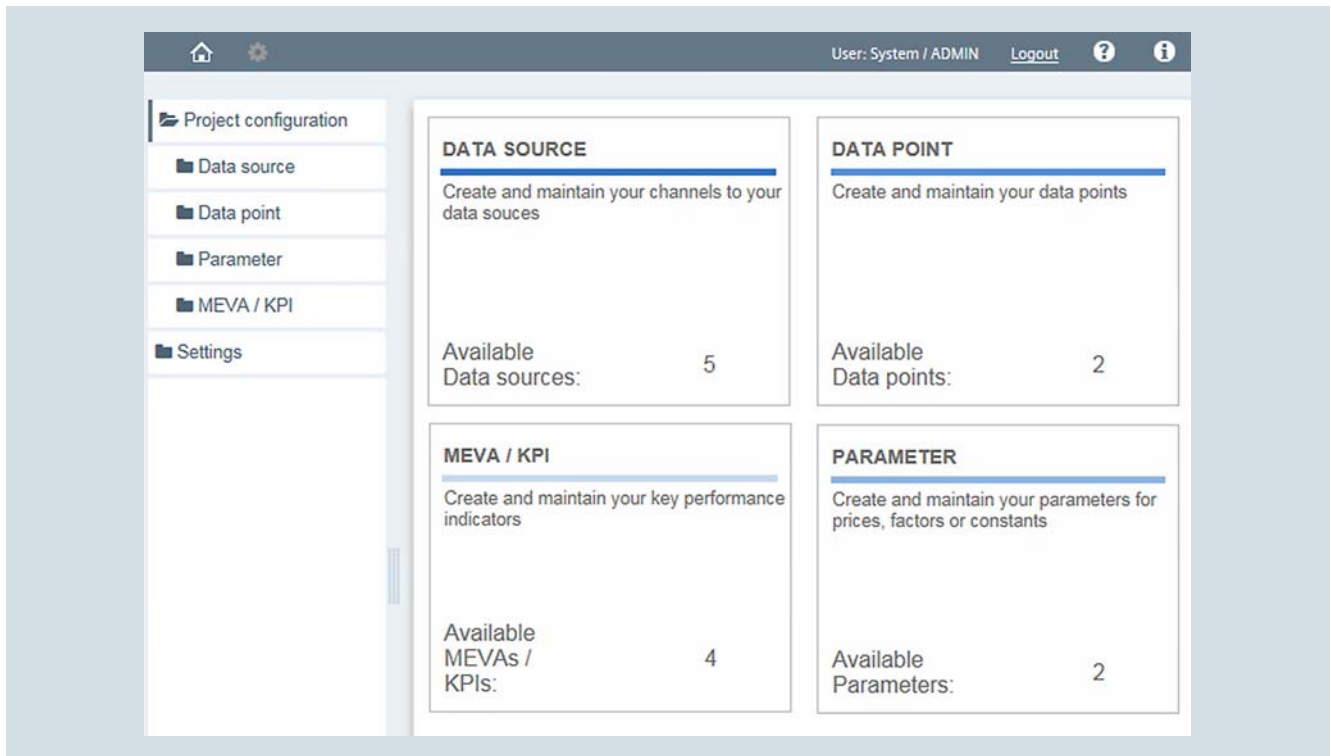
The number of available objects is displayed in the detail area in the bottom part of the corresponding tile.

Data sources

In the project configuration you can create new data sources (hardware objects) and data channels (acquisition channels) and configure them. You can create new data points using the created data sources and data channels. All data sources and data channels are displayed in the Energy Manager Web Client in a table.

> ## Note
>
> The creation of new data sources is not available in Energy Manager Basic. Only the automatically installed data source is available.
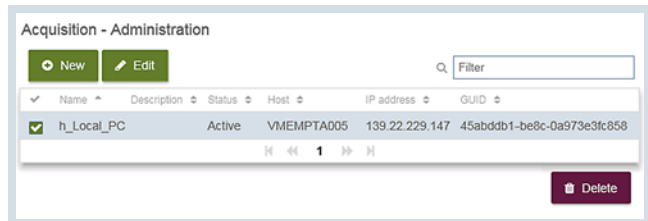

The "Manual acquisition" folder is created during installation of Energy Manager; in it, you only create new manual data points.

You can create and configure the following four channel types in the Energy Manager Web Client:

- WinCC
- Modbus
- Energy Suite
- OPC UA, DA, HDA
- Desigo CC
- ASCII

Data points

You create new data points and configure existing data points in the project configuration. All data points available in Energy Manager are displayed in the Energy Manager Web Client in a table.
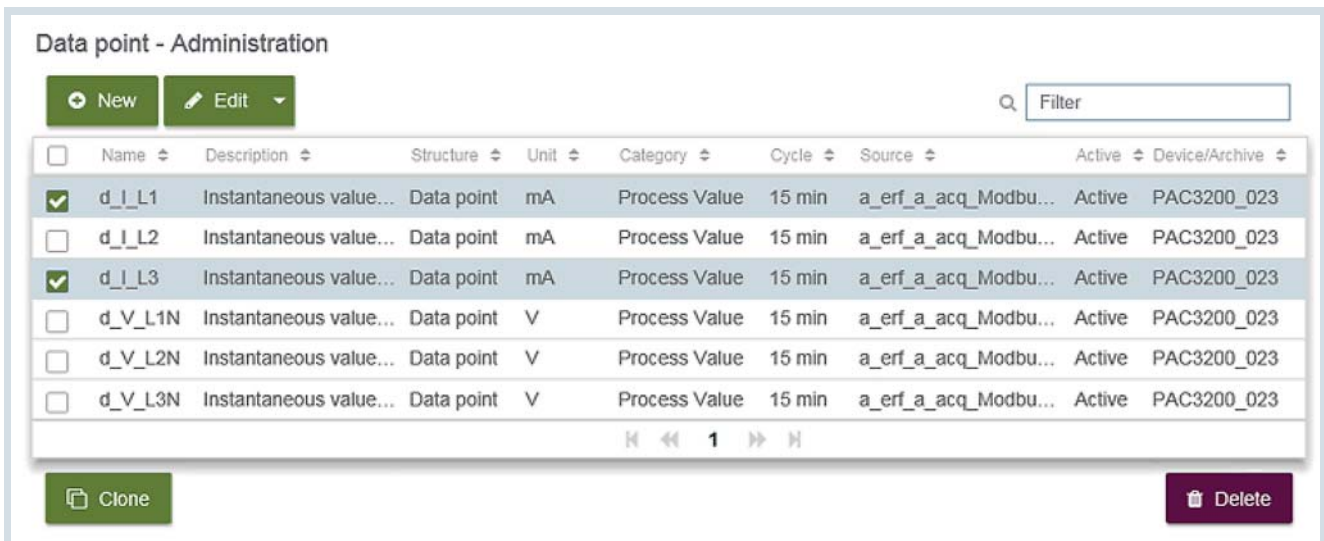
From this table you can create, configure or even clone new data points.

You can create the following data point types in Energy Manager Web:

- External data point
  Data point for automatic acquisition
- Manual data point
  Data point for manual acquisition
- Derived data point
  Data point derived from MEVA/KPI

Data points in Energy Manager have functions including:

- Plausibility check
  For each data point, define limits, gaps, and compare the values with previous values or other objects.
  If a value violates these plausibility criteria, the value is flagged.
- Substitute values
  If there is an invalid value or a gap, there is an option to replace these values.
  You can choose from the following replacement strategies:
  - LRU
    Last valid value
  - AKS
    Replacement by interpolation
  - Substitute value
    Value defined in configuration
  - Historical value
    Average value from the previous period.
    The length of the period is defined in the configuration.
- Compression
  Summarization of the acquisition cycle to other cycles, e.g. hourly or daily values.
- MindSphere
  Uploading the values to MindSphere
- Counter
  You can find more information on the counter in the following section.

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 calculated in Energy Manager PRO from the difference of the counter readings.

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 on short notice. All these factors must be considered by energy data management software.

Configuring the counter

In order for Energy Manager PRO to acquire counter values, you create a data point. 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 Energy Manager PRO. Even replacing the counter is not a problem with Energy Manager PRO: simply add the new counter and enter the current reading.

Calculating consumption based on counter readings

To calculate consumption values from counter readings, Energy Manager PRO provides the option of automatic compression during the measurement value acquisition. You can generate an additional measurement series based on counter readings at the time of acquisition, for example, compression to hourly values.
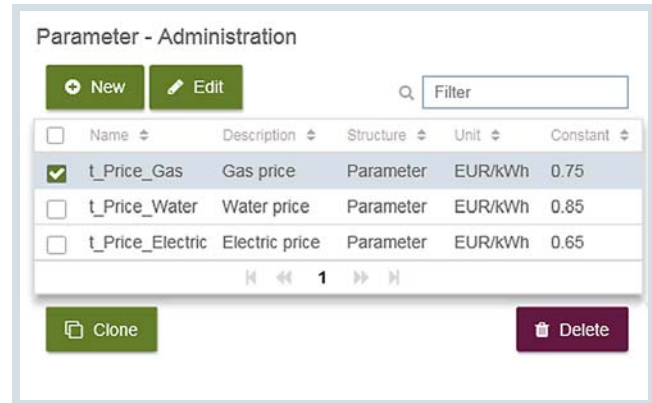
Filtering bad values

Define plausibility criteria for counter values. If a counter value violates these criteria, the value is filtered and replaced.

The following filter criteria are possible:

- Increment only
  Only counter values that are higher than the previous value are valid.
- High and low limit
  Counter values outside these limits are invalid.
- Counter difference
  High and low limit for the difference between the count value and the previous count value

Parameter

In Energy Manager Web Client you can create new parameters in the project configuration and configure them. Parameters are constants that have different values for different time periods. Parameters are needed for a variety of purposes, most often for setting the electricity price. All parameters available in Energy Manager are displayed in the Energy Manager Web Client in a table.
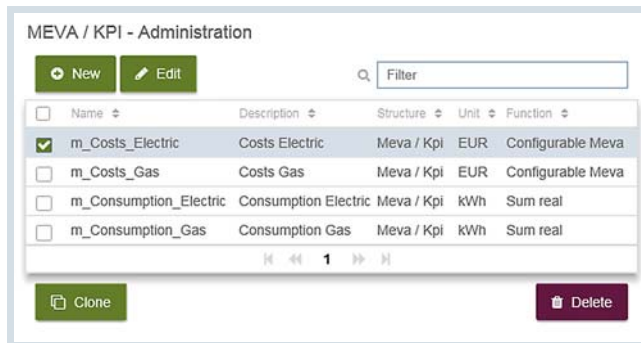

From this table you can create, configure or even clone new parameters.

MEVAs / KPIs

In the project configuration of the Energy Manager Web Client you can create and configure new MEVAs / KPIs. You use performance indicators to combine multiple objects, such as another performance indicator or data points, and create various calculations and results based on these objects. All performance indicators available in Energy Manager are displayed in the Energy Manager Web Client in a table.

From this table you can create, configure or even clone new performance indicators.

Note

A KPI object in the Energy Manager Web Client corresponds to a MEVA from the Energy Manager PRO Client. The term "performance indicator" comprises both objects.

Creating a new performance indicator

When creating a new performance indicator, you define the formula for calculating the performance indicator, among other things. You have a selection of predefined functions. You can also use the "Configurable MEVA" function to combine your own individual formula with the existing mathematical operators. The order of the objects that are used for the calculation ensures the correct calculation formula.

You can enter the mathematical operators either manually or via the green buttons. To use the selected tags in your formula or formula editor, you may:

- Double-click on the corresponding tag in the area on the right.
- Click on the green tag button in the formula editor (x button)
- Manual input of formula editor

Settings

The settings in the Energy Manager Web Client allow you to configure the most important system settings of your Energy Manager system.

You can configure the following settings:

- Mail settings
- Account settings
- Web Client settings
- User administration
- Units
- Alarm lists
- Fuse
- Regional settings
- Modbus device templates
- Data provider
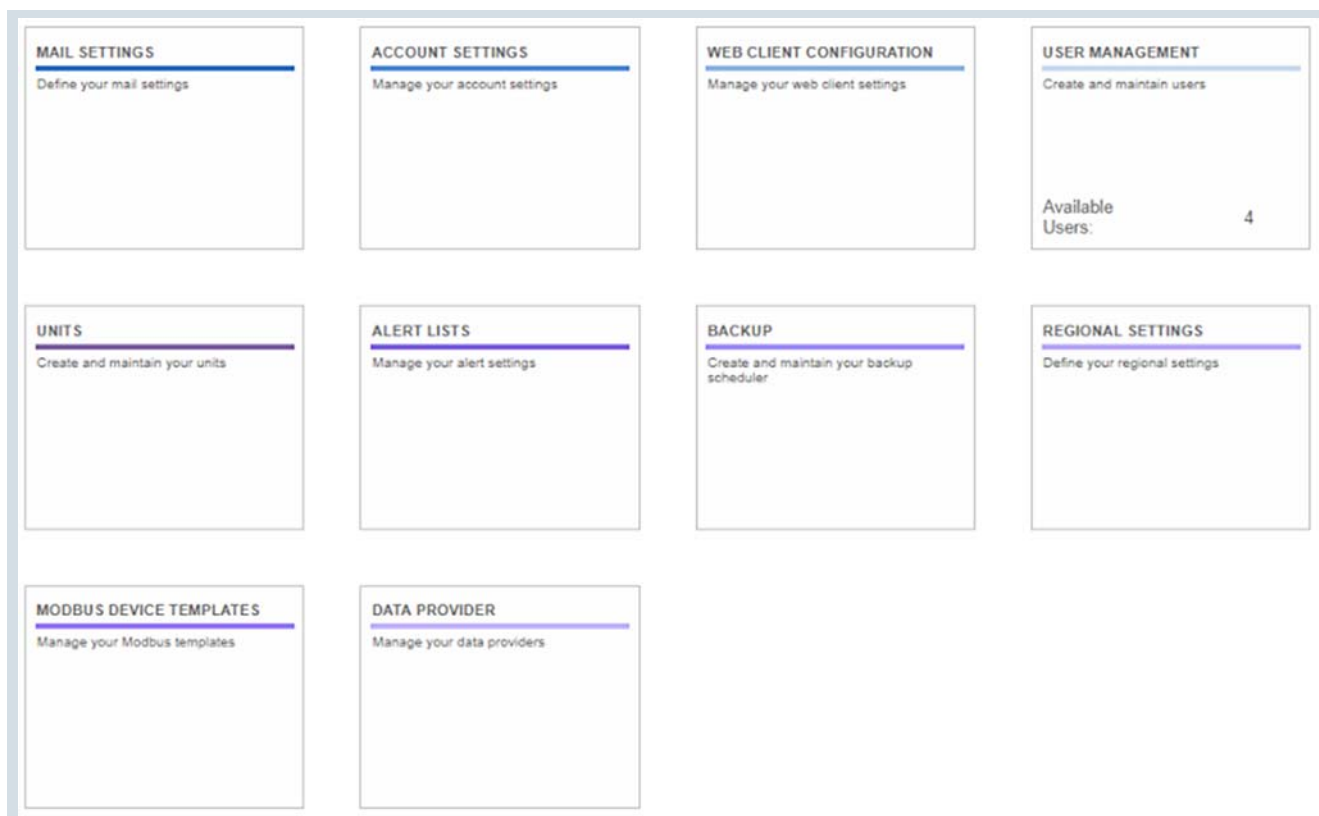
SIMATIC Energy Manager PRO Client

Energy Manager PRO Client basics

Energy Manager PRO Client as configuring tool

The **Energy Manager PRO Client** is the Windows-oriented **user interface** of Energy Manager PRO, which enables intuitive working. You configure all of the objects you need for energy data management in your organization in the Energy Manager PRO Client:

• You configure the objects that contain your operating data, such as data points or parameters. Thanks to the object-oriented approach, you use an object in several places, such as for calculating 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 existing configurations is always assured.

• You evaluate your operating data or performance indicators with the help of reports or the chart.
• You export operating data in XML or CSV format.
• You configure the interfaces that provide you with operating data, such as Modbus, WinCC, or OPC. This is completed quickly and easily using a wizard.

The grouped structure and the user-friendly tooltips of the Energy Manager PRO Client ensure that you easily get the desired result of your configuration.
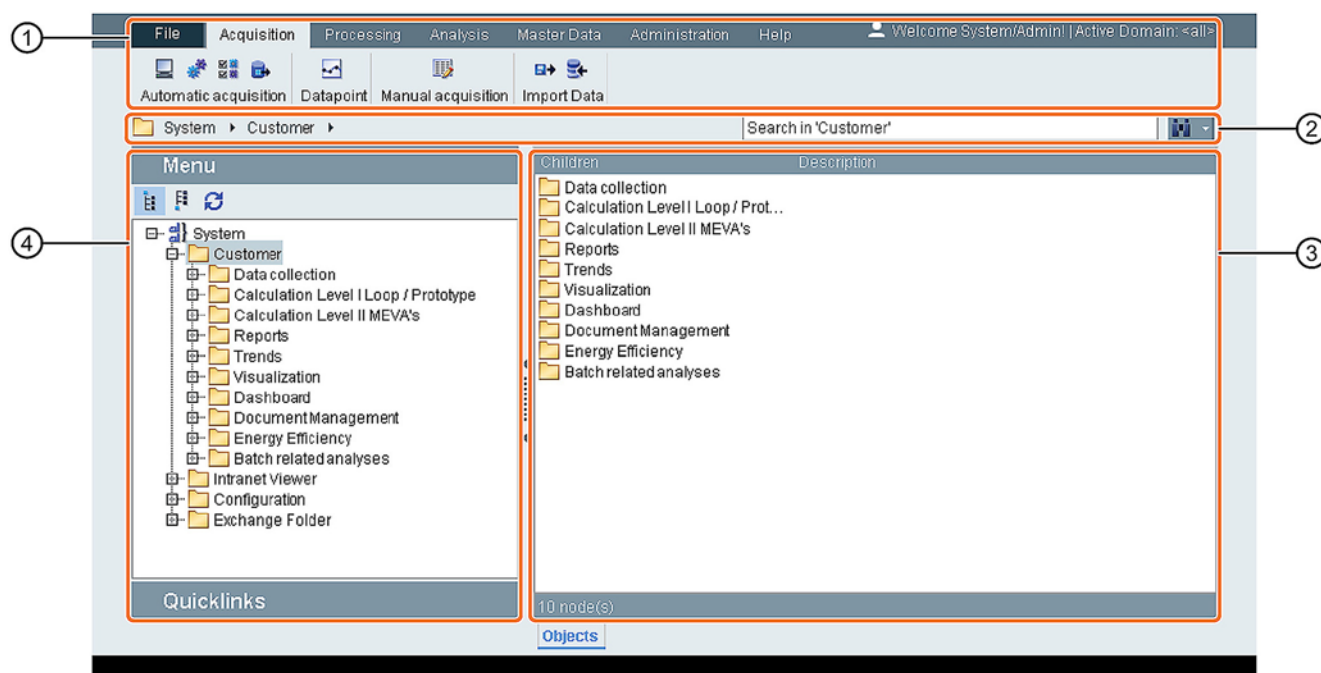
① **Menu bar**
The menu bar contains all buttons for system operation organized in categories.

② **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 detail area ③ .
When you click on the search result, the position of the search result in displayed in the project tree ④ .

③ **Detail area**
The detail area shows details of the object that you selected in the project tree.

④ **Project tree**
You create objects that you need for energy management in the predefined "System" root in the project tree.

You can structure the project tree, for example, according to locations or function. You create favorites for frequently required objects in the "Quicklinks" area.

Key functions of the Energy Manager PRO Client

Control center for your energy data management

The Energy Manager PRO Client represents your work environment for all of your energy data management tasks:

- Configuration of all interfaces
- Definition of data points (tags)
- Manual entry of data
- Entry of parameters (prices, CO_2 equivalents)
- Defining MEVAs / KPIs (all functions available)
- Initiation of reports
- Setup of batch analysis
- Creating widget dashboards
- Viewing of charts
- Export and import of configuration data
- Setting up the database backup
- Simulating tariffs
- Creating forecasts based on shifts and production plans
- Creating derived data points

Objects in Energy Manager PRO

You organize the objects needed for this work in a tree structure. The objects can be explicitly identified by their names. Once an object is created, you can use the "Copy" function to use it elsewhere in the project tree, such as in a report or in a calculation. A change to the object affects all points of use. By contrast, cloning creates a copy of the object with identical settings but with a new name.

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.
- You can export these properties as an XML file.
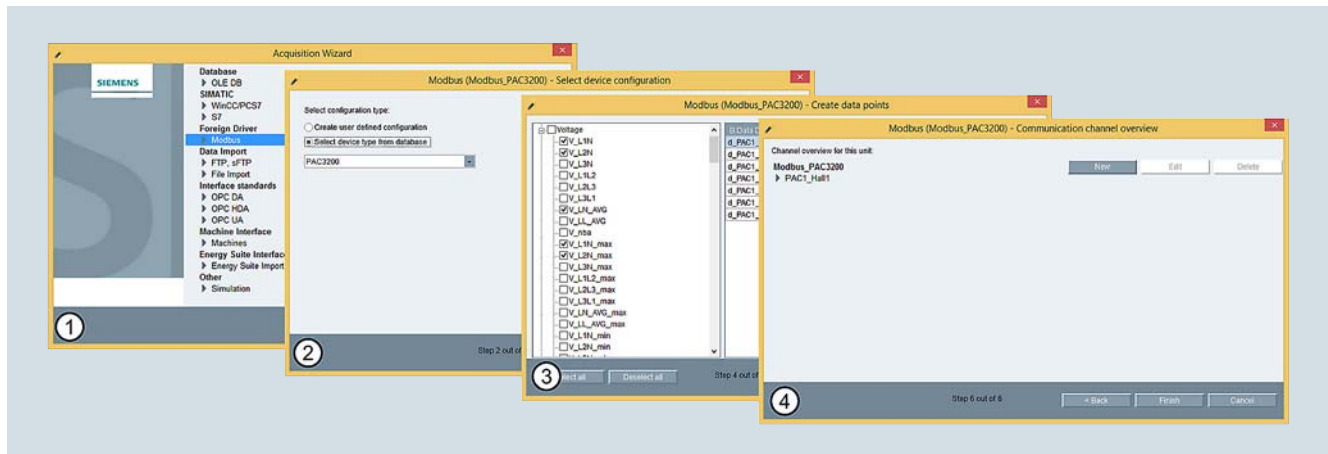
Search

The quick search is available in the Energy Manager PRO Client.

The quick search is a full text search, and the result is a list of all objects that contain the search term. The result is shown in the detail area. You can filter the result list, by entering terms in the quick search field again.

Wizard for interface configuration

In SIMATIC Energy Manager PRO, a wizard supports you when
configuring the interface you want to use to acquire data.

① Selection of the interface
- "S7" for acquiring data from an S7 controller.
- "WinCC / PCS 7" for acquiring values from a process value archive or compressed archive.
- "Modbus TCP" for acquiring data from measuring devices with Modbus support and Ethernet interface, such as SENTRON PAC measuring devices. The characteristic values acquired by the SENTRON PAC 3200 / 4200 measuring devices are pre-configured in SIMATIC Energy Manager PRO.
- "OPC-DA / OPC-HDA / OPC-UA" for acquiring data provided by an OPC server.
- "OLE-DB" for acquiring data from Excel spreadsheets or complex databases, such as SQL Server or Oracle.
- "FTP" for acquiring data from ASCII files. Secure transmission via sFTP is supported.
- "Machines" for acquiring data from consumers, e.g. CNC machines or the SIMATIC S7 energy efficiency monitor
- "Energy Suite Import" for acquiring data from SIMATIC Energy Suite. The data acquisition conforms to the "OPC-UA" interface.
- ""Desigo CC" for collecting data from the building management system Desigo CC

② Select data source from which data will be acquired, for example, a SENTRON PAC measuring device.

③ Select or define measurement values. A data point is created automatically in SIMATIC Energy Manager PRO for each measurement value.

④ Connection to the data source via the selected interface is configured. You can now configure an additional data source or create the acquisition structure in SIMATIC Energy Manager PRO.

Data acquisition

Automatic data acquisition

Introduction

If you want to acquire data automatically with Energy Manager, you must map at least one acquisition component as an object of the type "Hardware". You configure the data acquisition for this hardware in an additional step in a wizard.

Configuring an acquisition component with a wizard

In the Energy Manager PRO acquisition configuration, you establish the logical connection between the acquisition component (Acquisition) and the Energy Manager PRO Server (Pairing). The Energy Manager PRO acquisition configuration is installed together with the "Energy Manager PRO Acquisition" software component. The acquisition component supports communication via proxy server. You can configure the connection to the Energy Manager PRO Server manually or using the wizard.

Data channels in the Energy Manager PRO Client

The following data channels can only be configured in the Energy Manager PRO Client:

- OLE-DB
- PCS 7
- S7
- FTP, sFTP
- File import
- Machines
- Simulation
- Desigo CC

Manual data acquisition

Introduction

Manual data input is a frequently occurring phenomenon even though the degree of automation in an industrial environment is currently rather high. Interrupted connections during automatic acquisition, counters that cannot be acquired or failure of a sensor require manual data input.

Energy Manager PRO provides three tools for this purpose:

- Matrix for entering values.
- Mobile data acquisition (Page 78) for acquiring values with a mobile device in the SIMATIC Energy Manager app.
- Measurement value editor for editing previously acquired measurement values.

Matrix

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

- Entering measurement values of a counter whose values are not automatically acquired.
- Entering target values as a basis for comparisons.
- Entering production data or comments.

A plausibility check takes place as early as the input and incorrect values are highlighted in color. You can use historical values as guideline by displaying old data values. Each data point is displayed as a separate column with corresponding timestamps in the rows. You enter the values in the cells for each time stamp and data point. If you already have the values in tabular form, you can easily transfer them with Copy&Paste, e.g. from MS Excel.

See also

Validation (Page 91)
Change Management (Page 92)
Data acquisition (Page 89)

Mobile data acquisition

Mobile data acquisition of counter readings with a mobile device takes place in the Energy Manager app according to the mobile data acquisition from the Web Client.

See also

Mobile data acquisition via SIMATIC Energy Manager app (Page 78)

Data Processing

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 Energy Manager PRO

Energy Manager PRO offers the following options for detecting and correcting irregularities in the acquired 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, Energy Manager PRO has counter management which, in addition to the acquisition of counter readings, also handles counter overflows or replacements.

See also

Basics of Monitoring (Page 20)
Validation (Page 91)
Manual data acquisition (Page 89)
KPI alarm lists (Page 92)
Change Management (Page 92)
Counter Management (Page 92)

Precompression of the data

The data can be applied from the upstream systems or field devices over the standard interfaces. If fast data recording is needed, Energy Manager PRO can receive data in 1 s or 5 s increments, for example. This data can be temporarily stored for detailed analysis directly upon acquisition (for 62 days with 1000 data points). Only the compressed values are generally transferred to the Energy Manager PRO database.

A conversion based on the data point category is performed directly upon acquisition of the data. The consumption and production values are formed automatically from the counter values.

The raw data are compressed by default (15 min, 1 day, 1 month). When values are compressed, statistics such as minimum and maximum with time stamp and mean are calculated and stored for additional analyses.

Calculation level 1 (loop concept)

Definition

"Calculation level 1" designates the real-time preprocessing of measurement values in the acquisition component of Energy Manager PRO. The measurement values are not entered into the Energy Manager PRO database until they have been preprocessed.

Calculation level 2 (MEVA concept)

Definition

"Calculation level 2" is the object-oriented and time-independent calculation of performance indicators on the basis of acquired measurement values. Energy Manager PRO enables costs-by-cause energy cost allocation with "Calculation level 2."

To process performance indicators, you use ready-made database functions (MEVAs), which allow you to establish hierarchical accounting structures in the form of a tree in the Energy Manager PRO Client. This allows the user to understand the calculation at any time.

The principle is simple: A database function calculates the result with values provided by data points, parameters or other performance indicators. The return value of the database function can be reused as a parameter for another database function or in a report, chart and widget dashboard. The result of the database function can be stored in the database and exported by means of derived data points.

See also

Calculation level 3 (report template) (Page 91)

Calculation level 3 (report template)

Definition

"Calculation level 3" designates the time-independent processing and visualization of measurement values in reports. Microsoft Excel or Microsoft Word is used to visualize the reports.

To prepare the data exported from Energy Manager PRO, the full Microsoft Excel or Microsoft Word functionality (including macros) can be used, including statistical functions such as correlation or regression analysis. Furthermore, the results data can be prepared using graphs or diagrams. The automatic reporting of Energy Manager PRO provides you with a fast and valid decision-making aid.

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

Validation

Introduction

For precise analyses and predictions, correct measurement data is absolutely essential. Normally the data of many measuring points are recorded, processed, and transmitted in an industrial plant. Errors that occur in data series must be recognized by the energy data management software and made available to the energy manager in a clear format so that measures can be derived from them.

Energy Manager PRO essentially offers three methods for this purpose:

- **Reports** provide an overview of the data quality of the acquired values, for example
- Substitute value methods (Page 92) for automatic filling in of gaps or correction of faulty values.
- The **Service cockpit** is a clear representation of the hardware status and informs you in which of the configured interfaces the gaps have occurred.
- **Measurement value editor** for editing previously acquired measurement values.

Reports

Energy Manager PRO offers the following plausibility checks that can be used to check the data quality of data points in a report.

- Reference data point deviation: Low and high limit value violations, based on the configured limit values of the reference data point.
- Gaps: Number of gaps, based on the expected target value, such as four 15-minute values within an hour.
- Min/Max: Low and high limit value violations, based on the configured limit values.
- Status not OK: Number of entries with this status including timestamp.

The plausibility checks can be summarized in a common report, for example.

Measurement value editor

In the measurement value editor you edit the acquired measurement values of a data point. All changes are logged in the Energy Manager PRO Logging Editor for full traceability. Use the export in CSV format for more extensive changes: Then you can easily edit the measurement series in Microsoft Excel and then re-import them.

The measurement value editor is accessed over the shortcut menu of the data point.

KPI alarm lists

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." You can use filters to create your own "alarm lists". Optionally, the notifications can also be sent via e-mail or displayed in the Windows taskbar. You can also define reminder intervals if an alarm is not confirmed within a certain time span.

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 predicted consumption figures: Were the assumptions made 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.

The limit values for each data point are defined under its properties. The different data points can be combined in lists for alarming.

See also

Basics of Monitoring (Page 20)
Manual data acquisition (Page 89)

Substitute value formation

Gaps and values in a measurement series marked "invalid" can be automatically filled or corrected at the time of acquisition (or during subsequent calculation).

Energy Manager PRO offers the following substitute value methods for this purpose:

- Using the measurement value of a different data point:
  If a measuring point is designed to be redundant, the measurement value of the other measuring point is used if there is a gap in one measurement series.
- Using the last valid value:
  If a gap occurs, the last valid measurement value of the measurement series is entered.
- Using a constant value:
  The value of a data point configured as a "constant" is entered instead of the gap.
- Using historical value:
  Instead of the gap, a value with the same time stamp is used, but from the day before, for example.

The use of substitute value methods and the related corrections are considered to be a "change" and are logged and colored accordingly - also in a report. You have access to the measurement series at different times when "Versioning" is enabled. This ensures, for example, the reproducibility of report results.

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

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 a year when using cost center-based consumption data for energy accounting. With Energy Manager PRO you can reproduce the billing logic and record the user actions.

Tools for change management

The following tools are essentially available in Energy Manager PRO:

- Measurement value editor for editing measurement values:
  All changes are logged in the Energy Manager PRO Logging Editor for full traceability.
- Logging Viewer for displaying system and error messages:
  The Logging Viewer can be started in the toolbar under "Administration."
- Historization of measurement variables and reports:
  The historization can be opened from the shortcut menu of a measurement variable, a derived data point or a report.

Configuring versioning

All values are saved along with their date of creation if you are using versioning. By using this function, you limit the view to data on a specific date of creation.

When starting a report you can use the actual version or a maximum creation date. It is also possible to display all versions in the measurement value editor.

See also

Manual data acquisition (Page 89)

Notes

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

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