

The background of the advertisement is a photograph of a large industrial facility, likely a power plant or refinery, with complex piping, structural steel, and various pieces of equipment. Overlaid on this image are several semi-transparent blue digital interface elements. These include a 'Selector Auto/Man' with 'MAN ON' selected, a 'CONDENSADORA' (Condenser) status panel showing 'Energía Condensadores', 'Alarma Condensadores', and 'AUTO' mode, a 'VENT. IMPLUSION' (Impulse Vent) panel, and a large central gauge displaying '95.98'. A vertical column of binary code (0s and 1s) is visible on the left side. In the top right corner, there is a small table with columns for 'Fecha', 'Hora', 'Parámetro', and 'Valor', containing several rows of data. The Siemens logo is prominently displayed in the top left.

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SIMATIC Energy Management

Energy Efficiency begins with Transparency

SIMATIC Energy Manager V7.5

System
description

Edition
09/2024

siemens.com/energymanager

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SIMATIC

SIMATIC Energy Manager V7.5 – System description

System Manual

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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

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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.

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

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Introduction to SIMATIC Energy Manager

1.1 Requirements for energy data management software

Introduction

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

Reasons for the implementation of an energy management system

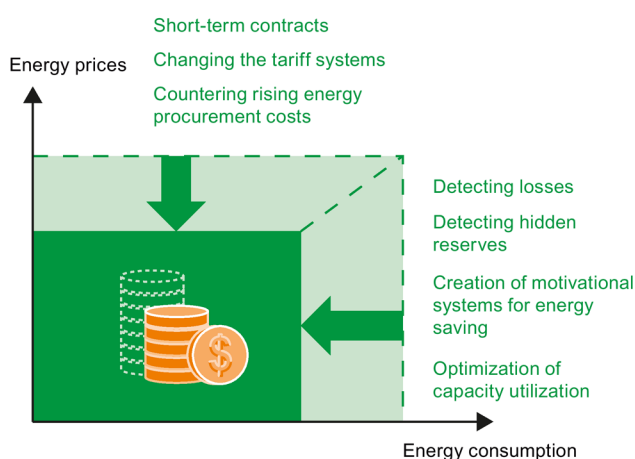
Lack of transparency in infrastructure and production processes, changing cost centers and heterogeneous system environments make an energy management system with a comprehensive range of interfaces necessary.

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

The legal situation and fulfillment of requirements and/or audit support are also reasons for the implementation of an energy management system.

Reducing costs and creating transparency

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



SIMATIC Energy Manager system description

In this SIMATIC Energy Manager system description you will become acquainted with the SIMATIC Energy Manager energy data management software:

- Area of application: Where is SIMATIC Energy Manager used?
- Concept: How is SIMATIC Energy Manager structured?
- How does SIMATIC Energy Manager support energy data management?
- Engineering: How are energy data management tasks implemented?
- Energy Manager Web client: Which range of functions does the browser-based user and configuration interface offer?

Key features

SIMATIC Energy Manager offers an end-to-end system solution, starting with the collection of various data, including consumption data (energy, water, waste, etc.), production data and more, through to monitoring, automated reporting and the widget dashboard:

- Monitoring: Monitoring the current situation (consumption such as energy, process values, production data, etc.)
- Controlling: High flexibility in determining performance indicators through the inclusion of consumption and production data. Summary of data in automatically created reports including automatic e-mail delivery. Status-related machine analysis through connection of the S7 energy efficiency monitor.
- Accounting with cost center relations: Costs-by-cause accounting of energy and material flows and allocation to cost centers.
- Prognosis & Planning: Optimal budget planning and procurement optimization through accurate prediction of energy requirements. The calculated figures can be used as a controlling mechanism.
- Setting reduction targets and decarbonization roadmaps in conjunction with measures
- Management of energy efficiency measures: Definition and tracking of energy efficiency measures according to ISO 50001.
- Determination and monitoring of the carbon footprint

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 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.

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

1.2 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:

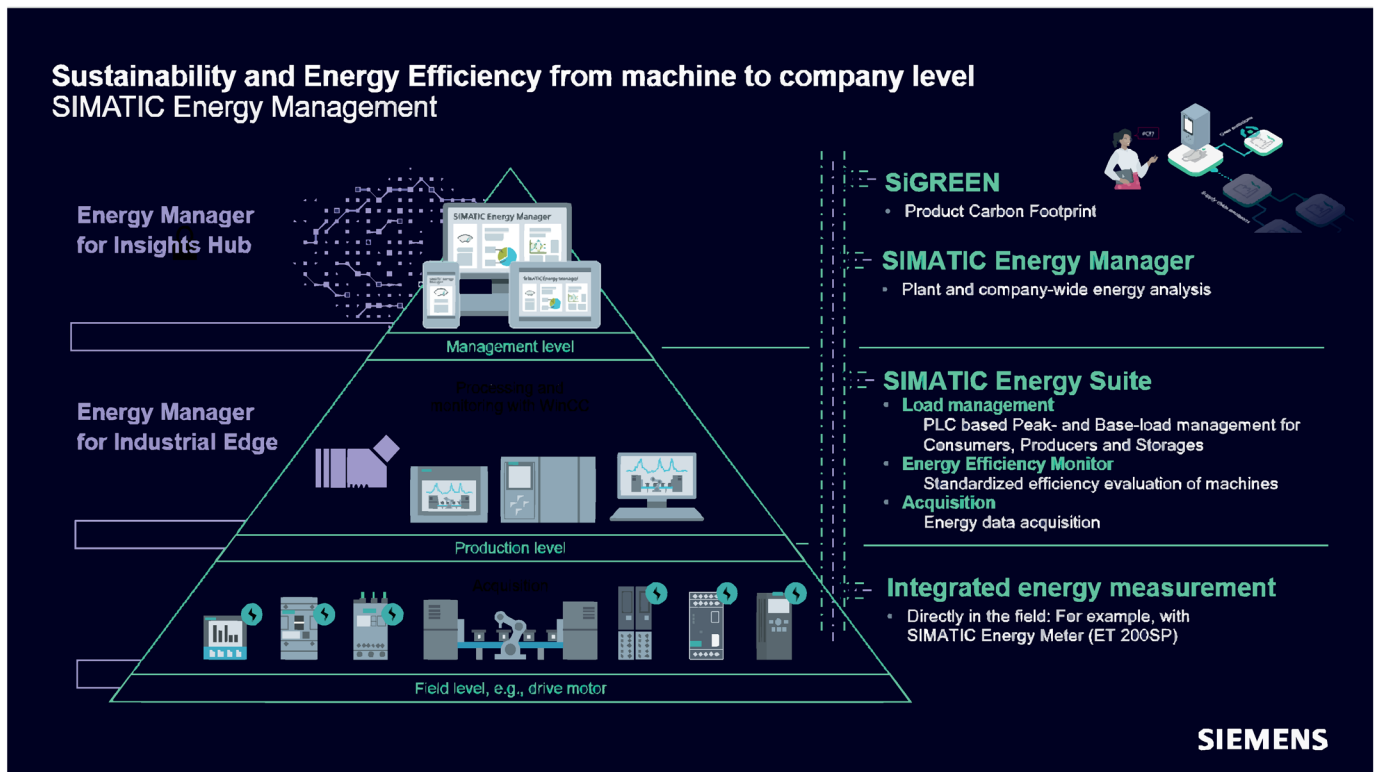
- Provides corporate-wide transparency through complete energy and material balancing of power generation and energy consumption systems.
- Enables costs-by-cause energy cost allocation and facilitates connection to the accounting system, for example, SAP R/3.
- Generates statistics for well-founded 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 (CO₂ 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.
- Supports definition and management of CO₂ reduction targets with regard to the company-wide decarbonization roadmap in connection with the necessary measures

1.3 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. With the load management in the SIMATIC Energy Suite, you can also avoid load peaks in industrial applications and spread loads evenly.
- With the SIMATIC Energy Suite Energy Efficiency Monitor, you can analyze the status-related efficiency of your machine using 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. Significant added value in decision-making can be created through the possibility of analyzing key figures across locations and through the combined analysis of different media with a wide range of process measured variables.

The interaction between SIMATIC Energy Manager and the SIMATIC Energy Suite leads to **continuous improvement process** with the target of **reducing costs** and **saving energy**.

1.4 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.

- 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)

(<https://new.siemens.com/global/en/company/stories/industry/factory-automation/brau-union.html>)

- Bette GmbH & Co. KG, Delbrück, Germany

The energy data is acquired with the SIMATIC and SENTRON measuring devices integrated with SIMATIC 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)

(<https://references.siemens.com/reference/?id=/data/Record-E6C1EB6422D4A79D2D2966700C7E7EA6.xml>)

- Coca-Cola HBC Austria GmbH, Edelstal / Austria

Complete reference example (Coca Cola Hellenic)

(<https://new.siemens.com/global/en/company/stories/industry/energymanagement-coca-cola.html>)

1.4 Application

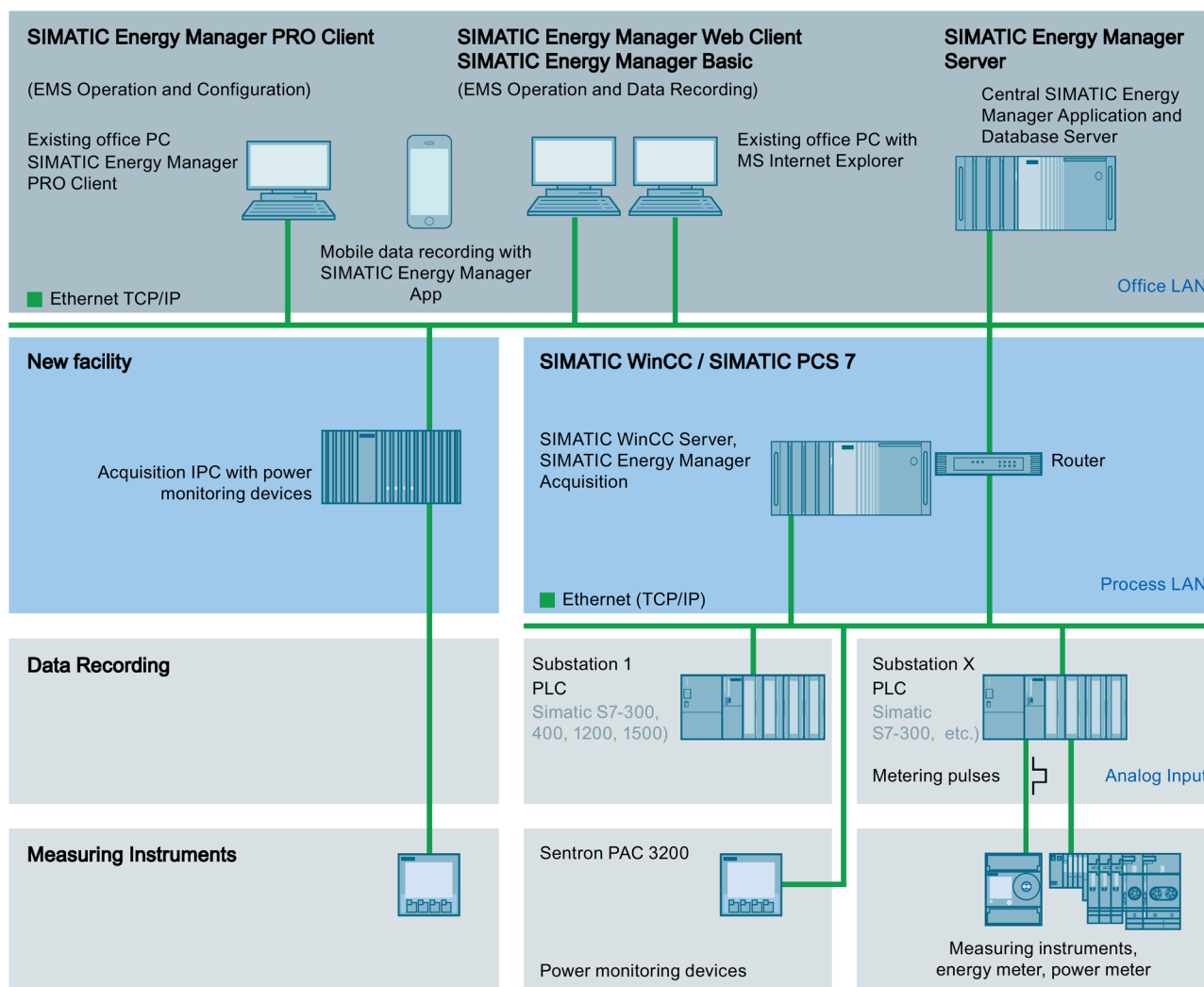
- GARDENA Manufacturing GmbH, Gerstetten / Germany
Complete reference example (Gardena)
(<https://new.siemens.com/global/en/company/stories/industry/factory-automation/gardena.html>)
- Clariant Produkte (Germany) GmbH, Heufeld / Germany
Complete reference example (Clariant)
(<https://new.siemens.com/global/en/company/stories/industry/factory-automation/clariant.html>)
- Grupo Pikolin, Zaragoza / Spain
Complete reference example (Grupo Pikolin)
(<https://references.siemens.com/reference/?id=/data/Record-0B9FD1A917C2785ADBEBF68F6ECED111.xml>)
- Further references to the SIMATIC Energy Manager in the References overview
(<https://references.siemens.com/en/result?sortby=LastModificationDate&itemsperpage=30&searchtext=simatic%20energy%20manager//XmlEditor.InternalXmlClipboard:62b544a8-bba0-9296-9ddf-b4c23277b749>)

Concept

2.1 Architecture and Scalability

Architecture

SIMATIC Energy Manager is based on a client-server architecture that is easily integrated into your company infrastructure. 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 Web Client	A web browser can be used to provide access via the Web Client, for example. The SIMATIC Energy Manager Web Client offers all the essential functions, such as retrieving generated reports or charts, entering measured values, managing energy efficiency measures and configuring data sources and data points. It also enables the user-defined creation of information views using widget dashboards. User-friendliness is further enhanced by a step-by-step wizard in the configuration processes.	1 ... n
SIMATIC Energy Manager Desktop Client	The Desktop Client is only available in the Pro version. This enables in-depth and extended configuration at expert level.	1 ... n ²
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.

2.2 Openness through standard interfaces

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

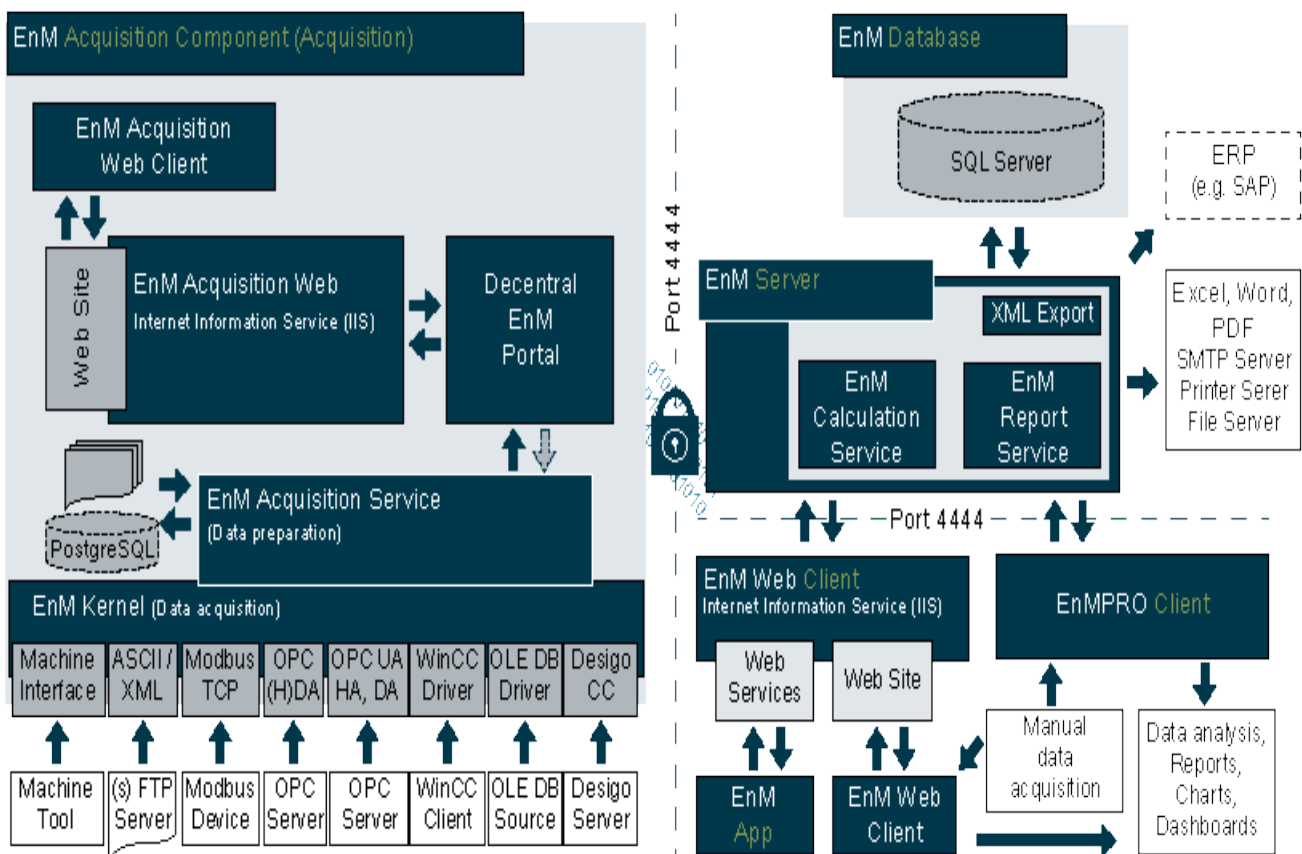
- Data from analog and digital measuring devices
- Historical data from different data sources

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

- Acquisition of load profiles via Modbus TCP from the Sentron PAC 2200CLP or Sentron PAC 4200 interface to the Multi Fieldbus Device.
- Interface to the Multi Field Bus Device.

- 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.

Component	Description
Energy Manager Web Client	All main functions, mainly wizard-guided in steps, are covered in the Energy Manager Web Client and you can access them there via 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.
Energy Manager PRO Client	The Energy Manager PRO Client is the desktop client and enables extended and in-depth configuration in expert mode. The access rights of individual users or user groups can be specifically restricted with the extensive user administration. In addition, the traceability of all changes made is guaranteed at all times. Every Energy Manager PRO system contains at least one PRO Client, which can be operated both locally and 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.

OPC Server (UA HA)

The time series of the data points can be provided via the Energy Manager OPC server.

REST API

The time series of the data points and the key figures for each batch can be accessed via the Energy Manager REST API.

2.3 Authorization concept

Data protection

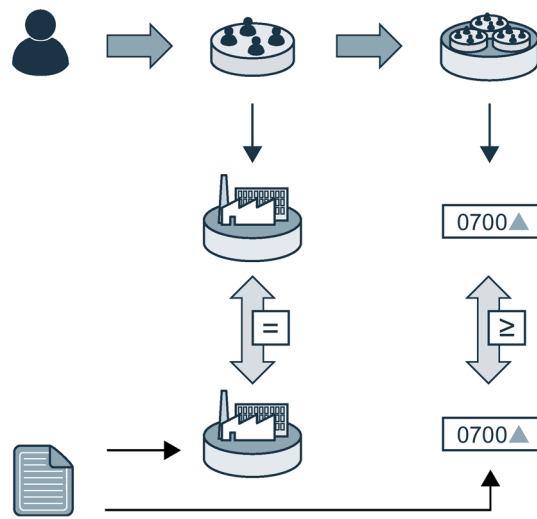
SIMATIC Energy Manager has a three-level authorization concept that prevents unauthorized access to sensitive data:

- 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.

2.4 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.

2.5 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.

2.6 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.

2.7 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 Web Server including one SIMATIC Energy Manager Web Client
- Microsoft SQL Server 2022 Database (embedded version)
- 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 V7.5	Download article no.	DVD package article no.
SIMATIC Energy Manager Basic incl. 50 Tags ¹	6AV6372-1DF07-5AH0	6AV6372-1DF07-5AX0
SIMATIC Energy Manager PRO incl. 50 Tags ¹	6AV6372-2DF07-5AH0	6AV6372-2DF07-5AX0
SIMATIC Energy Manager PRO Powerpack ²	6AV6372-2DF07-5AH3	6AV6372-2DF07-5AX3
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

The following expansions can be used as of SIMATIC Energy Manager V7.3:

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 Prognosis & Planning 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 recommended to use one acquisition component for each location, depending on the network configuration. Additional acquisition components are only available in Energy Manager PRO

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.

Upgrade SIMATIC Energy Manager PRO V7.4 to Energy Manager PRO V7.5

You can upgrade SIMATIC Energy Manager PRO V7.4 to SIMATIC Energy Manager PRO V7.5 with the following licenses. When migrating to the current version, you must consider the number of tags in your Energy Manager system.

Upgrade SIMATIC Energy Manager PRO V7.4 to Energy Manager PRO V7.5	Download article no.	DVD package article no.
Upgrade from systems with up to 50 tags and/or 1 consumer package	6AV6372-2DF07-5CH4	6AV6372-2DF07-5CX4
Upgrade from systems with up to 100 tags and/or 5 consumer packages	6AV6372-2DF07-5DH4	6AV6372-2DF07-5DX4
Upgrade from systems with up to 500 tags and/or 25 consumer packages	6AV6372-2DF07-5FH4	6AV6372-2DF07-5FX4
Upgrade from systems with up to 5000 tags and/or 100 consumer packages	6AV6372-2DF07-5HH4	6AV6372-2DF07-5HX4
Upgrade from systems with > 5000 tags and > 100 consumers packages	6AV6372-2DF77-5XH4	6AV6372-2DF77-5XX4

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	6AV6372-2DF17-5AX0

Energy data management with SIMATIC Energy Manager

3

3.1 Monitoring

3.1.1 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

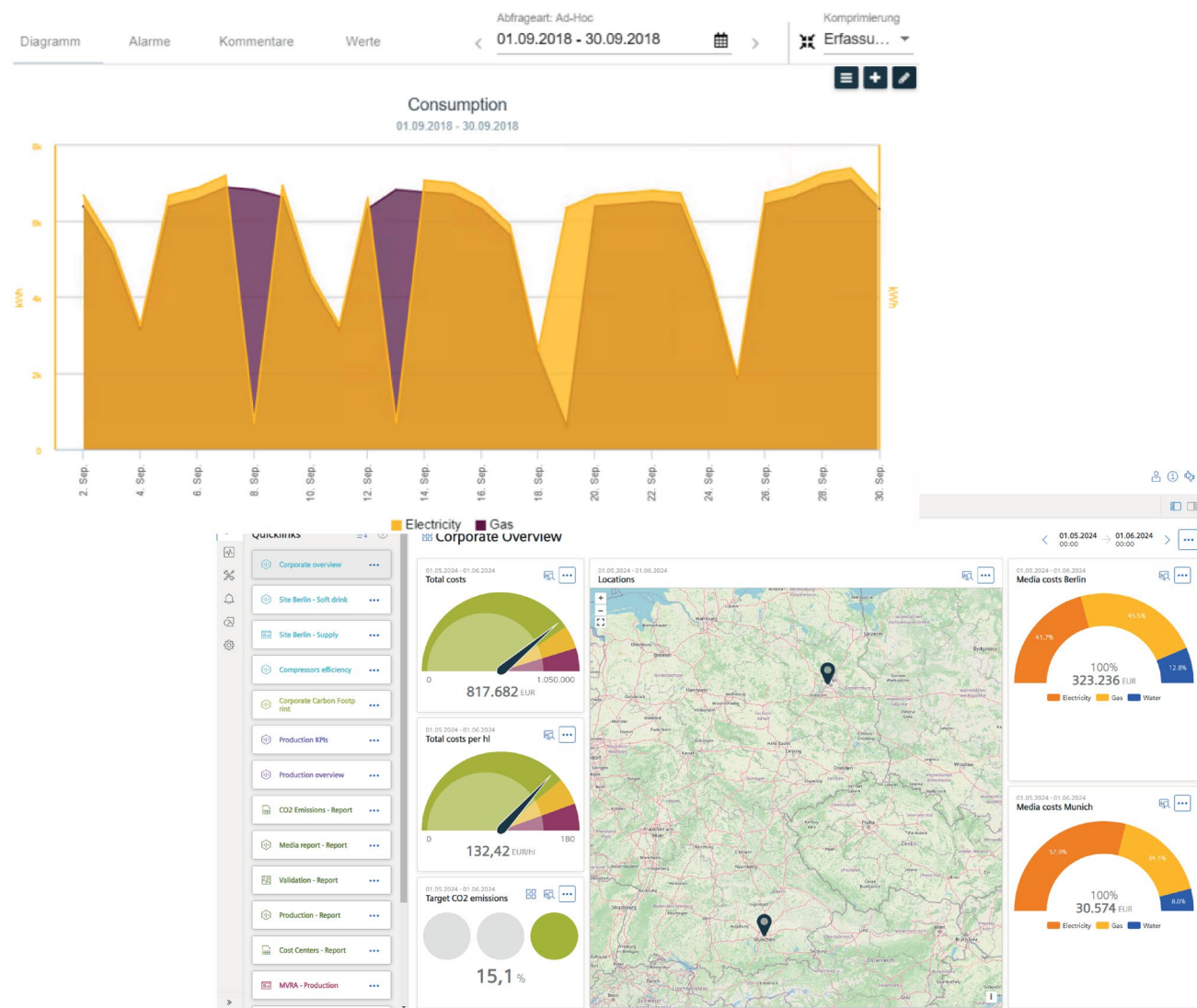
With the monitoring of Energy Manager, you have a fast and straightforward way to keep an eye on the energy and consumption data of your company. Energy Manager offers the following options for displaying and evaluating operating data and performance indicators:

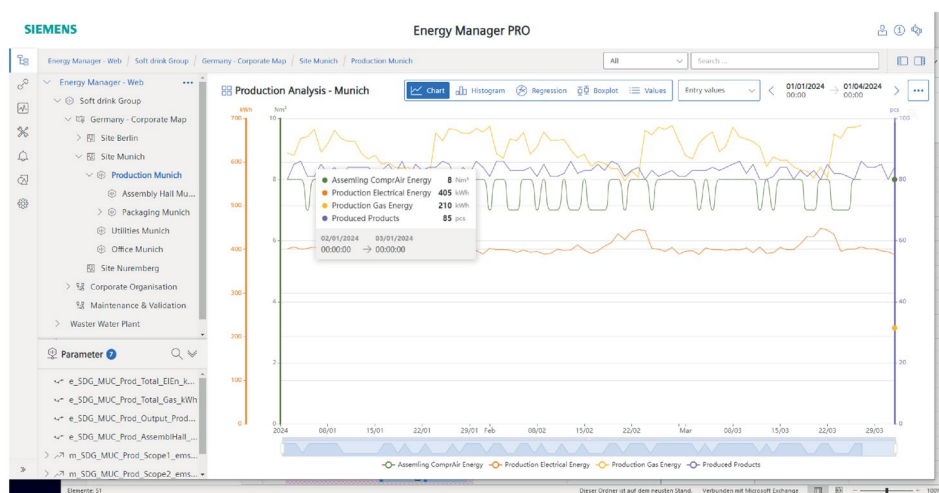
- Current values for display of the current situation.
- Historical as a basis for comparisons and analyzes.

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 only includes the Web Client, both in the Energy Manager Web Client and in the Energy Manager PRO Client. Compared to Energy Manager Basic, Energy Manager PRO offers a more in-depth and extended configuration in an expert mode.





See also

Online Monitoring (Page 33)

Chart (Page 28)

Widget dashboard (Page 30)

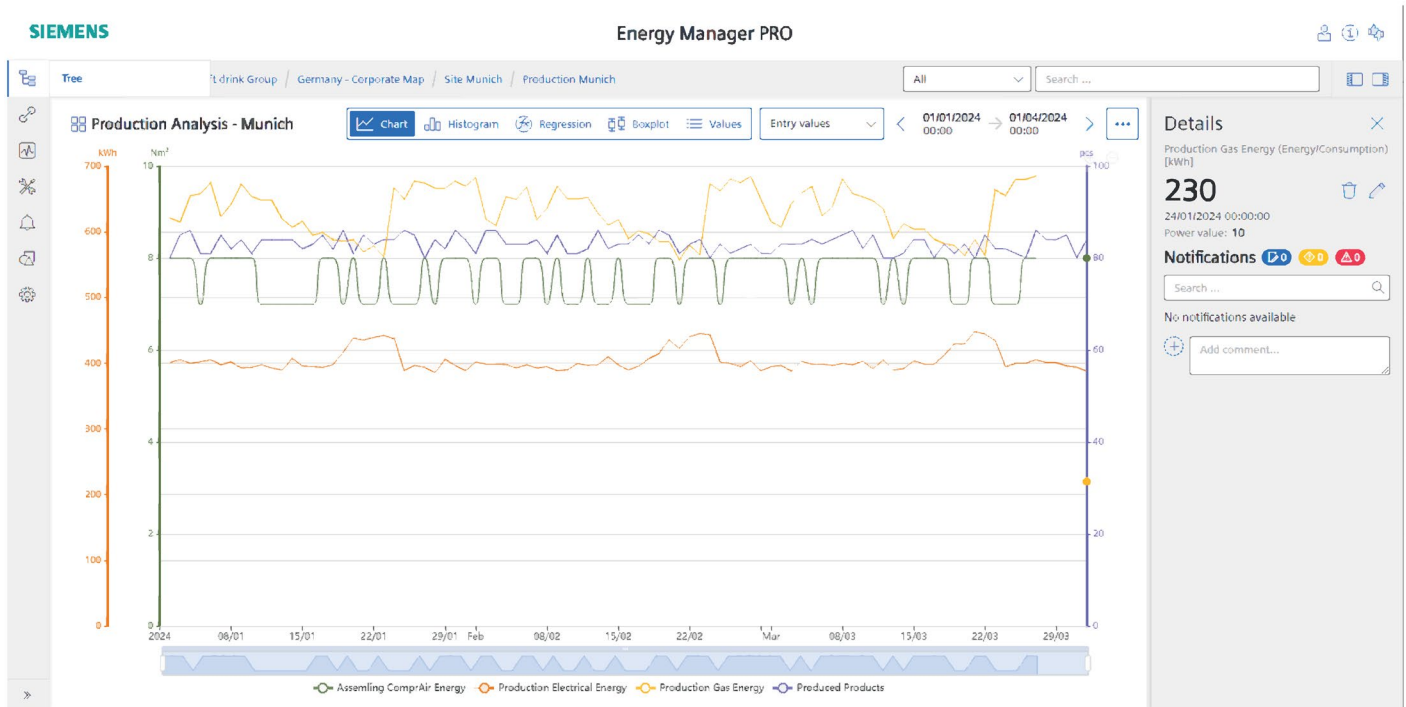
Basics of Data Management (Page 115)

3.1 Monitoring

3.1.2 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.

The user can enter comments on individual values in order to document problem analyses.

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
- Information on the comments and alerts visualized in the current chart can be shown and hidden via a side panel
- The comment function can be used to change and comment on values and display alerts
- 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 103)" section.

See also

Basics of Monitoring (Page 25)

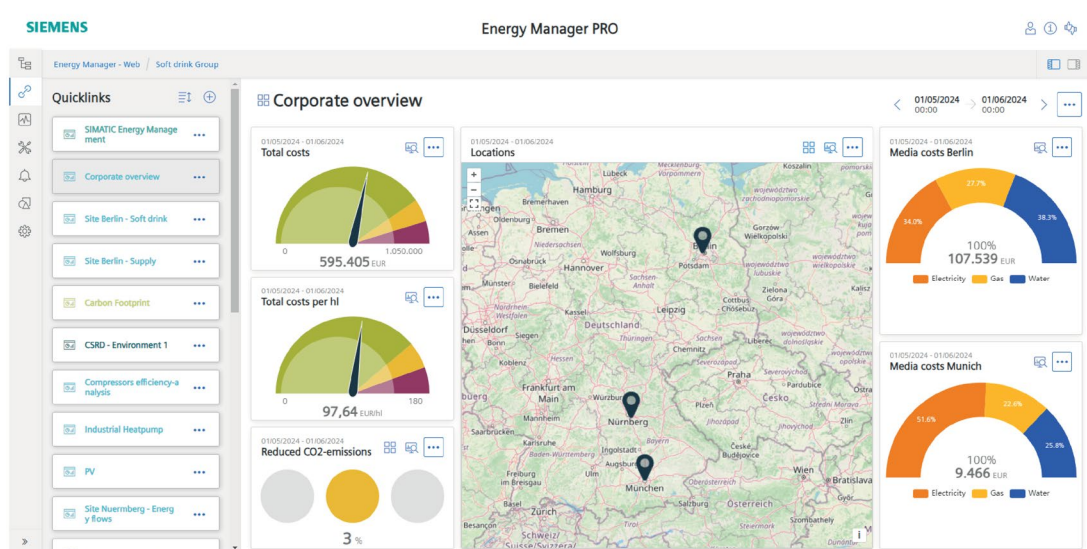
Chart (Page 102)

3.1.3 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.



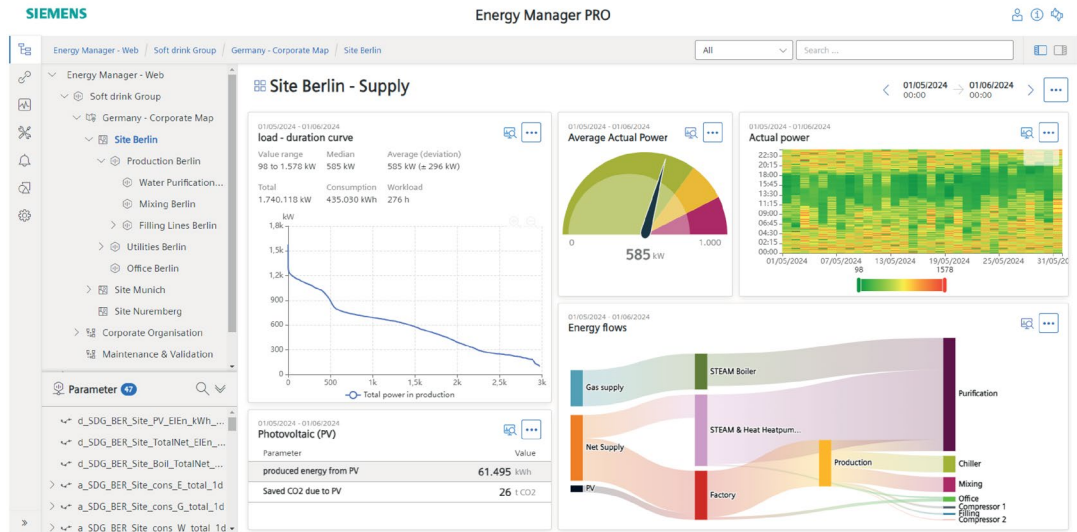
Using a widget dashboard

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 various widgets.

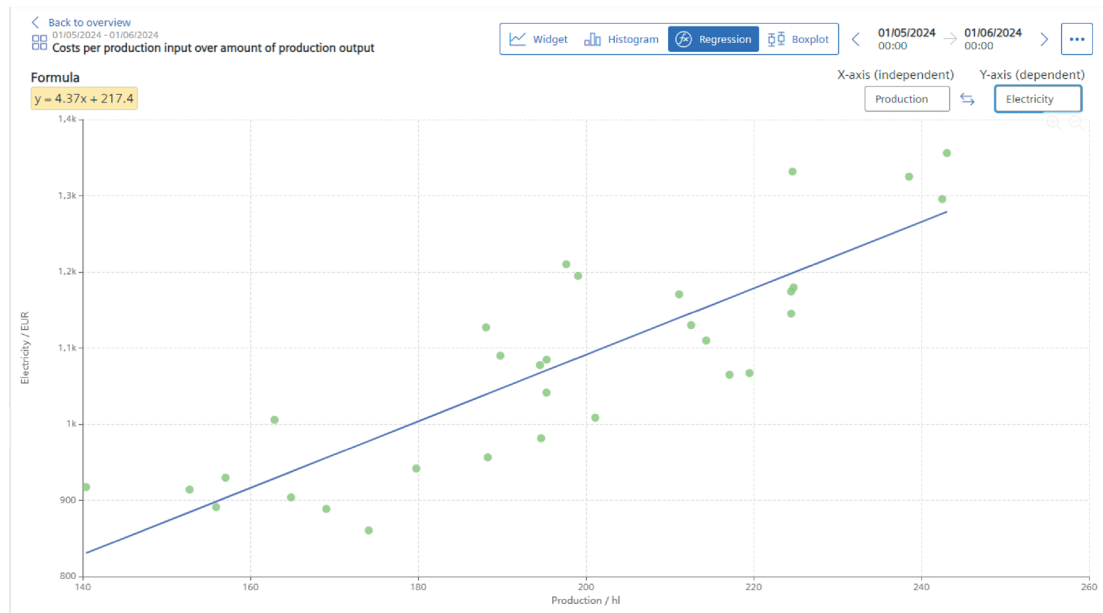
Depending on the widget type, you can assign one or more data points or key figures to the widget.



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 intervals of equal sized 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.

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.

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.

Box plot: The tooltip provides the user with information on the minimum, maximum, median, 25% quartile and 75% quartile.

See also

Basics of Monitoring (Page 25)

Performance Indicators (Page 36)

Widget dashboard (Page 82)

3.1.4 Online Monitoring

Online Monitoring enables you to display data points of Modbus devices and OPC channels in real time.

Configuration

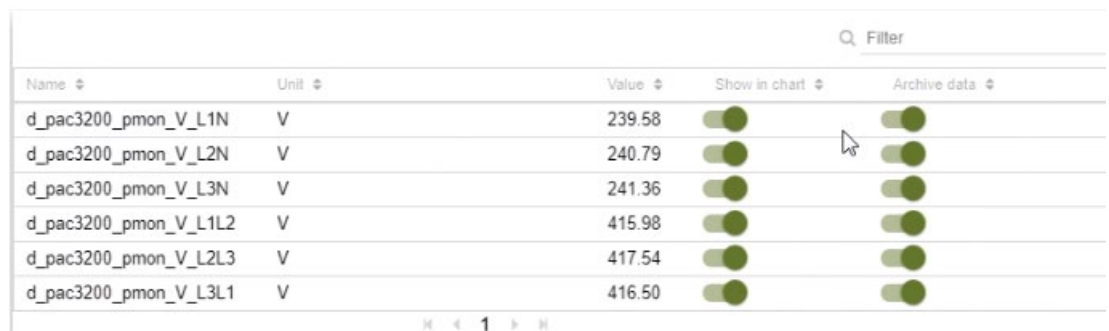
Under "Configuration", configure the Online Monitoring. You can activate the following functions for each data point:

- **Display in chart:** The corresponding data point is displayed in the Online Monitoring chart. You can activate this function for a maximum of 10 data points at the same time.
- **Archive data:** The values of the data point are saved for Online Monitoring for 62 days. Historical values are displayed in the chart only for these data points. When you deactivate this function, already archived data are not deleted.

Note

A maximum of 1000 data points per acquisition component and a maximum of 25 data points per device can be simultaneously archived.

The data points are displayed in tabular form:



Name	Unit	Value	Show in chart	Archive data
d_pac3200_pmon_V_L1N	V	239.58	☒	☒
d_pac3200_pmon_V_L2N	V	240.79	☒	☒
d_pac3200_pmon_V_L3N	V	241.36	☒	☒
d_pac3200_pmon_V_L1L2	V	415.98	☒	☒
d_pac3200_pmon_V_L2L3	V	417.54	☒	☒
d_pac3200_pmon_V_L3L1	V	416.50	☒	☒

The table contains the following six columns:

Column	Function
Name	Name of the data point
Unit	Unit of the value of the data point
Value	Current value of the data point This value is updated in the acquisition cycle of Online Monitoring.
Show in chart:	If this option is selected, the corresponding data point is shown in the Online Monitoring chart:
Archive data	If this option is activated, the values of the corresponding data point is saved for 62 days.

3.1 Monitoring

Chart

The data points selected under "Configuration" are graphically displayed under "Chart".

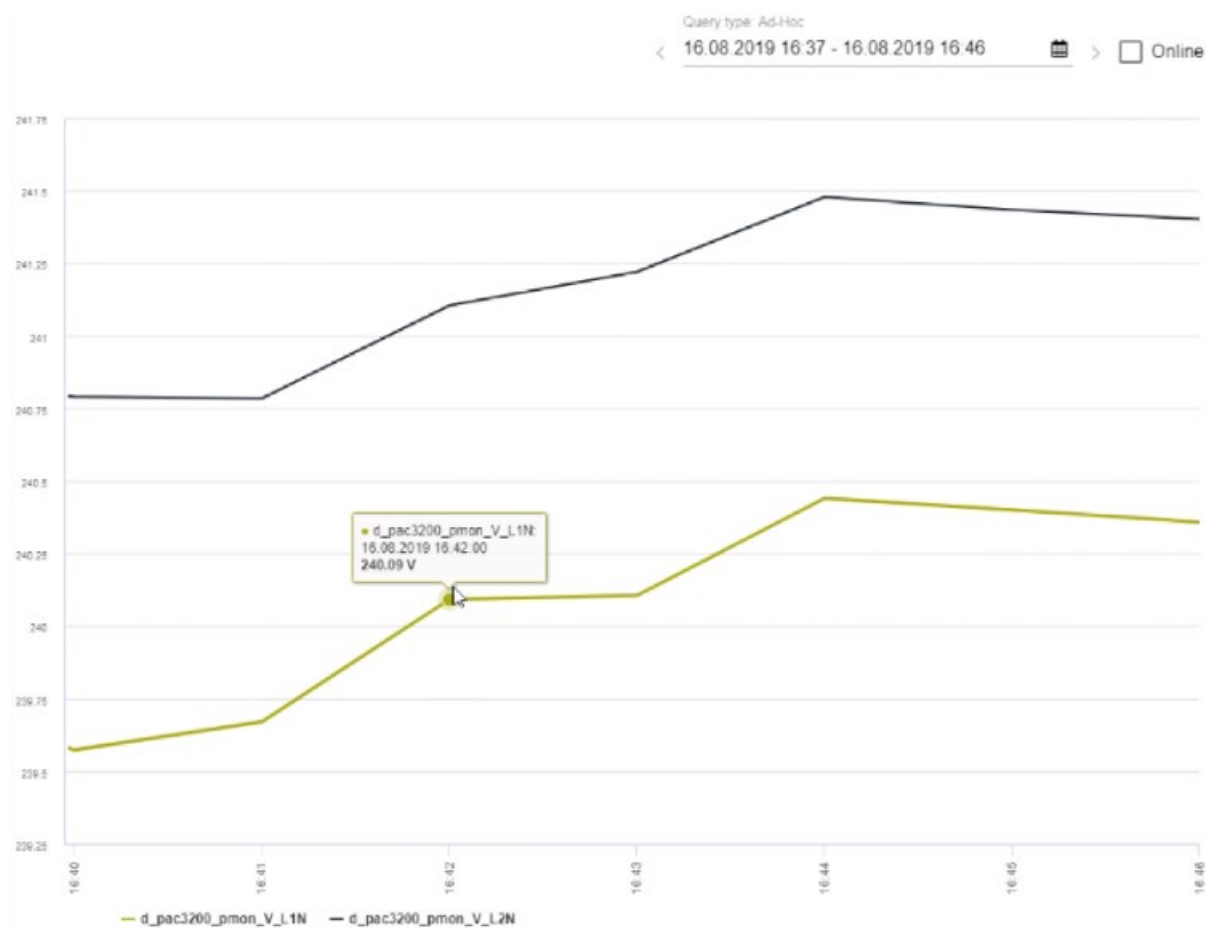


Figure 3-1 Online monitoring

Note

If you select a time period with a large number of measured values, loading the chart may take a considerable amount of time.

3.2 Controlling

3.2.1 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 implementation 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 parameters.
- 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 118)".

3.2.2 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.

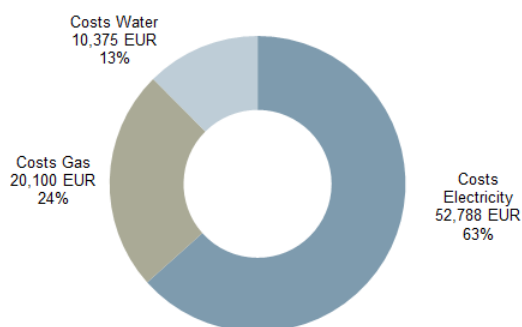
SIEMENS

Author: SIEMENS

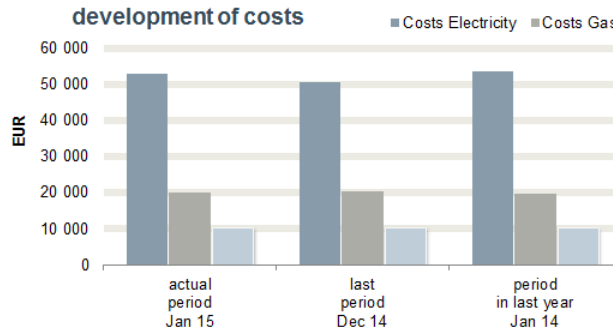
Key performance indicators

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

Cost allocation



development of costs



KPI's		Jan 15	Dec 14	Jan 14	comp. last period	comp. last year
		actual period	last period	period in 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.

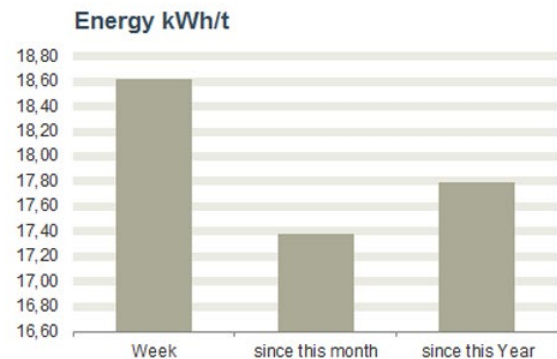
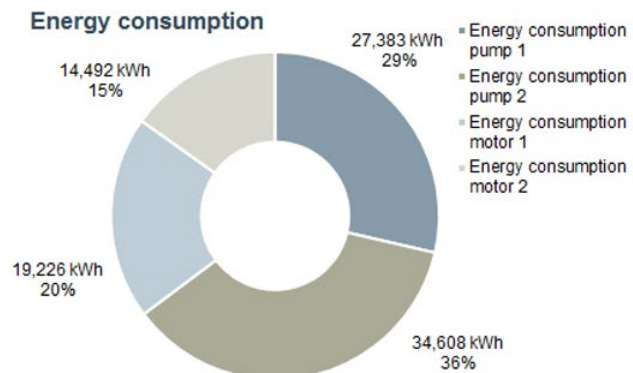
The following figure shows the energy consumption per ton. The different time ranges "Week", "Since beginning of month" and "Since beginning of the year" provide quick information of possible deviations. In this instance, the energy consumption per ton has already exceeded the current monthly and average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

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Author: SIEMENS

KPI's batch production

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



		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 38)

Specific Performance Indicators (Page 40)

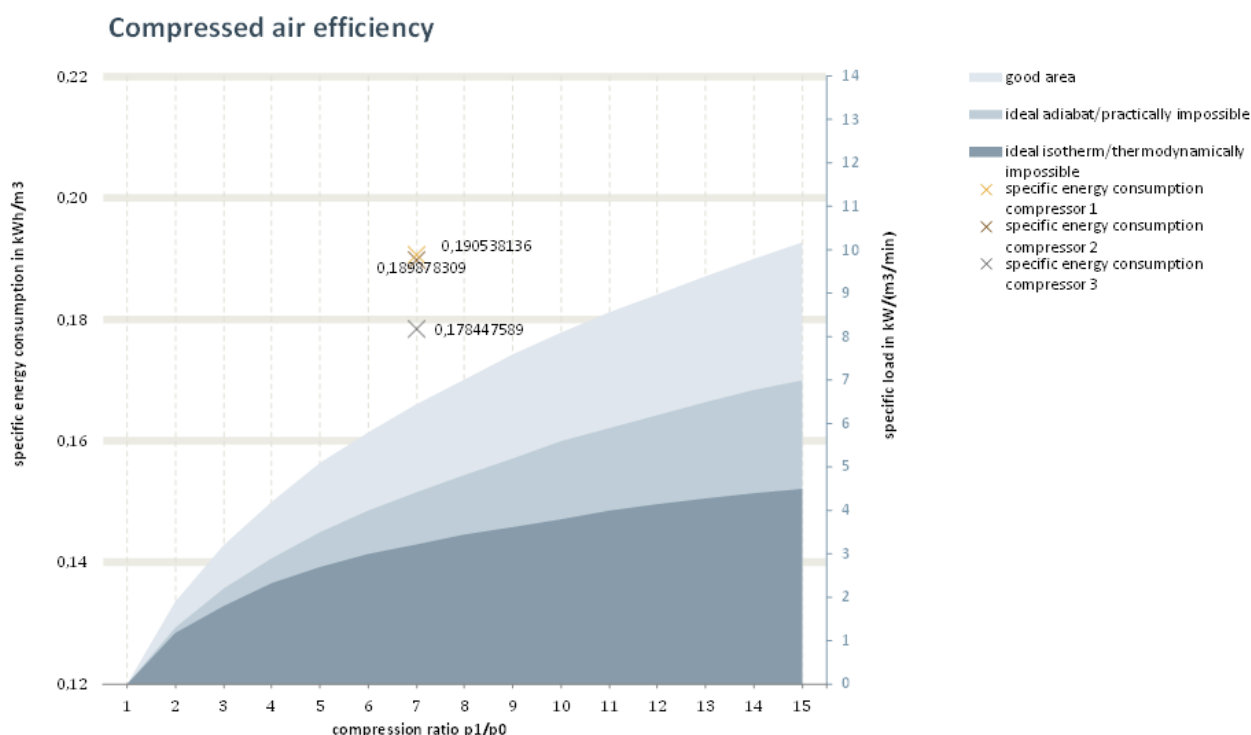
Widget dashboard (Page 30)

3.2.3 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 40)

3.2.4 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.

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Author: Siemens

KPI - Benchmark

Period
Date

1/1/2015

To 2/1/2015

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 44)".

3.2.5 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.

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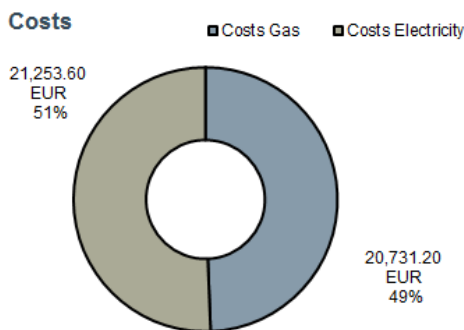
Plant Performance

Author: SIEMENS

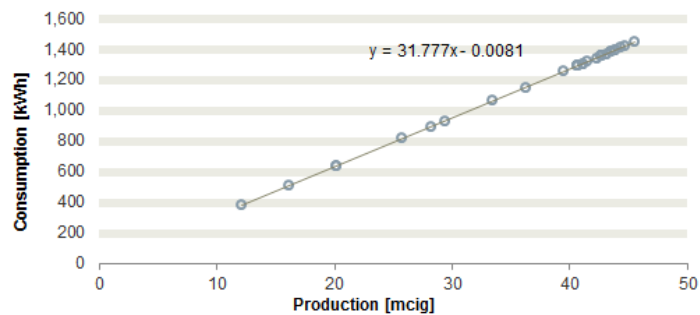
Period: 1/1/2015 To 2/1/2015

Date: 2/5/2015 7:47:08 AM

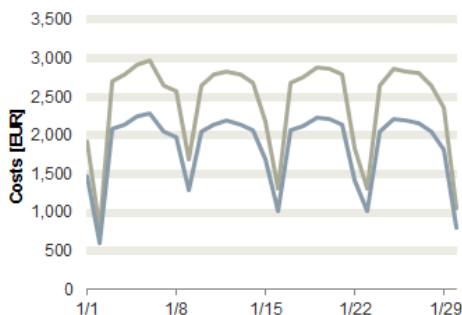
Costs



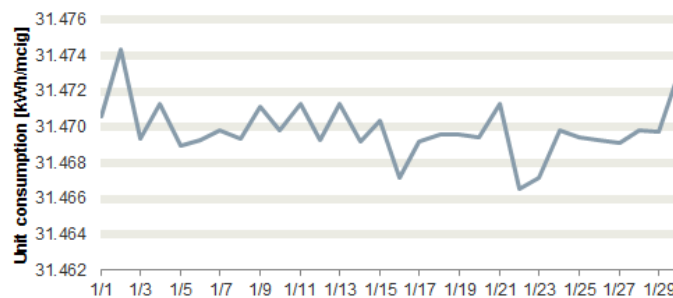
Relation between Production and Consumption



Cost Development



Unit consumption [kWh/mcig] per day



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

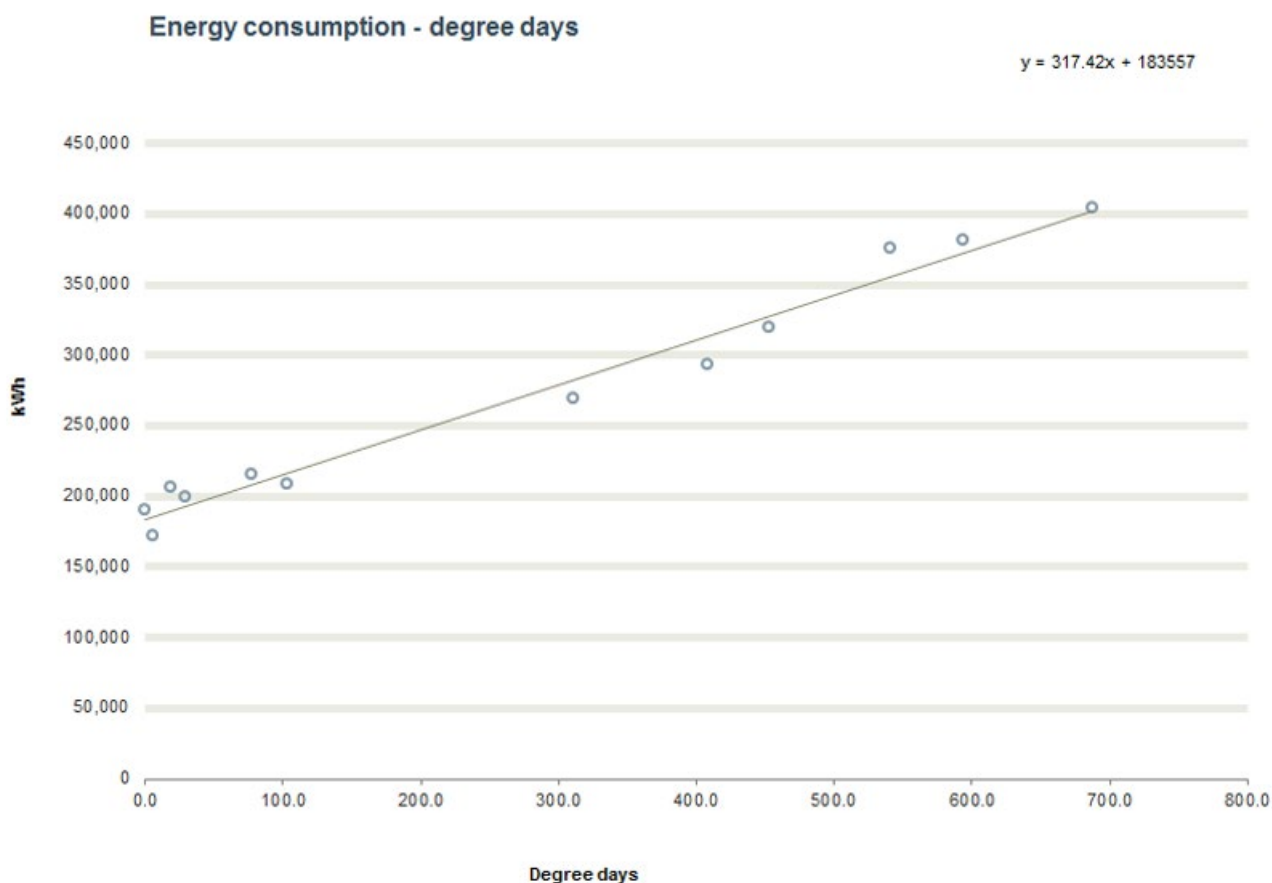
Author: SIEMENS

Degree Day Normalization

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%



Energy situation

Reports are often used to provide an overview of the energy situation. The following figure shows an overview of the energy sources used and the level of CO₂ emissions.

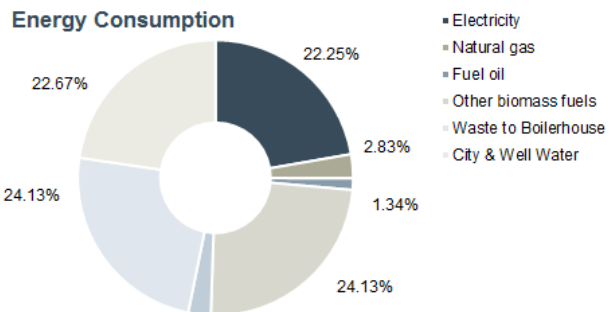
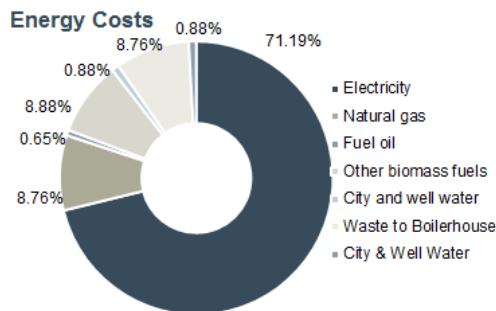
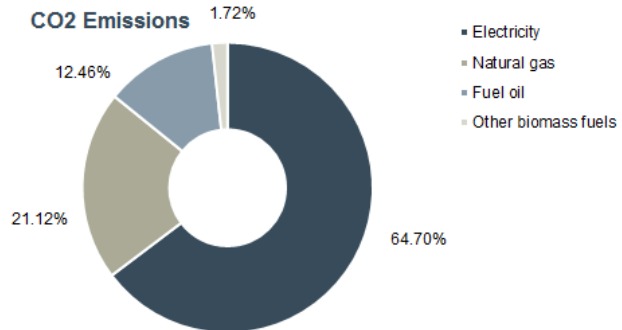
SIEMENS

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]	CO ₂ emission [t CO ₂]
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



It is quite clear from this example that electricity represents a significant portion of the costs as well as CO₂ emissions. However, the consumption data shows that basically only four energy sources are used. With regard to consumption, electricity is relatively expensive. A change of energy supplier can, for example, be a first measure.

See also

- Sustainability - Emissions (Page 44)
- Batch-related Energy Evaluation (Page 47)
- Performance Indicators (Page 36)
- Calculation level 2 (MEVA concept) (Page 117)
- Prediction based on production plans (Page 67)

3.2.6 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.

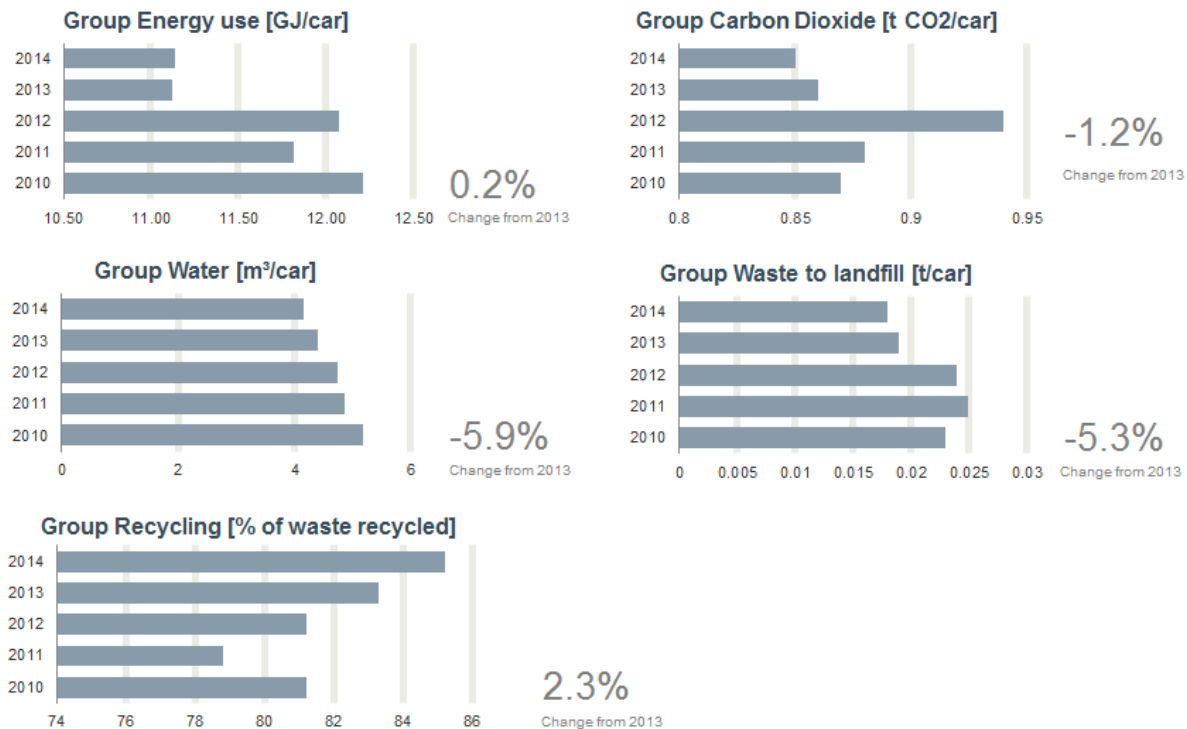
SIEMENS

Author: SIEMENS

Sustainability Management

Period: 1/1/2014 To 1/1/2015

Date: 2/5/2015 3:13:10 PM



Example of CO₂ emissions and emissions trading

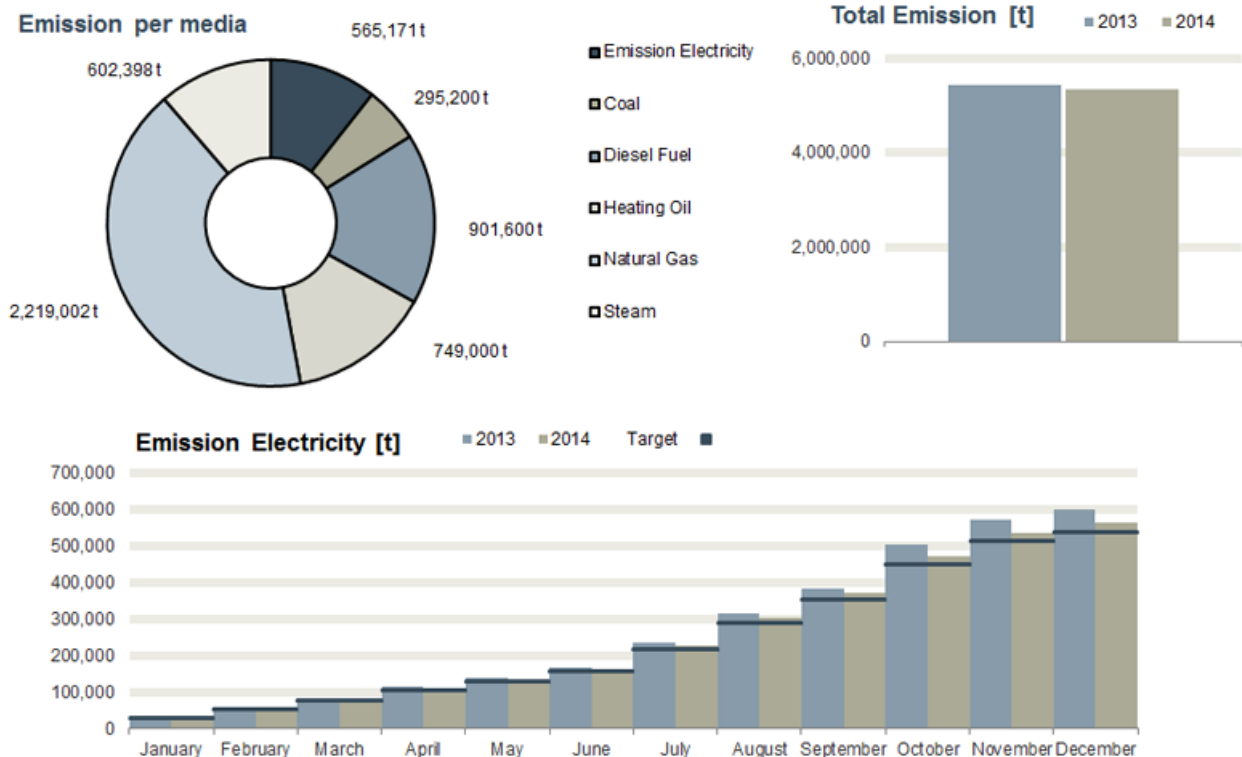
The emission of the greenhouse gas CO₂ is currently of public interest. Exceeding of legal limits may require the purchase of emissions allowances and thereby resulting in additional costs. A cumulative display up to middle of the year sheds light on the current emission situation.

SIEMENS

Author: SIEMENS

Carbon Emission

Period: 1/1/2014 To 1/1/2015
Date: 2/5/2015 3:13:30 PM



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 CO₂ emitted per kilowatt hour consumed.

See also

Benchmarking / Targeting (Page 39)

Targets cockpit - Measures management (Page 69)

3.2.7 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.

Implementation

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

The following figure shows a list of batches in the resulting batch report with plant units, batch ID and duration as well as the energy consumption per plant unit. Numbers and texts are supported as batch ID.

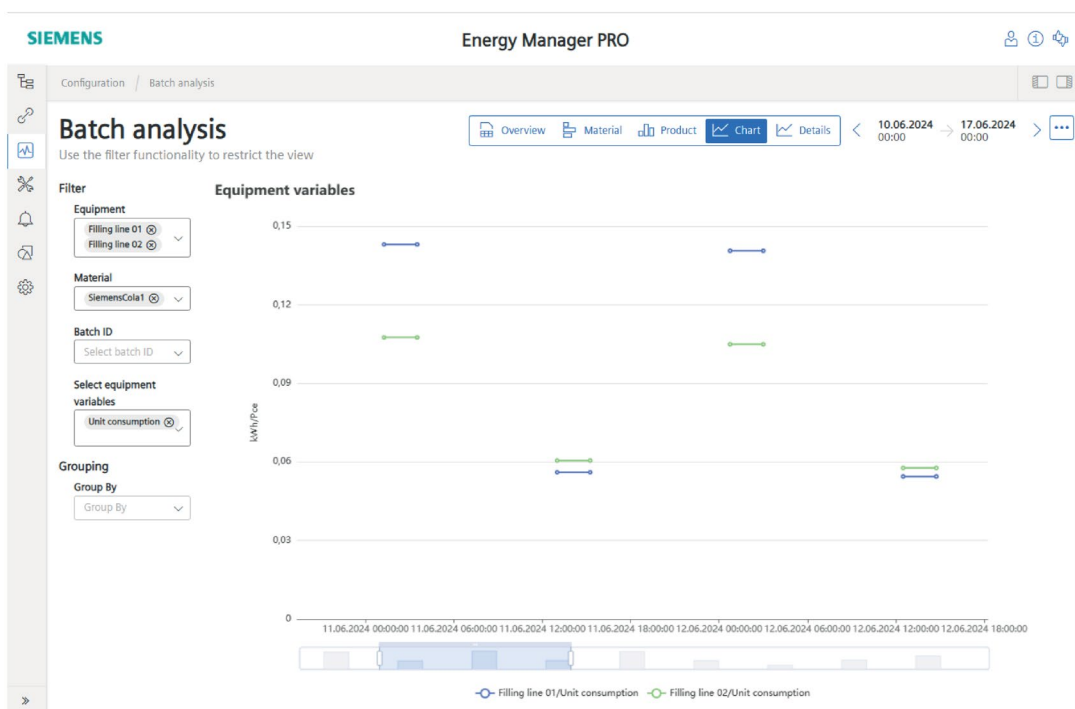
Anlage	Material	Batch ID	von	bis	Hh:mm:ss	Electricity	Unit consumption
Filling line 01	Soft drink2	200251	30.04.2024 20:30	30.04.2024 23:30	3:00	75 735,00	5,44
Filling line 01	No material	0	30.04.2024 23:30	01.05.2024 00:30	1:00	33 961,00	5,74
Filling line 01	Soft drink3	300251	01.05.2024 00:30	01.05.2024 04:00	3:30	97 569,00	5,18
Filling line 01	No material	0	01.05.2024 04:00	01.05.2024 05:00	1:00	48 543,00	4,88
Filling line 01	Soft drink1	100252	01.05.2024 05:00	01.05.2024 07:15	2:15	55 172,00	5,26
Filling line 01	No material	0	01.05.2024 07:15	01.05.2024 08:15	1:00	40 970,00	5,11
Filling line 01	Soft drink2	200252	01.05.2024 08:15	01.05.2024 11:15	3:00	75 672,00	5,41
Filling line 01	No material	0	01.05.2024 11:15	01.05.2024 12:15	1:00	31 759,00	5,38
Filling line 01	Soft drink3	300252	01.05.2024 12:15	01.05.2024 15:45	3:30	100 037,00	5,26
Filling line 01	No material	0	01.05.2024 15:45	01.05.2024 16:45	1:00	48 226,00	4,84
Filling line 01	Soft drink1	100253	01.05.2024 16:45	01.05.2024 19:00	2:15	55 432,00	5,27
Filling line 01	No material	0	01.05.2024 19:00	01.05.2024 20:00	1:00	41 813,00	5,23
Filling line 01	Soft drink2	200253	01.05.2024 20:00	01.05.2024 23:00	3:00	74 899,00	5,38
Filling line 01	No material	0	01.05.2024 23:00	02.05.2024 00:00	1:00	32 078,00	5,38
Filling line 01	Soft drink3	300253	02.05.2024 00:00	02.05.2024 03:30	3:30	100 467,00	5,30
Filling line 01	No material	0	02.05.2024 03:30	02.05.2024 04:30	1:00	48 826,00	4,85
Filling line 01	Soft drink1	100254	02.05.2024 04:30	02.05.2024 06:45	2:15	55 467,00	5,26

Implementation in Energy Manager Web

The following figure shows a listing of batches for a plant unit in Energy Manager PRO Web 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.

Equipment	Material	Batch ID	Start time	End time	Duration	Production amount	Electricity	Unit consumption	Gas	Compressed Air
Filling line 01	No material	0	01.06.2024 00:45:00	01.06.2024 01:45:00	01:00:00	0 piece	2,31 kWh	0 kWh/Pce	563,74 kWh	403,3 kWh
Filling line 01	SiemensCola3	300315	01.06.2024 01:45:00	01.06.2024 05:15:00	03:30:00	20.610 piece	1.145,11 kWh	0,18 kWh/Pce	1.441,99 kWh	1.177,5 kWh
Filling line 01	No material	0	01.06.2024 05:15:00	01.06.2024 06:15:00	01:00:00	0 piece	2,24 kWh	0 kWh/Pce	248,19 kWh	221,5 kWh
Filling line 01	SiemensCola1	100316	01.06.2024 06:15:00	01.06.2024 08:30:00	02:15:00	22.423 piece	1.124,79 kWh	0,1 kWh/Pce	613,02 kWh	430,2 kWh
Filling line 01	No material	0	01.06.2024 08:30:00	01.06.2024 09:30:00	01:00:00	0 piece	2,31 kWh	0 kWh/Pce	87,44 kWh	15,1 kWh
Filling line 01	SiemensCola2	200316	01.06.2024 09:30:00	01.06.2024 12:30:00	03:00:00	23.618 piece	1.234,13 kWh	0,11 kWh/Pce	580,5 kWh	719,1 kWh
Filling line 01	No material	0	01.06.2024 12:30:00	01.06.2024 13:30:00	01:00:00	0 piece	2,48 kWh	0 kWh/Pce	268 kWh	113,2 kWh
Filling line 01	SiemensCola3	300316	01.06.2024 13:30:00	01.06.2024 17:00:00	03:30:00	21.000 piece	1.157,5 kWh	0,06 kWh/Pce	82,47 kWh	79,1 kWh
Filling line 01	No material	0	01.06.2024 17:00:00	01.06.2024 18:00:00	01:00:00	0 piece	2,28 kWh	0 kWh/Pce	8 kWh	16 kWh
Filling line 01	SiemensCola1	100317	01.06.2024 18:00:00	01.06.2024 20:15:00	02:15:00	22.599 piece	1.143,29 kWh	0,06 kWh/Pce	18 kWh	141,6 kWh
Filling line 01	No material	0	01.06.2024 20:15:00	01.06.2024 21:15:00	01:00:00	0 piece	2,12 kWh	0 kWh/Pce	178,03 kWh	205,4 kWh
Filling line 01	SiemensCola2	200317	01.06.2024 21:15:00	02.06.2024 00:15:00	03:00:00	24.005 piece	1.278,34 kWh	0,11 kWh/Pce	693,34 kWh	720,1 kWh
Filling line 01	No material	0	02.06.2024 00:15:00	02.06.2024 01:15:00	01:00:00	0 piece	2,18 kWh	0 kWh/Pce	276,72 kWh	237,8 kWh
Filling line 01	SiemensCola3	300317	02.06.2024 01:15:00	02.06.2024 04:45:00	03:30:00	21.002 piece	1.154,84 kWh	0,19 kWh/Pce	1.495,84 kWh	1.408,3 kWh
Filling line 01	No material	0	02.06.2024 04:45:00	02.06.2024 05:45:00	01:00:00	0 piece	2,19 kWh	0 kWh/Pce	478,06 kWh	462,1 kWh

The following figure shows the chart with the KPIs of all batches in the selected period. Each KPI is shown as a line between the start time and end time of the batch. The chart can show up to 10 KPI trends.



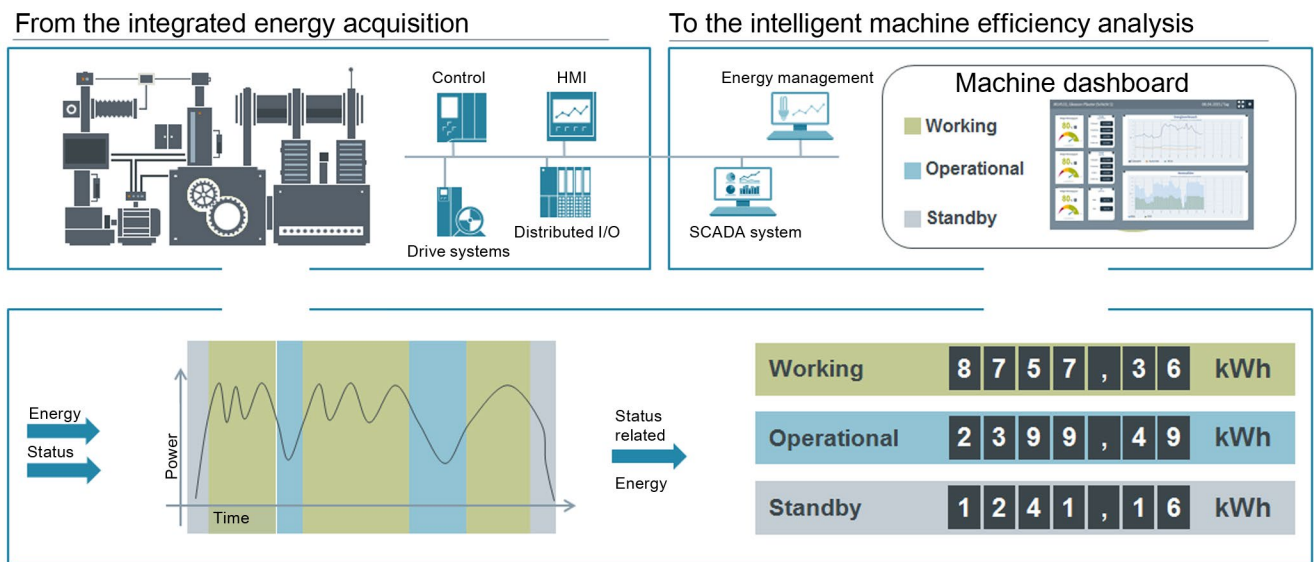
3.3 Status-related energy data management

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

3.4 Cost-center-oriented accounting

3.4.1 Basics for Accounting with Cost Center Distribution

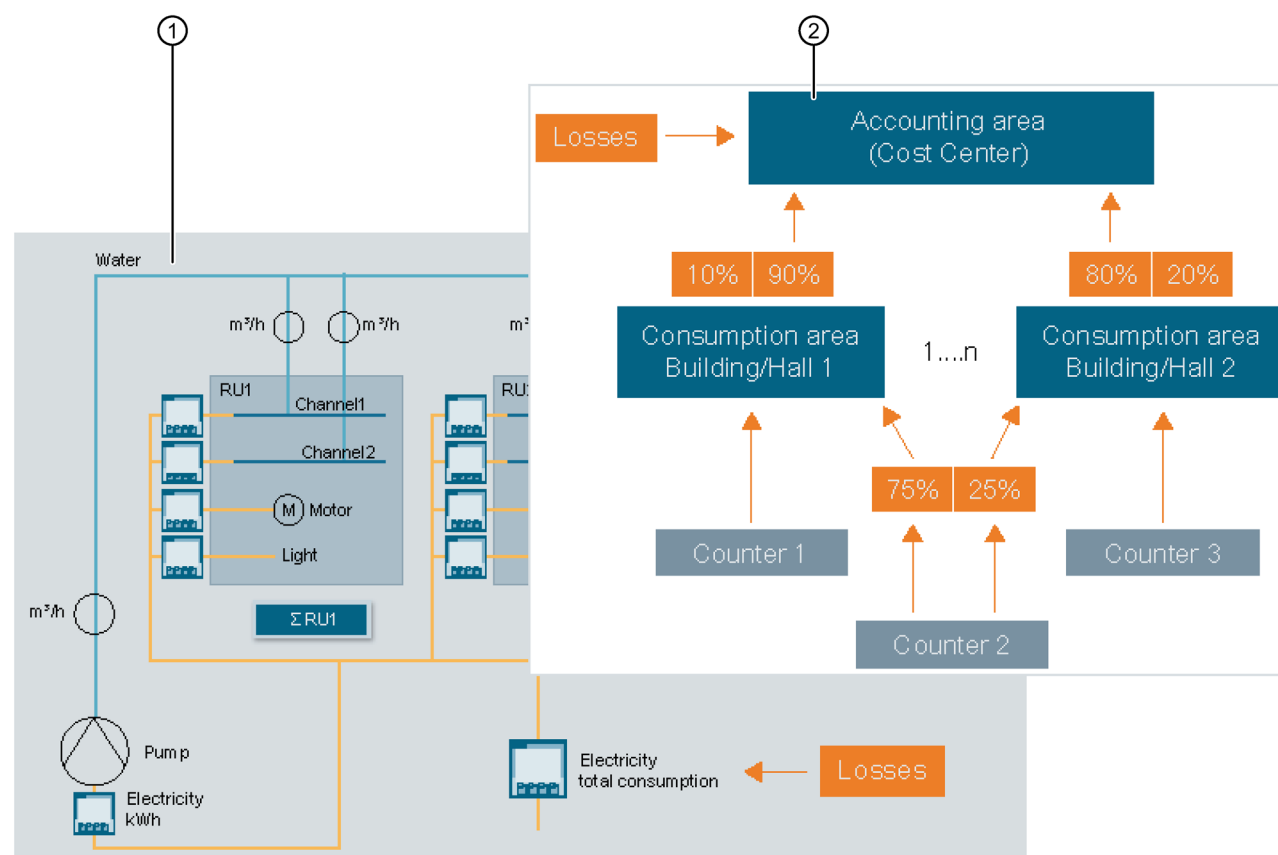
Introduction

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.

3.4.2 PAYG

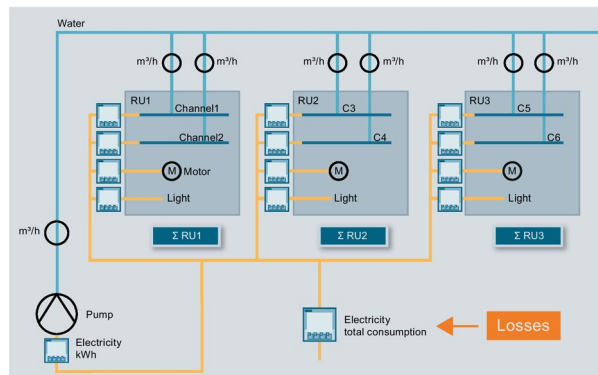
Introduction

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

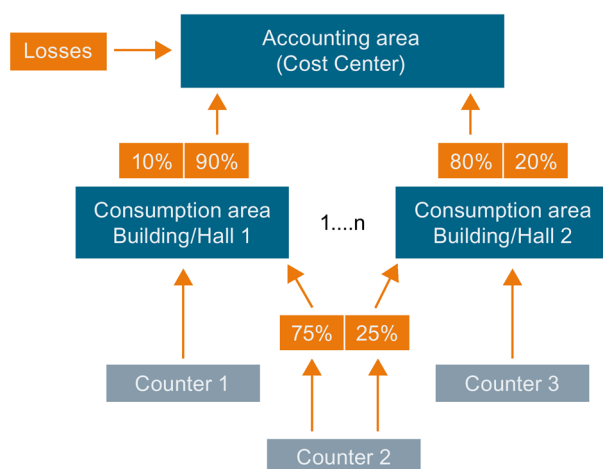
Period: 1/1/2015 To 2/1/2015
Date: 2/5/2015 7:44:07 AM

SIEMENS			total costs	total plant							
Medium			Energy Costs	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
		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
		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
CC < 100 % measured		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
		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
		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
		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
CC < 100 % measured		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

3.4.3 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.

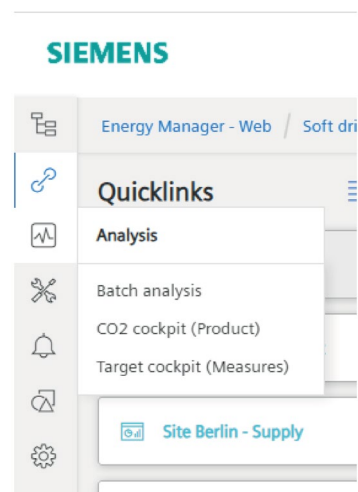
3.5 Batch analysis

With the batch analysis, you determine the resource consumption of a product per batch.

Batch analysis supports the following use cases, among others.

UC	Filter settings	Description
1	All assets, materials and batches	You obtain an overview of all batches and can export them as a CSV file. You can analyze the CSV file further in other tools.
2	All assets, materials and batches	You gain an overview of the energetic irregularities in selected batches. Sort the table by unit consumption, select the respective batches in the filter and switch to chart.
3	One asset, all materials and batches	You obtain an overview whether energy consumption depends on the produced material. To hide individual effects, view all batches during the time frame. Use unit consumption as KPI.
4	One asset, one material and all batches	You obtain an overview as to whether the different batches of a material are produced with equal efficiency in an asset. Use unit consumption as KPI.
5	Individual assets, one material and all batches	You obtain an overview of the unit consumption of a product that was produced in multiple assets at the same time.

To open the batch analysis, click on the "Batch analysis" icon or select "Batch list" from the asset overview.



3.5 Batch analysis

Overview structure

When you open the batch analysis, you will see an overview with the batches as well as their KPIs.

Batch analysis
Use the filter functionality to restrict the view

Equipment	Material	Batch ID	Start time	End time	Duration	Production amount	Electricity	Unit consumption	Gas	Compressed Air
Filling line 01	No material	0	17.06.2024 00:30:00	17.06.2024 01:30:00	01:00:00	0 piece	2,18 kWh	0 kWh/Pce	441,87 kWh	406,1 kWh
Filling line 01	SiemensC6a2	200348	17.06.2024 01:30:00	17.06.2024 04:30:00	03:00:00	23.903 piece	1.263,77 kWh	0,17 kWh/Pce	1.452,78 kWh	1.268,4 kWh
Filling line 01	No material	0	17.06.2024 04:30:00	17.06.2024 05:30:00	01:00:00	0 piece	2,28 kWh	0 kWh/Pce	475,14 kWh	405,6 kWh
Filling line 02	No material	0	17.06.2024 00:30:00	17.06.2024 01:30:00	01:00:00	0 piece	2,32 kWh	0 kWh/Pce	441,87 kWh	39 kWh
Filling line 02	SiemensC6a2	500348	17.06.2024 01:30:00	17.06.2024 04:30:00	03:00:00	23.903 piece	1.327,02 kWh	0,12 kWh/Pce	1.452,78 kWh	146,47 kWh
Filling line 02	No material	0	17.06.2024 04:30:00	17.06.2024 05:30:00	01:00:00	0 piece	2,36 kWh	0 kWh/Pce	475,14 kWh	37,87 kWh

Filter options

Table of batches and the KPI values assigned to the plant.
The maximum number of KPI values that can be displayed is 5.
You can recalculate , change  or delete  each batch.

You have the following options to filter the table for displayed batches:

- Filter for batches within a specific period.

< 17.06.2024 00:00 → 18.06.2024 00:00 >

- Filter for asset
- Filter for material
- Filter for batch ID

Material view

To open the material view, click "Material".

The chart shows the aggregated KPIs of all batches in the selected period grouped by material.



Asset view

To open the asset view, click "Product".

The chart shows the aggregated KPIs of all batches in the selected period grouped by asset.

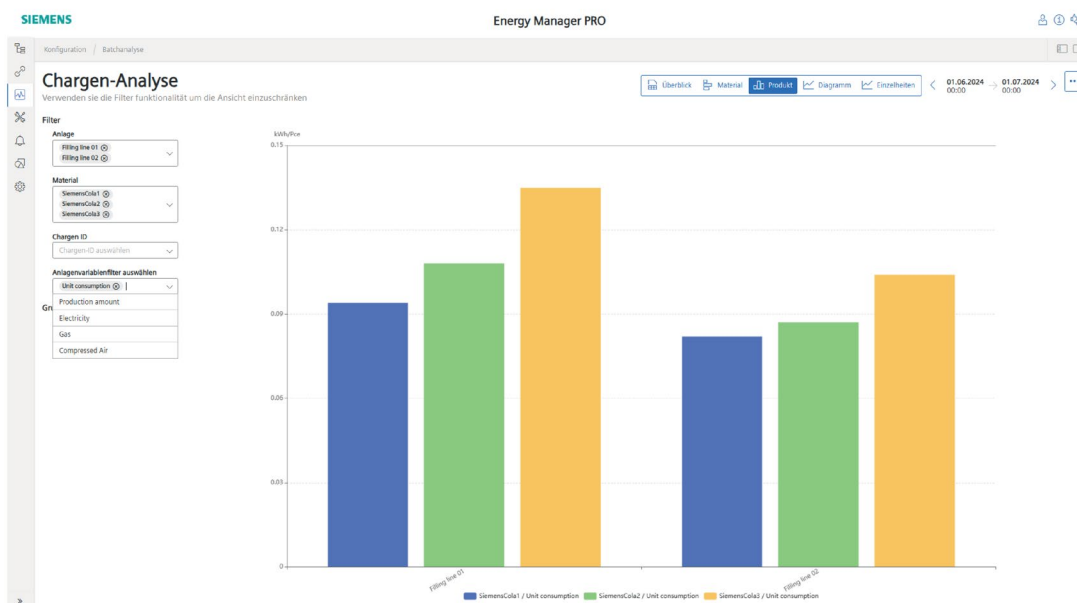
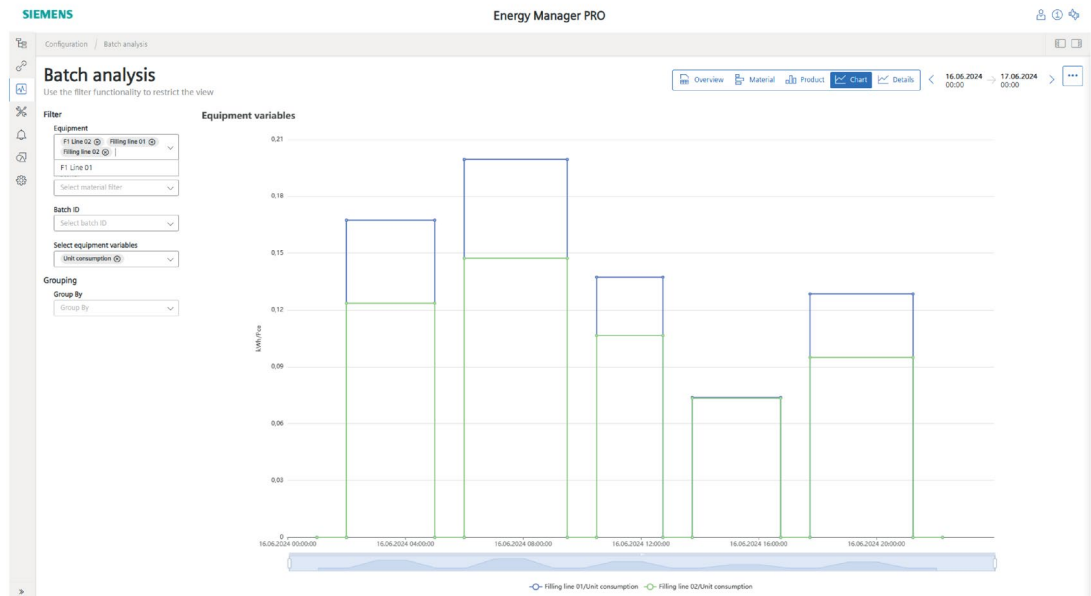


Chart view

Click "Chart" to open the chart view.

The chart shows the KPIs of all batches in the selected period. Each calculated KPI value is shown as a line between the start time and end time of the batch. The chart can show up to 10 KPI trends.



Details view

To open the details view, click "Details".

Under "Details", you can call up the detailed data of the underlying key figures or data points.



3.6 Media and activity management

Activities or media can be created in the configuration. The CO₂ equivalents, the costs per unit consumed and the costs for CO₂ certificates can be stored here in the form of a time-dependent contract. This information is later essential for the calculation of all key figures, such as costs, emissions in the product carbon footprint and in the Targets cockpit and measures management.

The screenshot shows the 'Edit medium / activity type - Site Berlin - Electricity' configuration window in the SIMATIC Energy Manager PRO software. The interface is divided into several sections:

- General information:** Includes fields for 'Name' (Electricity), 'Unit' (kWh), and 'Color' (represented by a color picker).
- Contract management:** Contains a section for 'Valid from' dates, with a dropdown showing 'Valid from 01/01/2020' and a detailed view for 'Valid from 01/01/2022'.
- Price [EUR / kWh]:** Includes a 'Price per kWh' field with a value of 0.143109009 and a 'Costs per CO₂ certificate' field with a value of 80.
- Emission data [kg CO₂e / kWh]:** Includes a 'Total' field with a value of 0.202, and sub-sections for 'Fossil', 'Biogenic', 'Other', 'Landuse', and 'Aircraft'.

The interface also features a left sidebar with navigation options like 'Soft drink Group', 'Site Berlin', 'Site Munich', and 'Site Nuremberg'. The top bar indicates the current configuration is for 'Site Berlin - Electricity'.

3.7 Product carbon footprint

Additional calculations can be performed based on the data from the batch analysis. The user can store the CO₂ equivalents in the media definition. The user can also define activities. One activity, for example, is electrical energy consumption.

Configure Activities
Configure activities for the site Berlin

Data set from: 01.01.2024

Material Phase

Production Phase

Media / Activity	Activity name	Asset	Allocation method	PCF allocation p.a. (tCO ₂ U/a)	Equipment variable
Electricity	Electricity	Berlin	No Allocation	0	Electricity
CO ₂ gas	CO ₂ gas losses - sparkling water	Berlin	Duration	336,000	
Gas	Gas	Berlin	No Allocation	0	Gas

Distribution Phase

Save Cancel

When defining the activity, the user defines a name, selects the medium and thus the coming CO₂ equivalent to be used and selects the equipment variable from the batch analysis. The user can optionally select an allocation method. A levy must be configured if only part of the CO₂-generating medium (gas, electrical energy, etc.) can be directly allocated to the plant and thus to the batch analysis. The remainder can be distributed among the products using the allocation method.

The following two methods are available for this

- Duration
- Production volume

For the duration, the occupancy period of the product in the plant is used to determine the allocation factor. For the production quantity, the production quantity is used to determine the factor.

The products for the product carbon footprint can be managed in the configuration under "Material management". All existing products are automatically created there using the data from the batch analysis. If required, the product description, the product name and the associated material group can be configured here.

The screenshot shows the 'Edit medium / activity type - Site Berlin - Electricity' configuration window in the SIMATIC Energy Manager PRO. The window is divided into several sections:

- General information:** Includes fields for Name (Electricity), Unit (kWh), and Color (a color selection button).
- Contract management:** Includes a section for Valid from dates (01/01/2020 and 01/01/2022) and a section for Price (EUR / kWh) and Costs per CO2 certificate (EUR / tCO2e).
- Emission data (kg CO2e / kWh):** Includes fields for Total (0.202), Fossil, Biogenic, and Other, as well as Landuse and Aircraft.

Buttons for 'Save' and 'Cancel' are located at the bottom of the window.

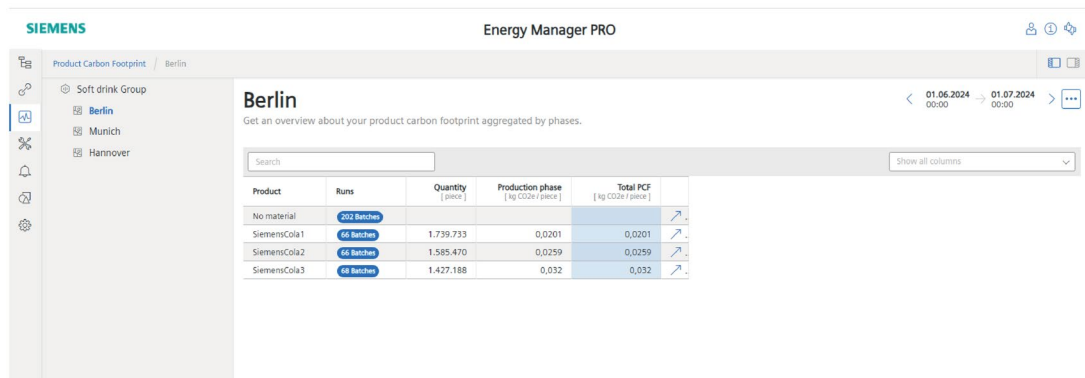
The screenshot shows the 'Edit activity CO2 gas losses - Sparkling water' configuration window in the SIMATIC Energy Manager PRO. The window is divided into several sections:

- General:** Includes fields for Name (CO2 gas losses - Sparkling water) and Media / Activity (CO2-Gas).
- Asset:** Includes a dropdown menu for Asset (Berlin - Site Berlin - Soft drink factory).
- Direct assigned emissions:** Includes a dropdown menu for Equipment variable (No variable).
- Allocation:** Includes a dropdown menu for Allocation method (Duration), a field for PCF allocation per year (336.000 tCO2e / a), and a field for Reference production hours per year (8.760 h / a).

Buttons for 'Save' and 'Cancel' are located at the bottom of the window.

3.7 Product carbon footprint

The CO2 cockpit gives the user an overview of the products at each location.



SIEMENS Energy Manager PRO

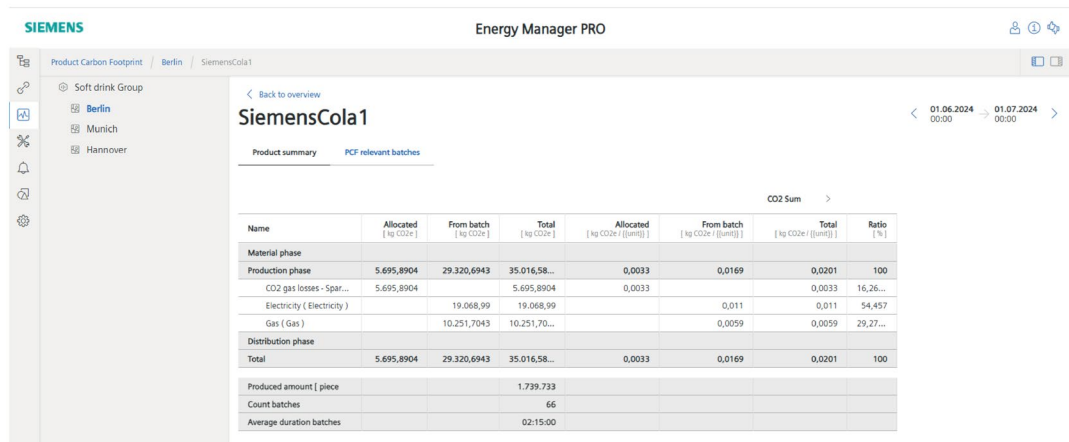
Product Carbon Footprint / Berlin

Get an overview about your product carbon footprint aggregated by phases.

Search: Show all columns

Product	Runs	Quantity [piece]	Production phase [kg CO2e / piece]	Total PCF [kg CO2e / piece]
No material	001 Batch			
SiemensCola1	001 Batch	1.739.733	0,0201	0,0201
SiemensCola2	001 Batch	1.585.470	0,0259	0,0259
SiemensCola3	001 Batch	1.427.188	0,032	0,032

By clicking on the arrow next to the respective product, the user receives detailed information about the product.



SIEMENS Energy Manager PRO

Product Carbon Footprint / Berlin / SiemensCola1

Back to overview

SiemensCola1

Product summary PCF relevant batches

CO2 Sum

Name	Allocated [kg CO2e]	From batch [kg CO2e]	Total [kg CO2e]	Allocated [kg CO2e / [unit]]	From batch [kg CO2e / [unit]]	Total [kg CO2e / [unit]]	Ratio [%]
Material phase							
Production phase	5.695,8904	29.320,6943	35.016,58...	0,0033	0,0169	0,0201	100
CO2 gas losses - Spar...	5.695,8904		5.695,8904	0,0033		0,0033	16,26...
Electricity (Electricity)		19.068,99	19.068,99		0,011	0,011	54,457
Gas (Gas)		10.251,7043	10.251,70...		0,0059	0,0059	29,27...
Distribution phase							
Total	5.695,8904	29.320,6943	35.016,58...	0,0033	0,0169	0,0201	100
Produced amount [piece]			1.739.733				
Count batches			66				
Average duration batches			02:15:00				

The activity data for each batch can optionally be transferred to SiGREEN. In SiGREEN, data from suppliers' supply chains can be queried or supplemented with secondary data. By combining the data, an overall picture of the product's carbon footprint is created.

3.8 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.



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 94)

3.9 Planning and Prediction

3.9.1 Basics of Planning and Projection

Introduction

Planning and prognosis 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: "Multi-Variable Regression Analysis" widget.
- Production plans: With SIMATIC Energy Manager PRO Prognosis & Planning 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 (Page 66)

Prediction based on production plans (Page 67)

Prediction based on shifts (Page 67)

3.9.2 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.



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

Basics of Planning and Projection (Page 65)

Multi-Variable Regression Analysis (MV.RA) (Page 94)

3.9.3 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

Specific Performance Indicators (Page 40)

Basics of Planning and Projection (Page 65)

3.9.4 Prediction based on shifts

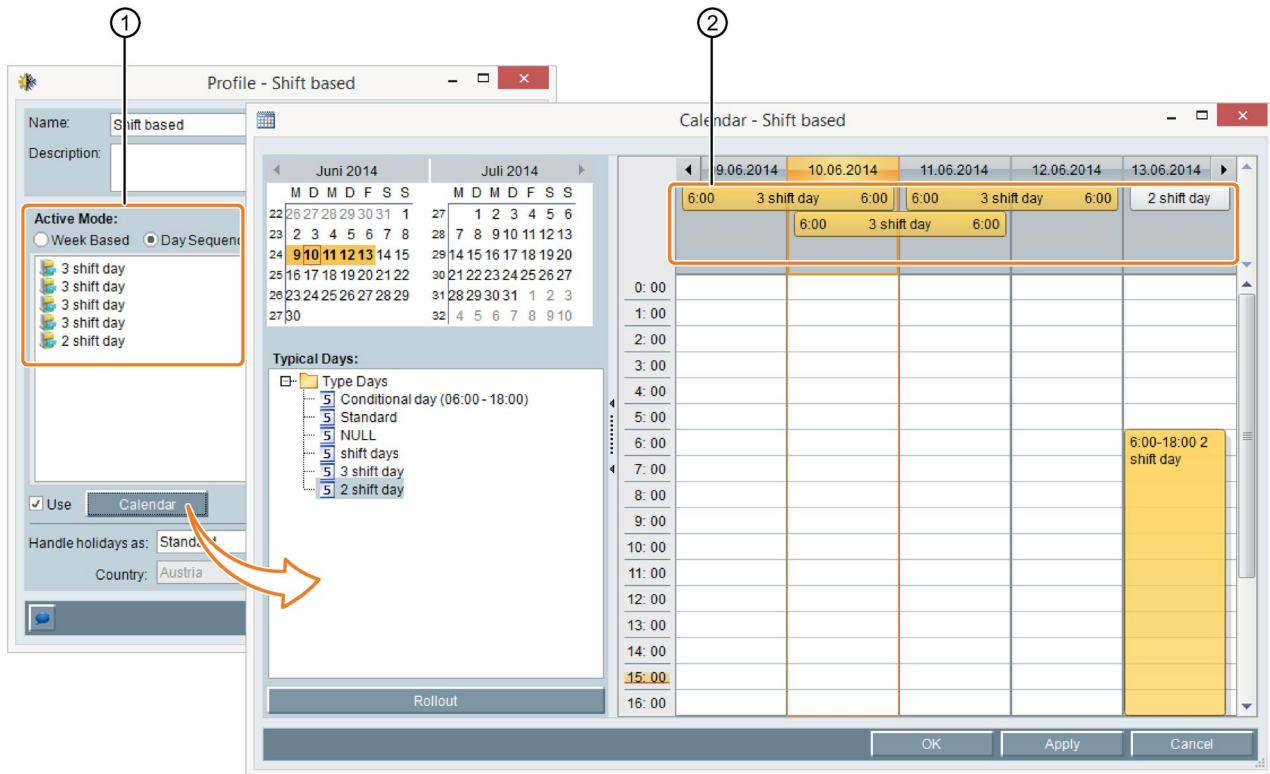
Forecasting based on shifts or the comparison day principle uses shifts or type days that are analyzed over a reference time period from the past, such as a quarter. In this analysis phase, you determine the average energy consumption per shift or day at a user-definable cycle, for example, 15 minutes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

Basics of Planning and Projection (Page 65)

3.10 Targets cockpit - Measures management

3.10.1 Target cockpit

Decarbonization targets are an integral part of the corporate strategy of many companies. Nevertheless, the following questions very often remain unanswered

- What about my target achievement?
- Where should I invest?
- Is the measure economical?

We provide exactly these answers with the Target cockpit in Energy Manager.

In addition to setting targets for reducing CO₂ emissions, this tool can also be used to flexibly manage other frequently requested targets such as reducing final energy consumption, water consumption, etc.

3.10.2 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.

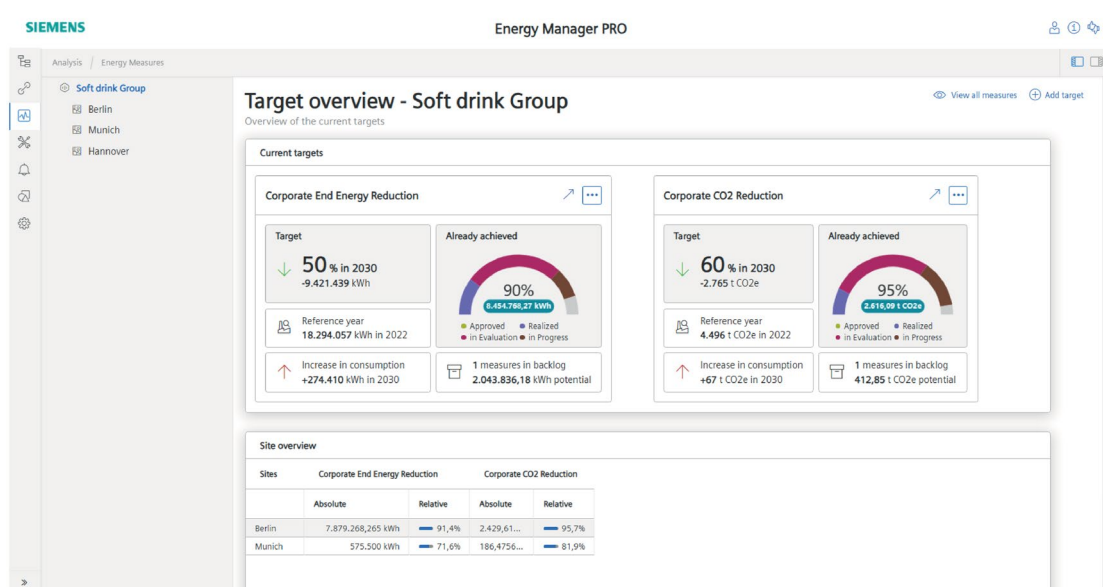
Energy Manager is the tool for meeting the increased requirements: The planned energy efficiency improvement measures are entered and immediately evaluated with Energy Manager.

3.10.3 Implementation in Energy Manager

Defining targets and monitoring target achievement

In the Targets cockpit, the user can easily define targets at the company level. These targets are passed on to the locations, whereby location-specific targets can also be defined.

Once the targets have been defined, they are displayed in the overview dashboard. In addition to the target definition, the target achievement is displayed according to the status of the measure.



As soon as the basic data for calculating target achievement has been entered at the location level, these targets are also available at the location level. These are also summarized again at the company level in order to obtain an overview of the achievement of targets at each location.

Verifying measures

All measures that support this target are displayed by clicking on the respective target. When a measure is selected, the key figures for the measure are displayed on the right.

Viewing measures of: Corporate CO2 Reduction

Name	Site	Net present value	Payback period	Investment	CO2 reduction	State
Reduce Water Leakages	Berlin	168,595 EUR	2,06 y	100k EUR	0 t CO2/a	Realized
Photovoltaic Installation	Berlin	327.322 EUR	10 y	650k EUR	145,99 t CO2/a	Realized
Photovoltaic Installation	Munich	30.605 EUR	9,82 y	52,13k EUR	11,59 t CO2/a	Realized
Corporate Energy Management System	Berlin	27.031 EUR	6,04 y	70k EUR	61,89 t CO2/a	Realized
Industrial Heatpump for Steam & Heat Production	Berlin	606.024 EUR	11,33 y	1,8M EUR	1,5k t CO2/a	Evaluation
Connection to the district heating grid for steam and heating	Berlin	820.164 EUR	6,82 y	1M EUR	577,38 t CO2/a	Implement
Energy Efficiency Optimization in the production	Munich	563 EUR	5,89 y	40k EUR	13,49 t CO2/a	Evaluation
Lighting - LED for Production and Office	Munich	35.566 EUR	3,64 y	20k EUR	8,89 t CO2/a	Implement
Corporate Energy Management System	Munich	55.042 EUR	2,5 y	30k EUR	36,54 t CO2/a	Realized

Corporate Energy Management System
State: **Realized**

- Investment: 70.000 EUR
- Annual costs: 12.000 EUR
- Realized saving: 61,89 t CO2/a
23.524,71 EUR/a
169.546,65 kWh
81.452,06 kWh
- Net present value: 27.031,3 EUR
- Payback period: 6,04 y
- Return on investment: 235,37 %

Definition of a measure

The user can define a measure directly. The costs and savings can be defined in addition to a description and general information. The key figures relevant to an investment, such as the present value or amortization period, are available immediately afterwards.

The evaluation of the savings can be calculated directly in the system.

3 Capabilities

1 Gas [kWh]

Planned kWh

Planned EUR/a

Planned t CO2/a

11,13M of 11,3M

779,35k of 791,22k

2,98k of 3,03k

Realized kWh

Realized EUR/a

Realized t CO2/a

11,13M of 11,3M

779,35k of 791,22k

2,98k of 3,03k

2 Electricity [kWh]

Planned kWh

Planned EUR/a

Planned t CO2/a

5,35M of 9,45M

765,44k of 1,35M

1,08k of 1,91k

Realized kWh

Realized EUR/a

Realized t CO2/a

10,73M of 9,45M

1,54M of 1,35M

2,17k of 1,91k

Medium *

Electricity

Current value

9.446.611,89 kWh/a

Calculate value

Current value was calculated using datapoint 'd_SDG_BER_Site_Boil_TotalNet_Gas_kWh_SOURCE' and date range 13.06.2024 <-> 14.06.2024.

Planned value

5.348.685,428 kWh/a

Planned savings

4.097.926,4620000003 kWh/a

Realized value

10.731.863,23 kWh/a

Realized savings

-1.285.251,3399999999 kWh/a

Calculate value

Realized value was calculated using datapoint 'd_SDG_BER_Site_Boil_TotalNet_Gas_kWh_SOURCE' and date range 13.05.2024 <-> 14.06.2024.

The question "Where should I invest?" also arises very frequently. There is also a simple answer to this in the Energy Manager.

All measures in the system can be called up in the company view. A pre-defined filter provides the user with a list of all measures that have already been sufficiently planned but not yet approved by management. The user can use the sorting function to find the measures that would be preferable from an economic point of view (cash value). It is also possible to give preference to the measure that brings the greatest CO2 savings.

3.11 Data provider

You can make the data points and their measurement data accessible to other programs and systems in your Energy Manager System.

OPC UA server

You can provide the data points and data via an OPC UA server in Energy Manager. 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
- Basic 128 RSA 15
- AES 128 SHA 256 RSA OAEP
- Basic 256
- Basic 256 SHA 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.

REST API data provider

In Energy Manager, the data points and data are provided via a Rest API data interface. This interface can be accessed on the application server at the following URL:

http(s)://...servername.../EnMPRODataService

The following information is provided:

- Times series of measurements
- Batch data

To be able to perform a data query via this interface, an application must first log in to the SIMATIC Energy Manager using the login method. To log in, you must use a user/password combination that is valid in Energy Manager. If the login is successful, a bearer token is sent to the client in the response telegram, which is required for further data retrieval.

SIMATIC Energy Manager Web Client

4.1 Comparison Energy Manager Basic with Energy Manager PRO Web

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 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:

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
Energy efficiency measures	Available	Available
Widgets	All widgets except "Map" widget	All widgets including "Map" widget
Data sources	An automatically pre-installed acquisition component	Possibility to create additional acquisition components
Data channels/interfaces	Creating new interfaces of the type: • OPC UA, OPC HDA, OPC DA • WinCC • Energy Suite • Modbus • sFTP, FTP • Desigo CC • ASCII	Creating additional interfaces, e.g.: • OLE DB • Machines • S7 You can find more information about the various interfaces in the manual "SIMATIC Energy Manager PRO V7.5 - 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
S7 Energy Efficiency Monitor	Not available	Connection of the S7 energy efficiency monitor over the machine interface
Planning and Prognosis	Prognosis via multivariable widget in the web dashboard	Additional prognosis based on production plans and shifts
Login	Login with user name and password	Login via "Single Sign On" is possible

You can find more information on the functionality of Energy Manager Basic and PRO in the user manual "SIMATIC Energy Manager Basic/PRO V7.5 - Operation".

4.2 Access to the Energy Manager Web Client

The Energy Manager Web Client can be opened via the 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:

Additional information

You can find additional information about SIMATIC Energy Manager on the Internet (<http://www.siemens.com/energymanagerpro>).

See also

Chart (Page 28)

Widget dashboard (Page 30)

4.3 General Functions

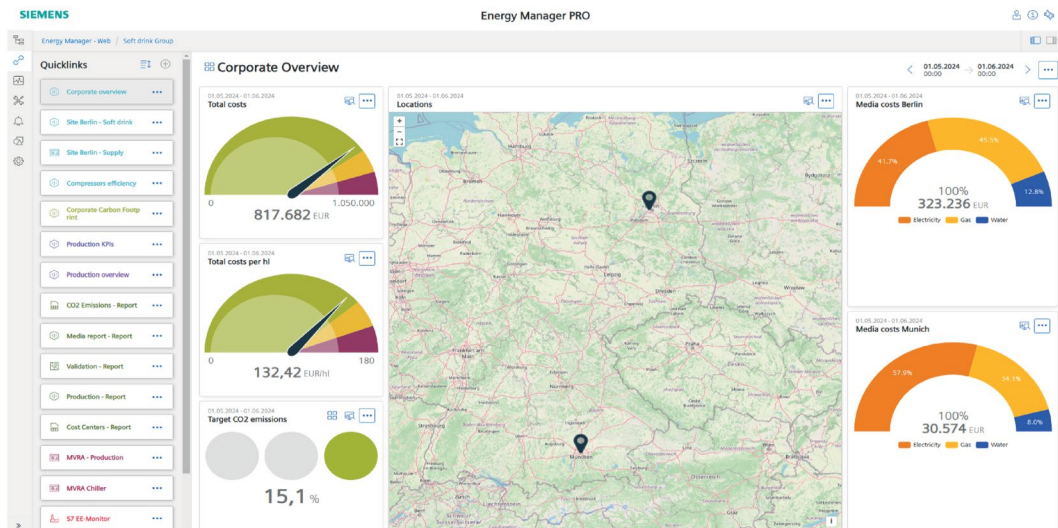
Energy management made easy This was the motto behind the development of the Energy Manager Web Client and its functions such as the widget dashboard.

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.



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.

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

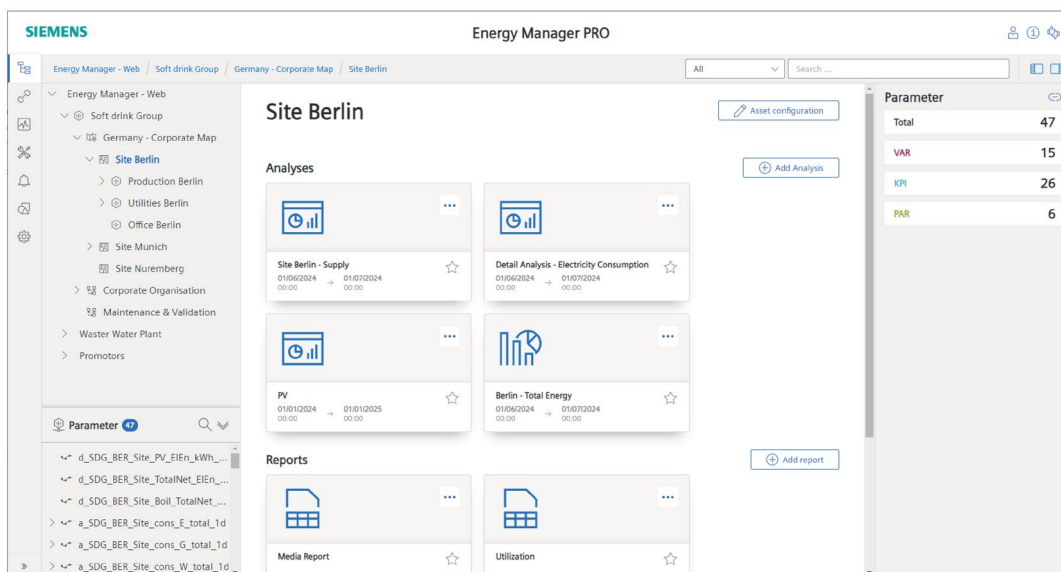
You use the Energy Manager Web Client for the following tasks:

- 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 and assets
- Create batch configuration and retrieve the data in the batch analysis.
- Create activities to calculate the CO2 footprint.
- Customize system structure
- Access documents and upload new documents to the Energy Manager database (Energy Manager PRO)

- Define targets, edit and view energy efficiency measures
- Create materials for batch analysis
- Define media with simple contracts that are used in the Targets cockpit and for calculating the CO2 footprint.
- 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

4.4 Asset view

The asset structure serves as central navigation and provides the objects a clear structure. When an asset is selected, the asset view appears. The user is given an overview of the linked data points, key figures or parameters in the area at the bottom left. The dashboards, charts, matrices and reports are shown in the middle. Statistics on the assigned data point, key figures or parameters are in the right area.



4.5 Object creation and object management

You can use the **context menu** to manage the system structure of your Energy Manager Web Client in editing mode.

Object creation

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

- Asset
- Site asset
- Country asset
- Organization asset
- Dashboards
- Reports
- Charts
- Matrices
- Folders

Object editing

An edit entry is displayed in the context menu to configure the analysis objects.

- Edit

Object management

You can use the context menu to move and structure the objects as you wish using the configuration tools. The following functions are available:

- Delete object
- Delete shortcut
- Cut
- Copy

If an object has been cut or copied, paste options are available for a tree element:

- Insert element or link below (on the same level)
- Insert element or link below (layer below the selected object)

4.6 SIMATIC Energy Manager PRO Client

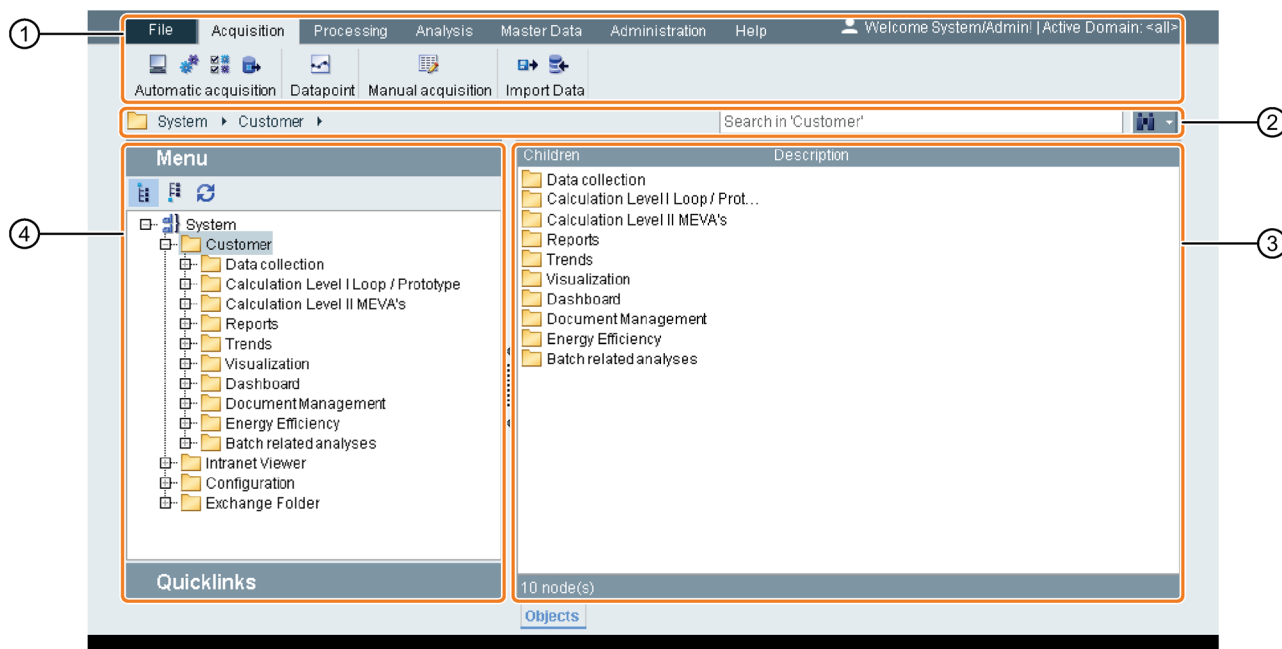
4.6.1 Desktop Client

4.6.1.1 Energy Manager PRO as a configuration tool

The **Energy Manager PRO Desktop 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 Desktop 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 is 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.

4.6.1.2 Essential functions in the Desktop Client

Control center for your energy data management

The Energy Manager PRO Desktop 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, CO2 equivalents)
- Defining MEVAs / KPIs (all functions available)
- Configuration of reports
- Setup of batch analysis
- Viewing of charts
- Export and import of configuration data
- Simulating tariffs
- Creating forecasts based on shifts and production plans

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.

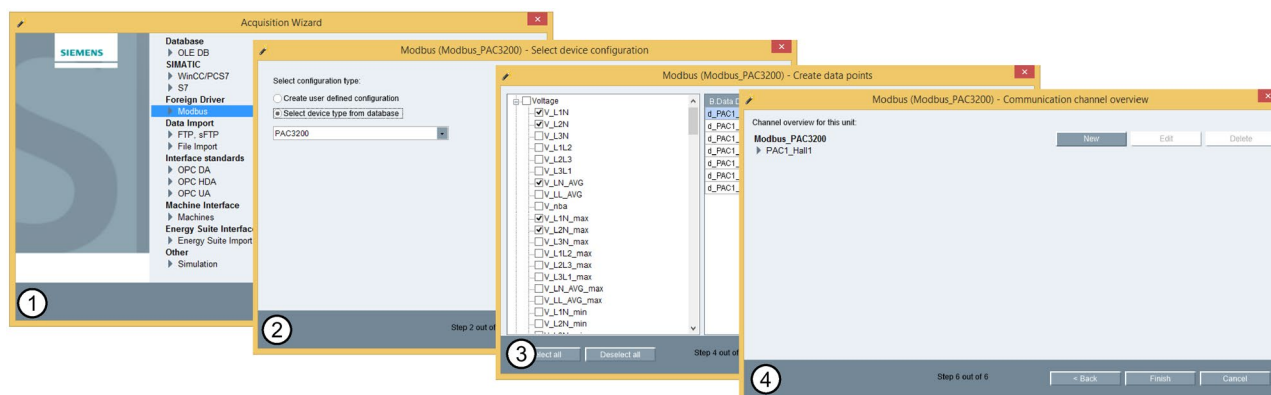
Search

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.

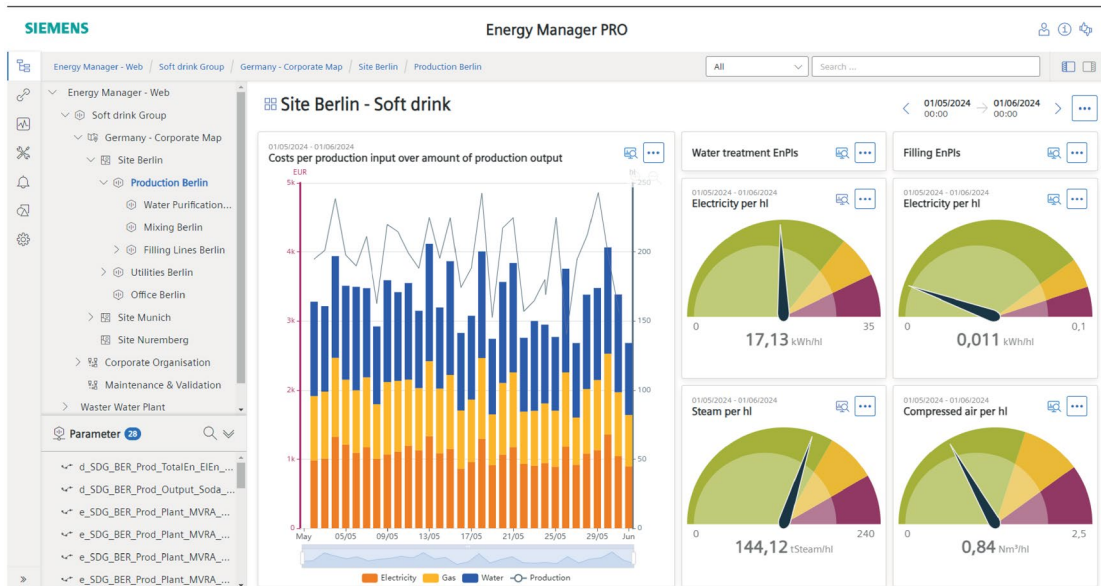


- ① Selection of the interface
 - "S7" for acquiring data from an S7 controller.
 - "WinCC / PCS 7" for acquiring values from a process value archive or compressed archive.
 - "Modbus TCP" for acquiring data from measuring devices with Modbus support and Ethernet interface, such as SENTRON PAC measuring 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.

4.7 Widget dashboard

4.7.1 Data analysis in the widget dashboard

Plant and measurement data are visualized in the widget dashboards via so-called widgets. To present a desired information 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.



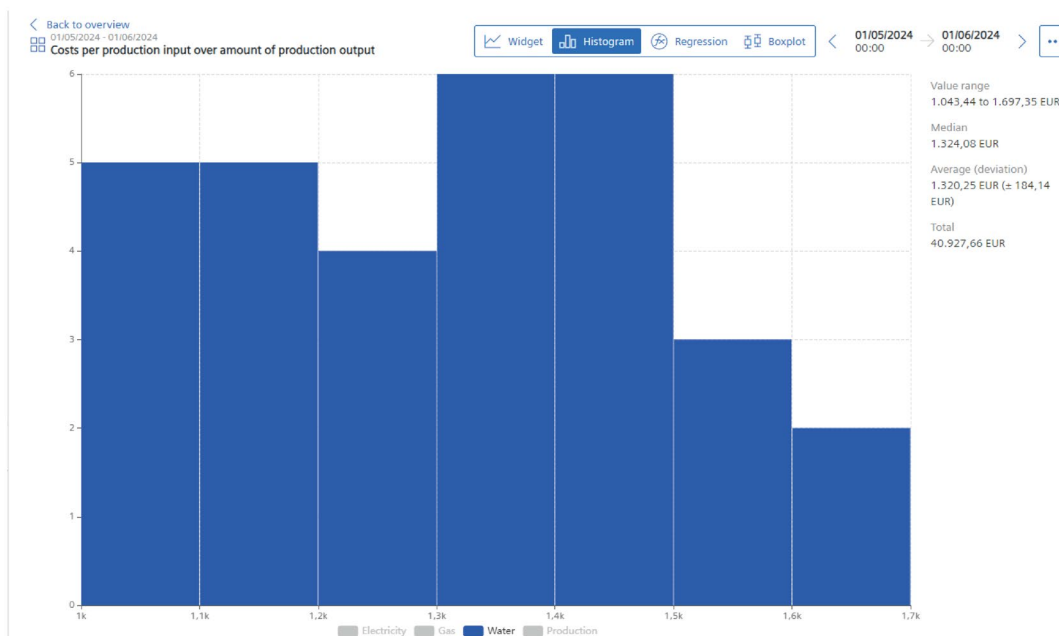
An analysis function is integrated in the widgets that display values. Because the analysis requires a certain amount of space, the widgets offer a zoom function for the desired object (magnifying glass symbol in the upper right corner). Next to the magnifying glass symbol you can see the link symbol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

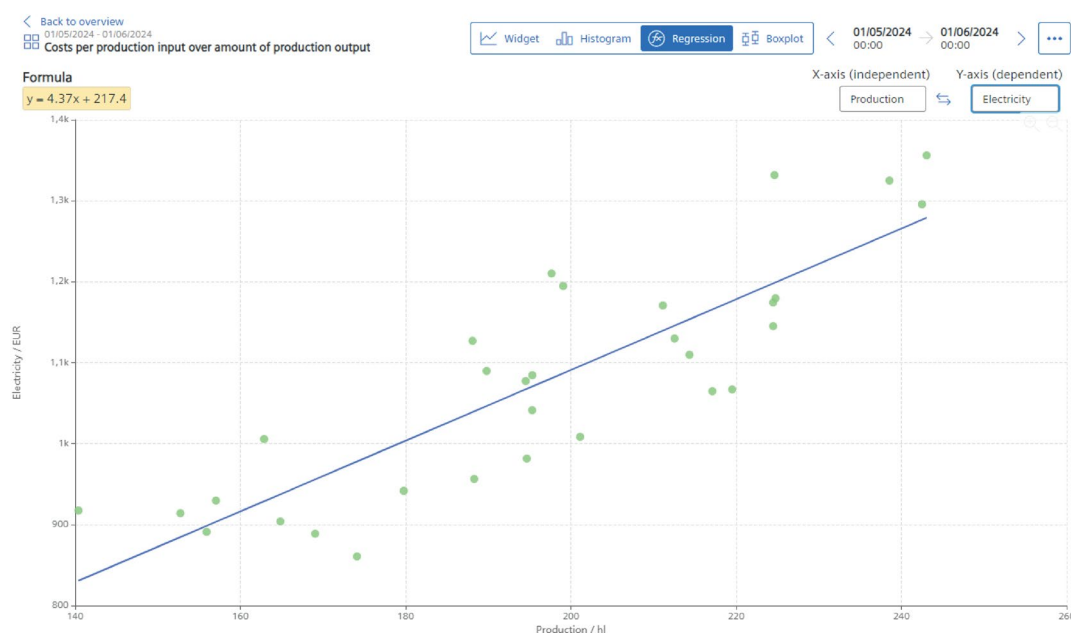
The first available analysis is the frequency distribution (histogram). Here, the difference between the minimum and maximum value of the data point during the analyzed period is divided into 20 areas of equal size, and the number of values is determined for each area.

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.



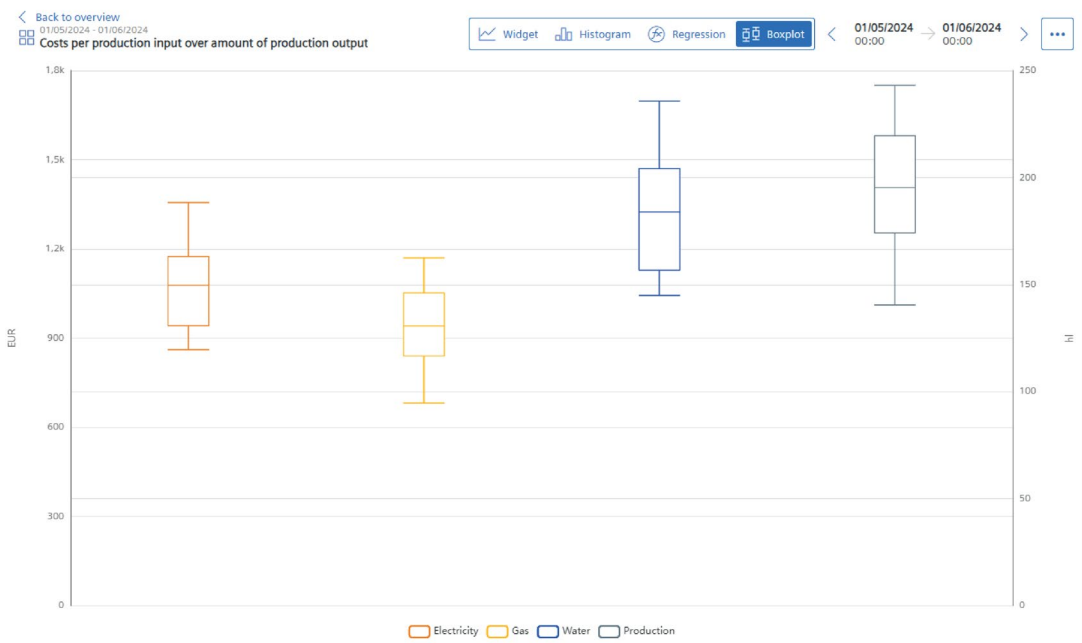
Widgets that have at least two configured data points offer a second possible analysis – the regression analysis. Here, the values of two data points are shown in an X-Y diagram. The trend line describes the relationship of the two data points, which can also be represented with the formula $y = k *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



4.7 Widget dashboard

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.

The third analysis option offered by widgets is a box plot analysis. In addition to the outliers, the box plot shows the minimum, maximum and, as a box, the 25% percentile, the 75% percentile and the median.



4.7.2 Added value of the individual widgets

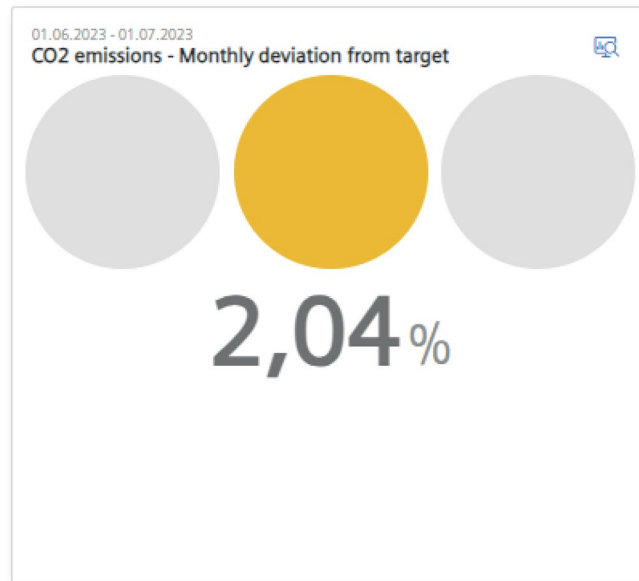
4.7.2.1 Gauge / Traffic Light

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.

To the right of the value is the unit that is taken from the data point configuration.

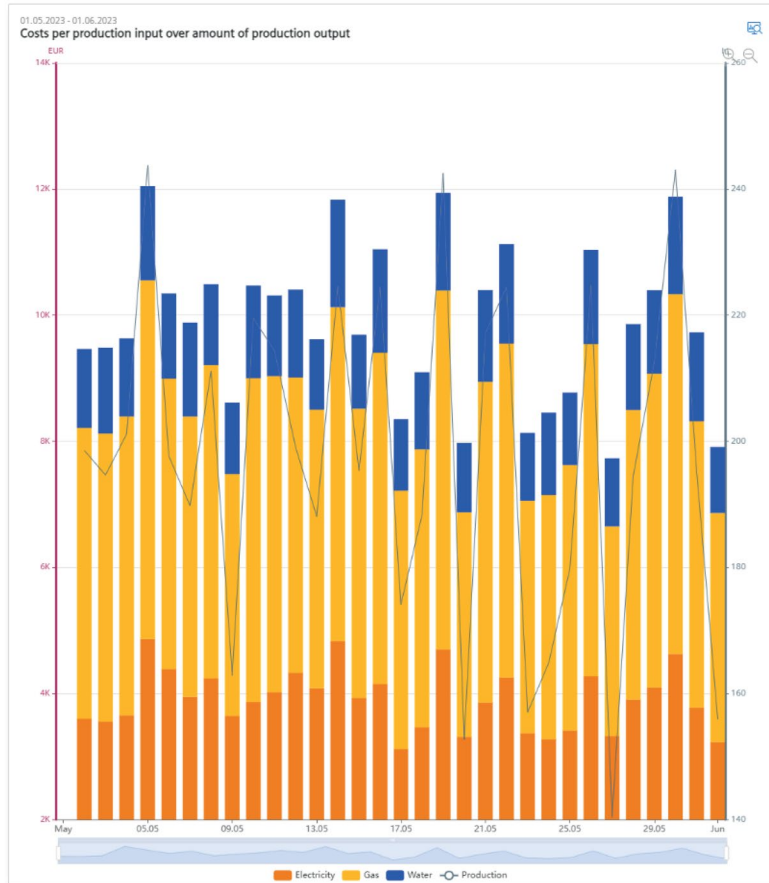
The value is shown below the gauge or the traffic light. The number of decimal places displayed can be configured.



4.7.2.2 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.

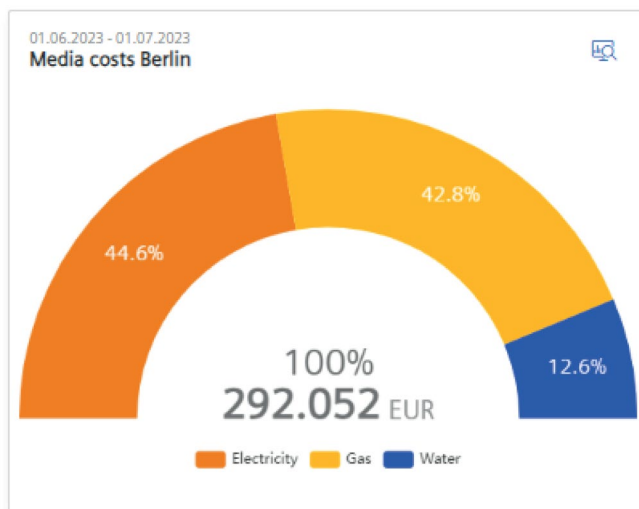


Up to ten data points on up to five y axes can be displayed simultaneously in the Chart widget. Likewise, the data points for two different time ranges (x axes) can be displayed. Two x axes are used very frequently to compare the current week with the last week.

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.

4.7.2.3 Pie chart

The pie chart provides a simple representation of the breakdown. The names of the data points or key figures can be taken directly from the Energy Manager or customized in the widget. By clicking on one of the media displayed in the legend, these can be hidden, whereupon the total value is adjusted accordingly and displayed without the hidden part. Both the detailed data and statistical information are available in the other tabs.



4.7.2.4 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.

02/10/2023 21:00:00 - 03/10/2023	
Weather Data	
Parameter	Value
Temperature	11,72 °C
Humidity	68 %
Air pressure	1.021 hPa

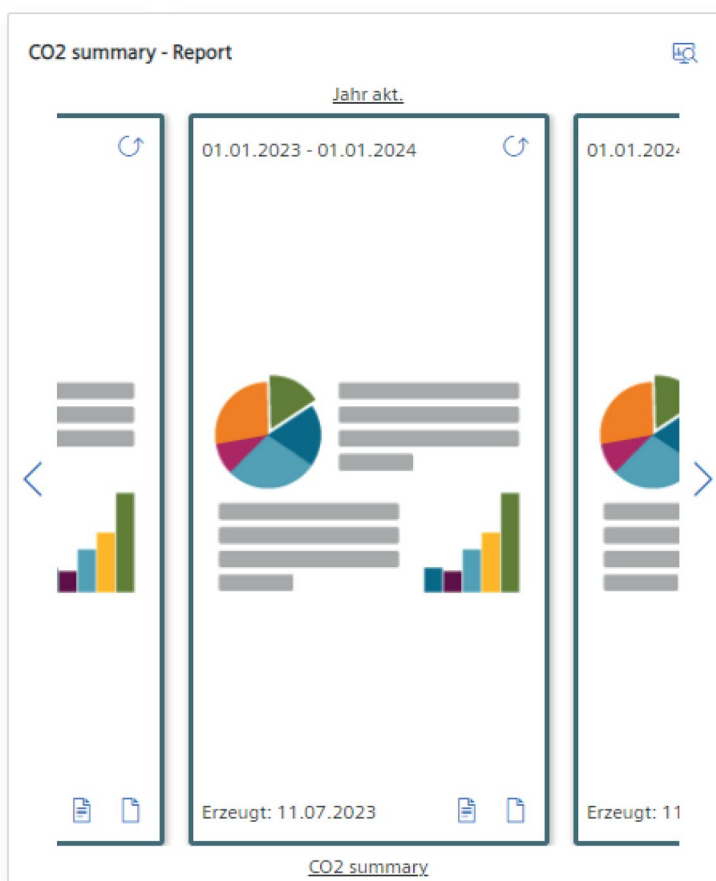
4.7.2.5 Table

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 moving to the next tab, you can view the values in the table in all statistical evaluations.

13.06.2024 - 14.06.2024 Matrix				
Zeitstempel	Steam p. hl tSteam/hl	Prod p. hl kWh/hl	Emissions t CO2	Water l
13.06.2024 00:15:00	0	0	0	0
13.06.2024 00:30:00	147,8	15,74	0,03	6.671,62
13.06.2024 00:45:00	138,82	15,56	0,02	3.827,04
13.06.2024 01:00:00	149,02	17,88	0,04	7.654,08
13.06.2024 01:15:00	139,96	16,32	0,02	3.827,04
13.06.2024 01:30:00	153,47	18,75	0,04	7.608,38
13.06.2024 01:45:00	148,85	18,46	0,02	3.712,8
13.06.2024 02:00:00	136,62	16,94	0,02	4.729,54
13.06.2024 02:15:00	0	0	0	0
13.06.2024 02:30:00	149,6	17,84	0,04	7.025,76
13.06.2024 02:45:00	138,72	17,86	0,02	3.815,62
13.06.2024 03:00:00	144,49	16,94	0,04	7.631,23
13.06.2024 03:15:00	144,26	15,28	0,02	3.827,04
13.06.2024 03:30:00	149,43	16,96	0,04	7.631,23
13.06.2024 03:45:00	143,96	15,77	0,02	3.804,19
13.06.2024 04:00:00	138,27	15,37	0,02	3.838,46
13.06.2024 04:15:00	152,27	16,63	0,02	3.827,04
13.06.2024 04:30:00	142,31	18,14	0,04	7.642,66
13.06.2024 04:45:00	140,36	15,41	0,02	3.815,62
13.06.2024 05:00:00	144,28	18,76	0,04	7.642,66
13.06.2024 05:15:00	141,98	16,69	0,02	3.815,62
13.06.2024 05:30:00	147,29	15,22	0,03	7.619,81
13.06.2024 05:45:00	136,8	17,3	0,02	3.827,04
13.06.2024 06:00:00	151,54	16,65	0,02	3.815,62

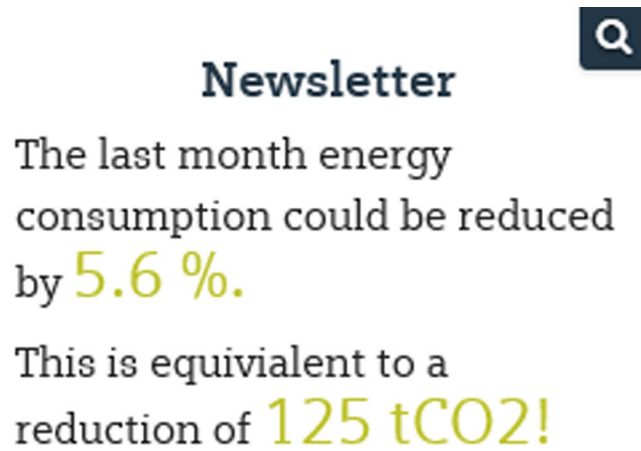
4.7.2.6 Report

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.



4.7.2.7 Text / Image

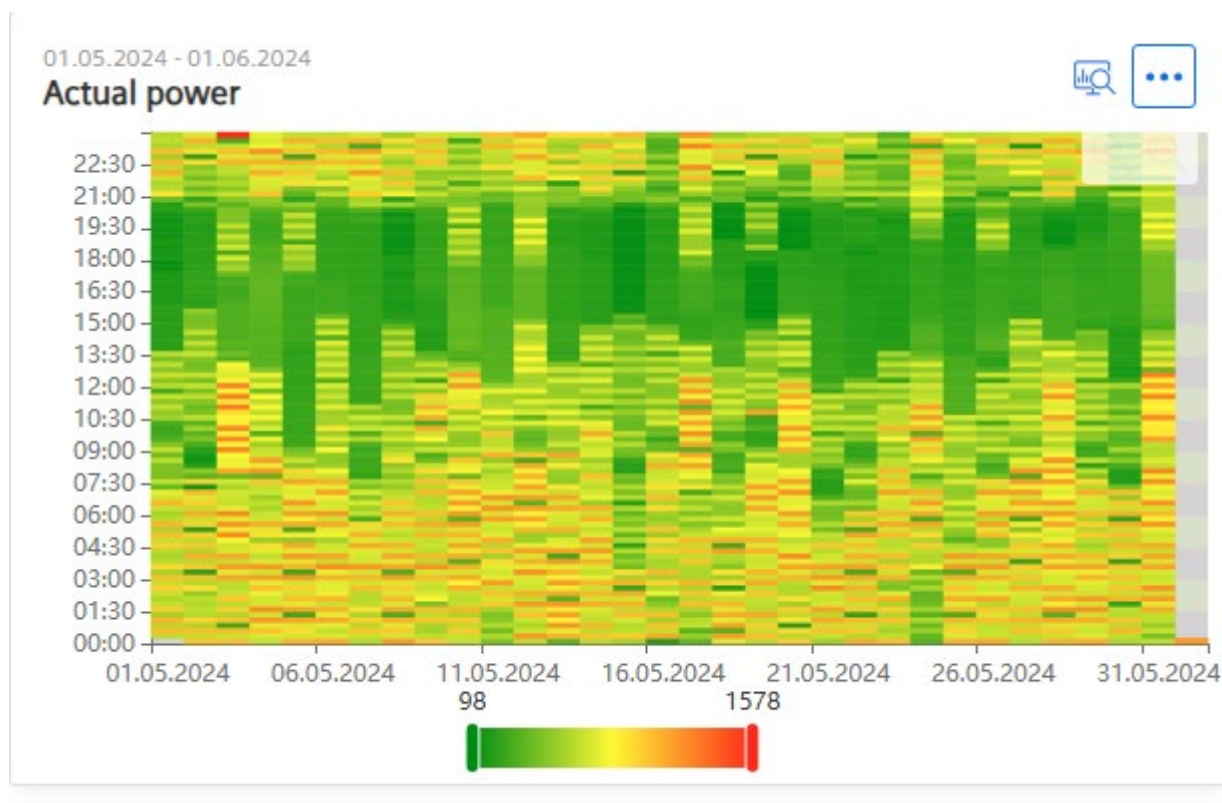
Formatted text can be displayed on the dashboard using the Text widget. Additional hyperlinks can be inserted to go to other web contents.



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.

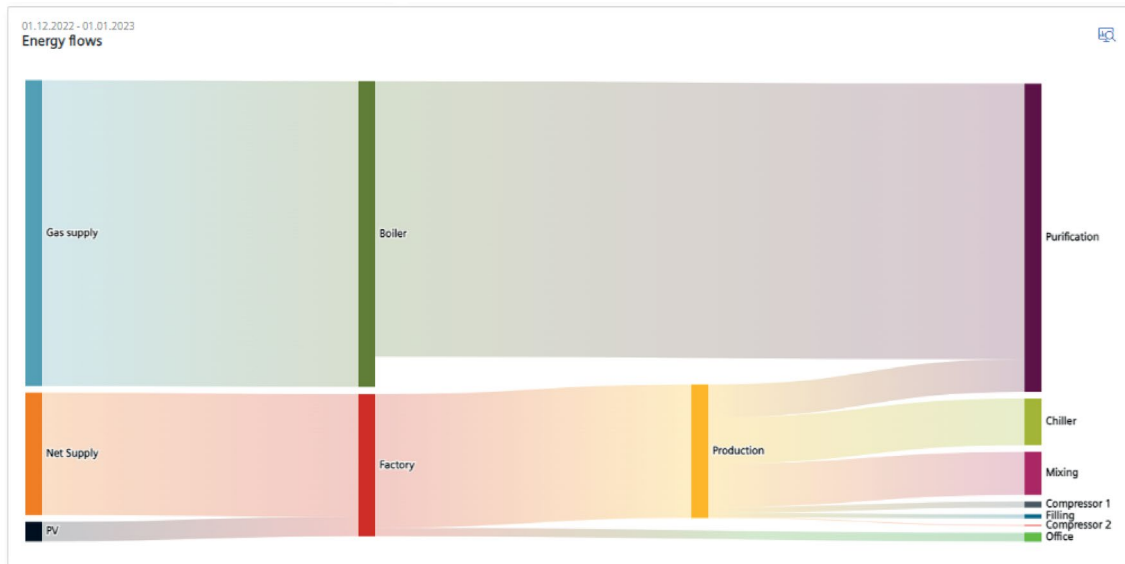
4.7.2.8 Heatmap

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.

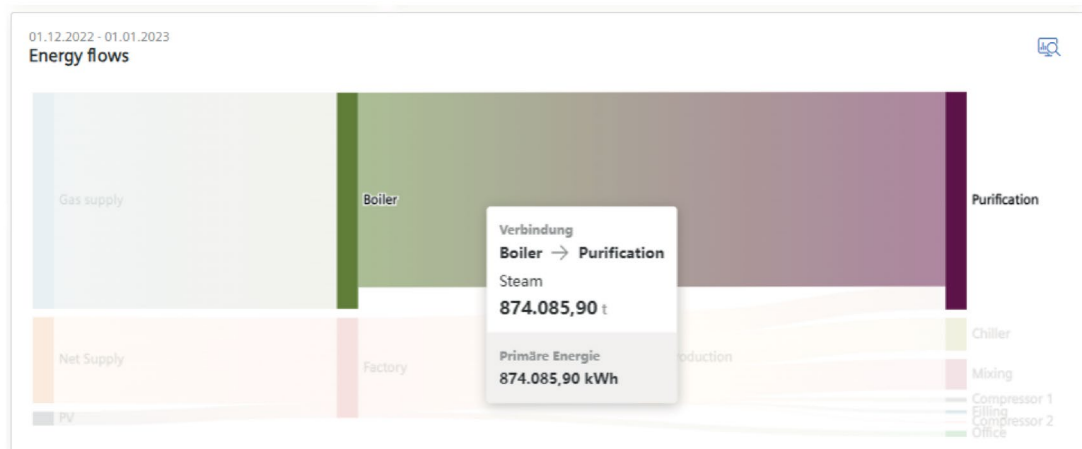


4.7.2.9 Sankey diagram

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).



Brief information with the consumption value can be opened via the tooltip on the respective link.

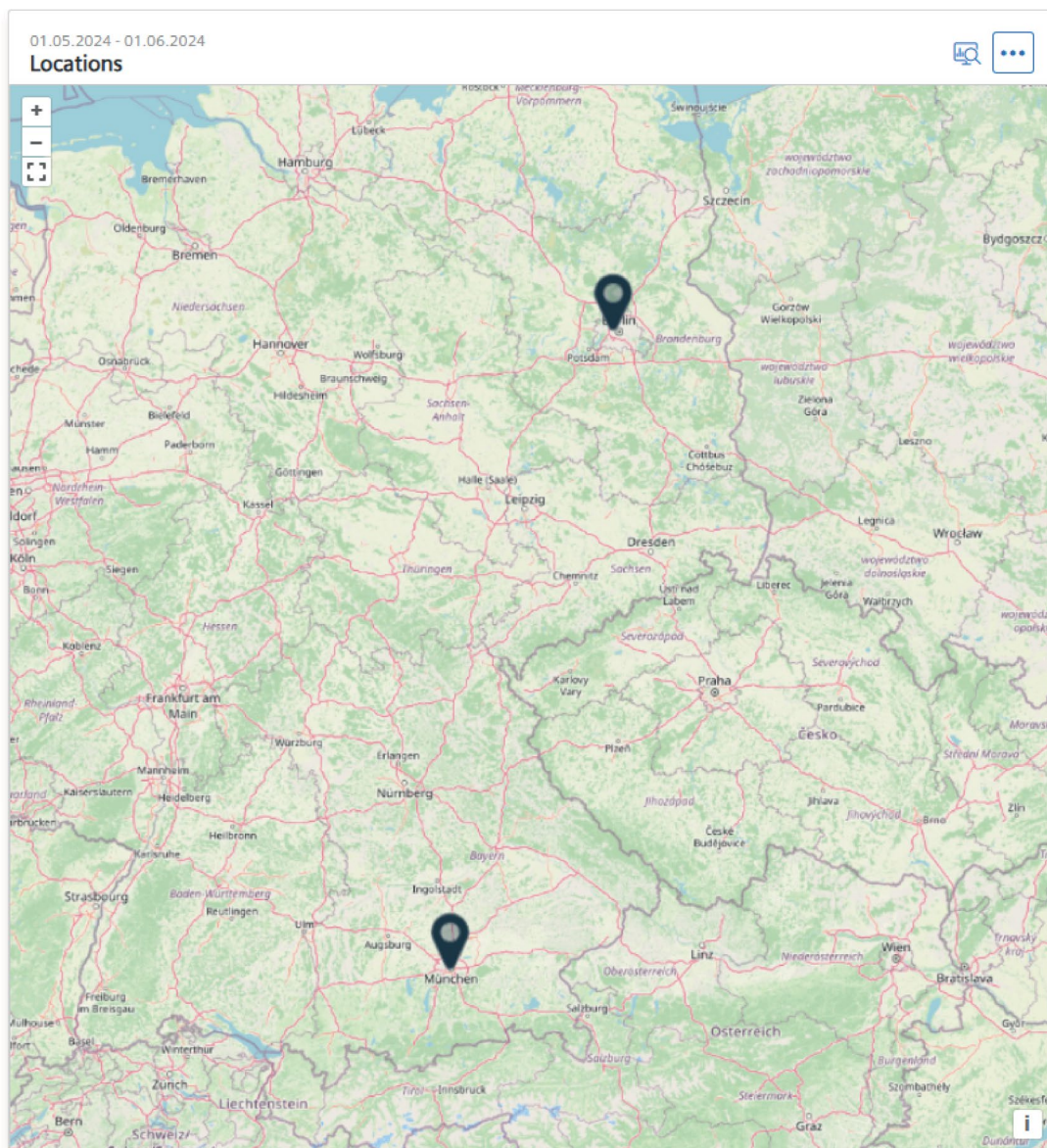


4.7.2.10 Maps

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.



4.7.2.11 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.

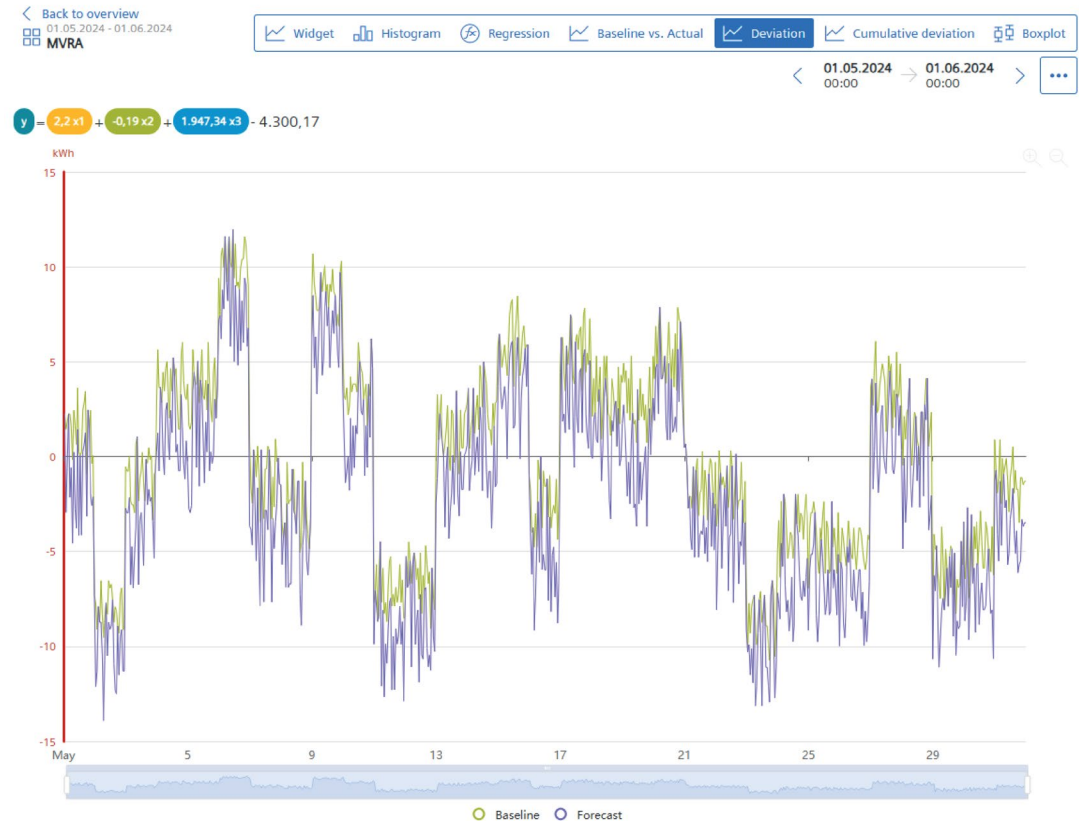
The baseline and the actual consumption are displayed in the fourth tab. If forecast is enabled, the forecast based on the forecasted data of the influencing factors is also displayed.

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.



4.7 Widget dashboard

The deviation between the baseline and the actual energy consumption is displayed in the fifth tab. If the forecast is active, the deviation of the forecast from the actual consumption is displayed in this tab also.



In the sixth tab, the deviation of the baseline and, optionally, of the forecast is displayed cumulatively.



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.

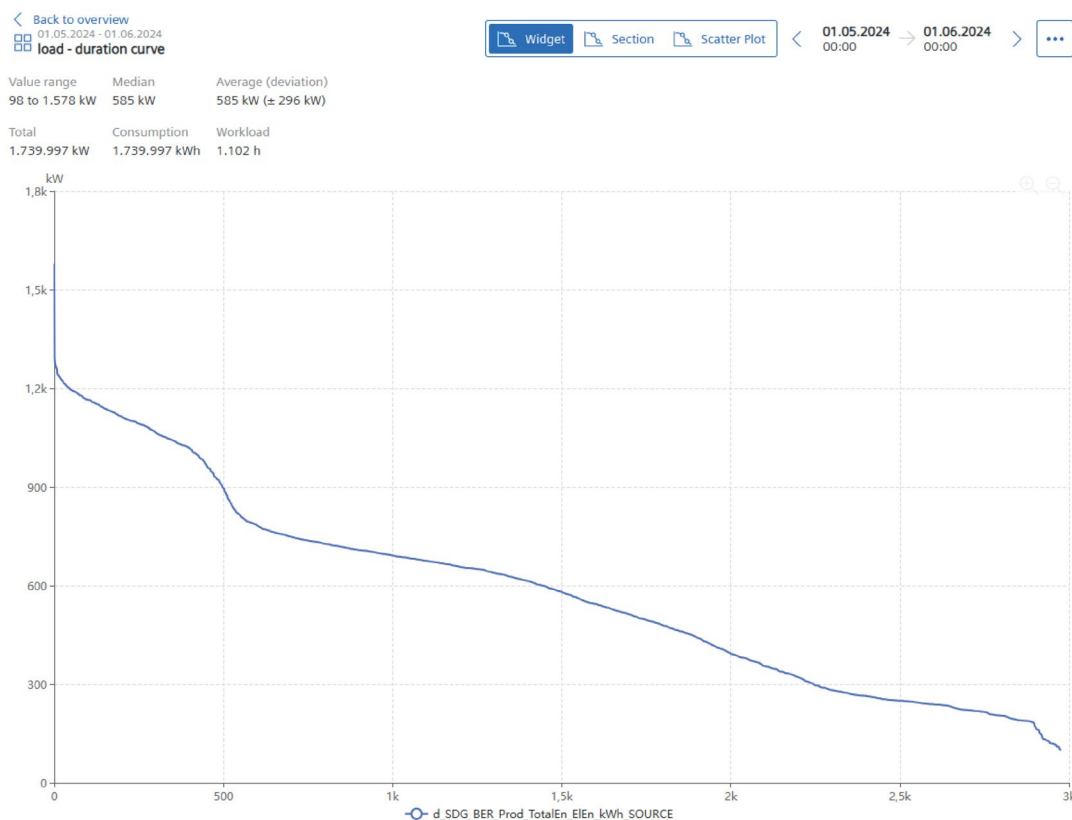
A derived data point with the ending "baseline_deviation" and "forecast_deviation" is created for the baseline and for the forecast. This data point represents the deviation of the actual value from the baseline or from the forecast value.

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

4.7.2.12 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.

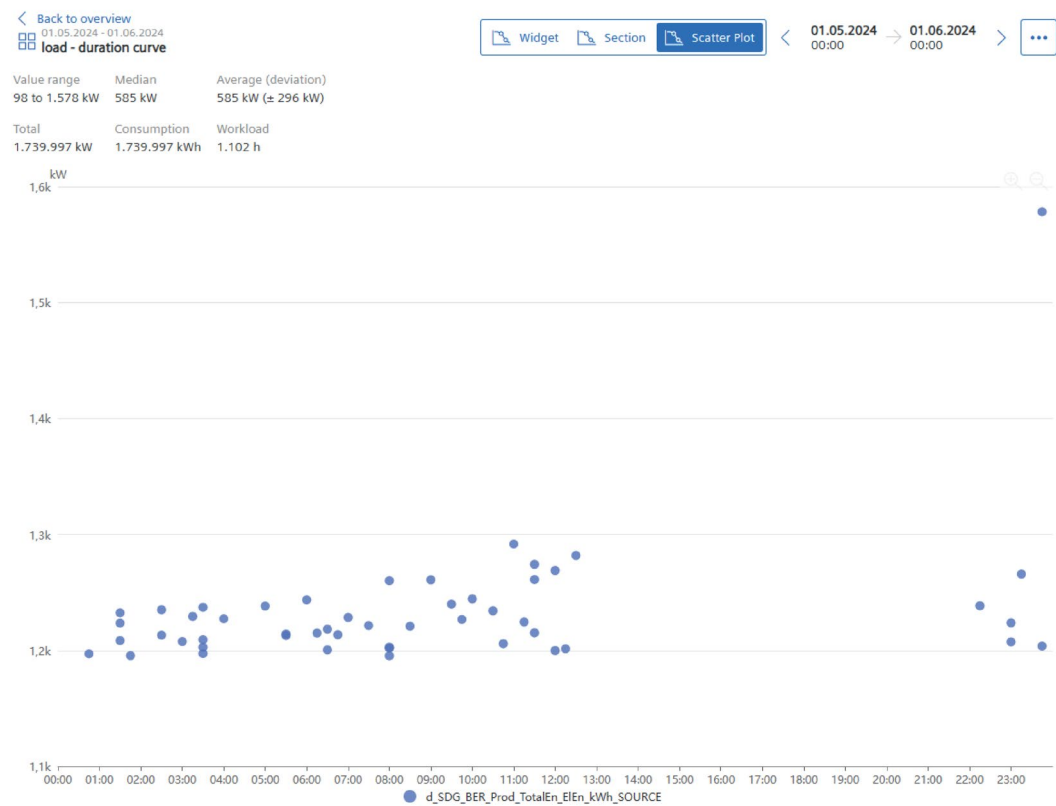


In the second tab, the duration curve of the n-highest values is shown in the observation period. The number of the n-highest values is configured individually in the widget configuration dialog.



4.7 Widget dashboard

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.

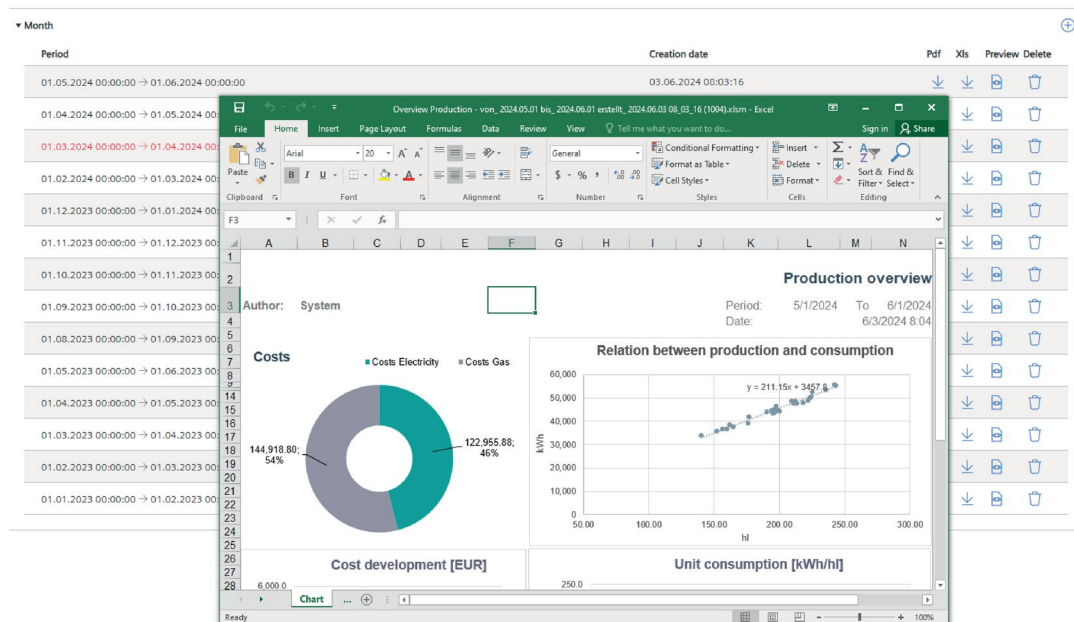


4.8 Report

4.8.1 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.

Overview Production



4.8.2 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

The screenshot shows the 'General' configuration page for a new report. It features a 'Back to overview' link at the top left. The main form has the following elements:

- Name ***: A text input field containing 'Overview_Site_Berlin'.
- Description**: A larger text input field.
- Text type**: A dropdown menu with 'Name' selected.
- Country**: A dropdown menu with 'Germany' selected.
- Use template**: A checked checkbox.
- Predefined report template**: A dropdown menu with a list of options:
 - COP_analyses
 - EEnPI_overview
 - Energy_summary
 - Example Report - Balance
 - Example Report - Balance Compare
 - Example Report - Protocol
 - Example Report - Protocol with Analysis
 - Example Report - Sorted load curve

Below the dropdown menu is a blue 'Next' button. At the bottom of the form are 'Save' and 'Cancel' buttons. The page is part of a multi-step process, with '1 General' being the current step, followed by '2 Periods (Query types)' and '3 Sections (Modules)'.

4.9 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 28)" in the "Energy data management with SIMATIC Energy Manager" section.

4.10 Matrix

4.10.1 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.

Manual Data Collect...			Chart	Histogram	Regression	Boxplot	Values
Timestamp	Hall 12 [Wh]	Hall 15 [EUR]					
02.05.2024 00:00:00	123						
03.05.2024 00:00:00	220						
04.05.2024 00:00:00							
05.05.2024 00:00:00							
06.05.2024 00:00:00							
07.05.2024 00:00:00							
08.05.2024 00:00:00							
09.05.2024 00:00:00							

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 28)".

4.10.2 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

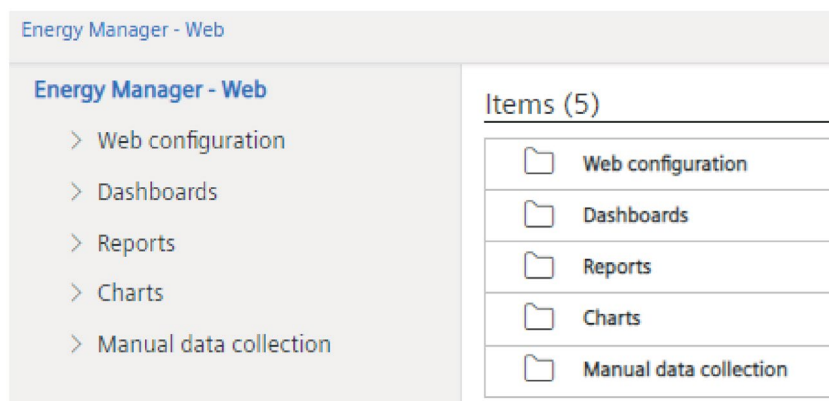
After logging into the Energy Manager app, the app downloads the approved reading routes from Energy Manager and displays these reading routes. The app also applies the appropriately configured data points as well as their main plausibility settings. You can also define an existing folder structure as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

See also

Mobile data acquisition (Page 110)

4.11 Folders

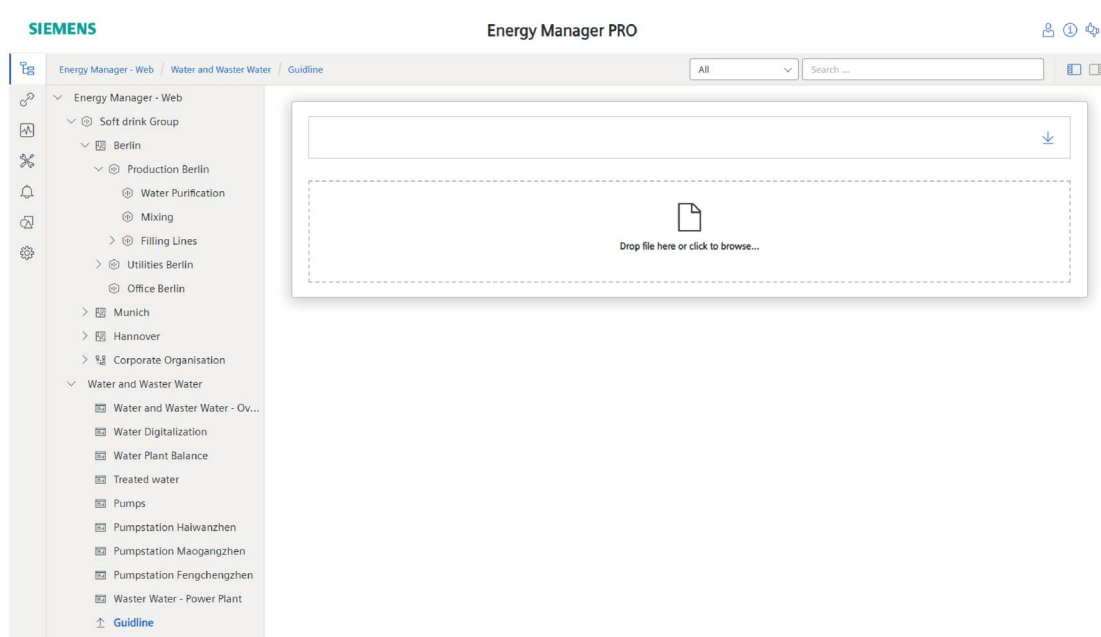
As an alternative to the assets, files and objects can be created in folders in the navigation area. When you open a folder in the navigation area, its contents are displayed in the detail area. To view the content of a folder, the folder must be released for you or you must have the necessary authorization.



4.12 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.

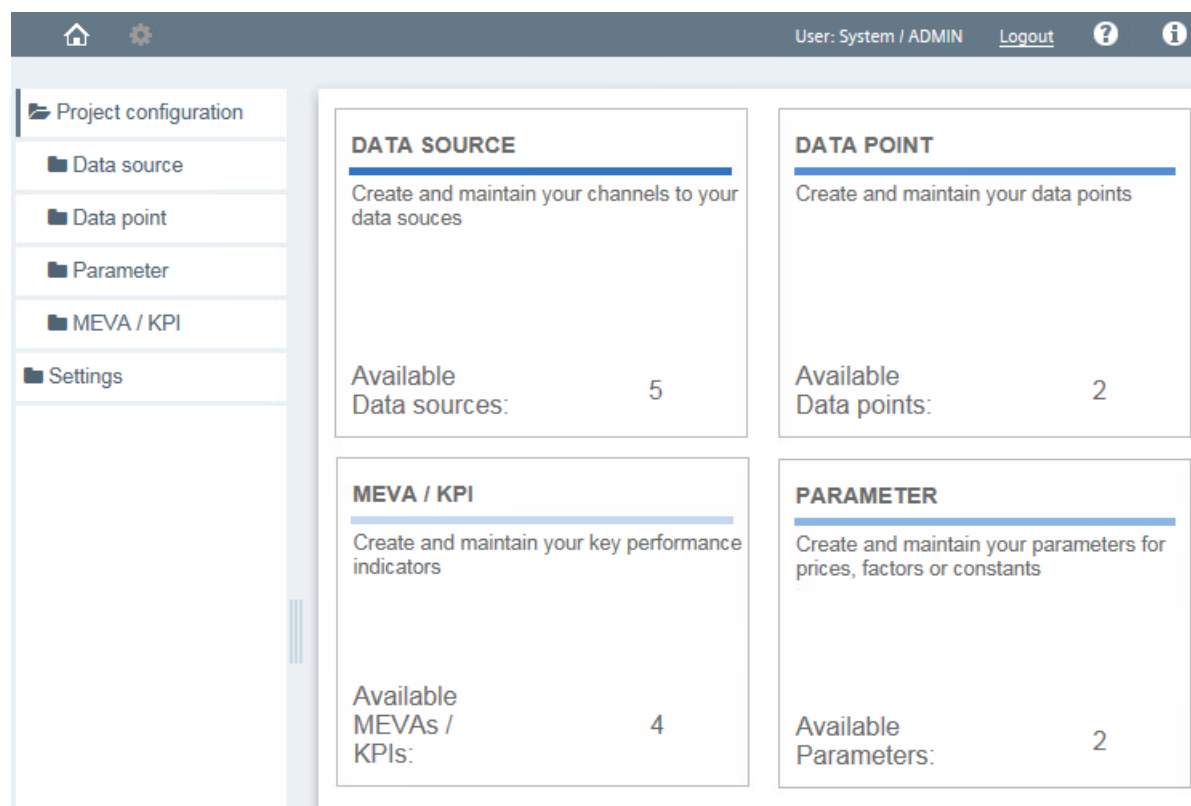


4.13 Project configuration

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.

4.13.1 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.

Acquisition - Administration

+ New
✎ Edit

🔍

✓	Name ^	Description ⇅	Status ⇅	Host ⇅	IP address ⇅	GUID ⇅
✓	h_Local_PC		Active	VMEMPTA005	139.22.229.147	45abddb1-be8c-0a973e3fc858

⏮ ⏪ 1 ⏩ ⏭

🗑 Delete

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 channel types in the Energy Manager Web Client:

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

4.13.2 Data acquisition in the Desktop Client

4.13.2.1 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 Desktop 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
- WinCC Unified

4.13.2.2 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 104) 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.

The screenshot shows a web-based interface titled "Input Values - Production Information". It features a table with three columns: "Date", "e_Production [Stk]", and "e_ProductionComment [-]". The table contains data for the period from 23.06.2014 to 30.06.2014. The data is organized in rows, each representing a specific time interval. The values for "e_Production [Stk]" are entered in the second column, and comments are entered in the third column. The interface includes navigation buttons ("Previous Page", "Next Page"), a date range selector, and checkboxes for "Mark Changes" and "Copy With Headers".

Date	e_Production [Stk]	e_ProductionComment [-]
23.06.2014 04:00:00		
23.06.2014 08:00:00	400	
23.06.2014 12:00:00	600	
23.06.2014 16:00:00	200	Reduced speed because of mainten...
23.06.2014 20:00:00	0	
24.06.2014 00:00:00	0	
24.06.2014 04:00:00	0	
24.06.2014 08:00:00	450	
24.06.2014 12:00:00	150	Changed materials
24.06.2014 16:00:00	642	
24.06.2014 20:00:00	464	
25.06.2014 00:00:00	384	Additional night shift
25.06.2014 04:00:00	0	
25.06.2014 08:00:00	0	
25.06.2014 12:00:00	872	
25.06.2014 16:00:00	234	
25.06.2014 20:00:00		

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

Change management and validation in the Desktop Client (Page 118)

Data acquisition in the Desktop Client (Page 108)

4.13.2.3 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 104)

4.13.3 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.

Data point - Administration

New

Edit

Filter

☐		Name	Description	Structure	Unit	Category	Cycle	Source	Active	Device/Archive
☒		d_I_L1	Instantaneous value...	Data point	mA	Process Value	15 min	a_erf_a_acq_Modbu...	Active	PAC3200_023
☐		d_I_L2	Instantaneous value...	Data point	mA	Process Value	15 min	a_erf_a_acq_Modbu...	Active	PAC3200_023
☒		d_I_L3	Instantaneous value...	Data point	mA	Process Value	15 min	a_erf_a_acq_Modbu...	Active	PAC3200_023
☐		d_V_L1N	Instantaneous value...	Data point	V	Process Value	15 min	a_erf_a_acq_Modbu...	Active	PAC3200_023
☐		d_V_L2N	Instantaneous value...	Data point	V	Process Value	15 min	a_erf_a_acq_Modbu...	Active	PAC3200_023
☐		d_V_L3N	Instantaneous value...	Data point	V	Process Value	15 min	a_erf_a_acq_Modbu...	Active	PAC3200_023

1

Clone

Delete

From this table, you can create new data points, configure, clone or even open the chart of the data point.

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

- Interpolation

Replacement by linear interpolation with the last valid value

- 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/ Insights Hub

Uploading the values to MindSphere/ Insights Hub

- Counter

You can find more information on the counter in the following section.

4.13.4 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 with the interpolation function.

The following filter criteria are possible:

- 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

4.13.5 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 measured value of a different data point

If a measuring point is designed to be redundant, the measured 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 measured 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 previous day, 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 points in time 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 bad values manually.

4.13.6 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.

Parameter - Administration

New Edit		Filter			
☐	Name	Description	Structure	Unit	Constant
☒	t_Price_Gas	Gas price	Parameter	EUR/kWh	0.75
☐	t_Price_Water	Water price	Parameter	EUR/kWh	0.85
☐	t_Price_Electric	Electric price	Parameter	EUR/kWh	0.65
1					
Clone		Delete			

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

4.13.7 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.

MEVA / KPI - Administration

+ New
✎ Edit

🔍

☐	🔗	Name ▾	Description ▾	Structure ▾	Unit ▾	Function ▾
☒		m_Costs_Electric	Costs Electric	Meva / Kpi	EUR	Configurable Meva
☐		m_Costs_Gas	Costs Gas	Meva / Kpi	EUR	Configurable Meva
☐		m_Consumption_Electric	Consumption Electric	Meva / Kpi	kWh	Sum real
☐		m_Consumption_Gas	Consumption Gas	Meva / Kpi	kWh	Sum real

⏮ ⏪ 1 ⏩ ⏭

📄 Clone

🗑 Delete

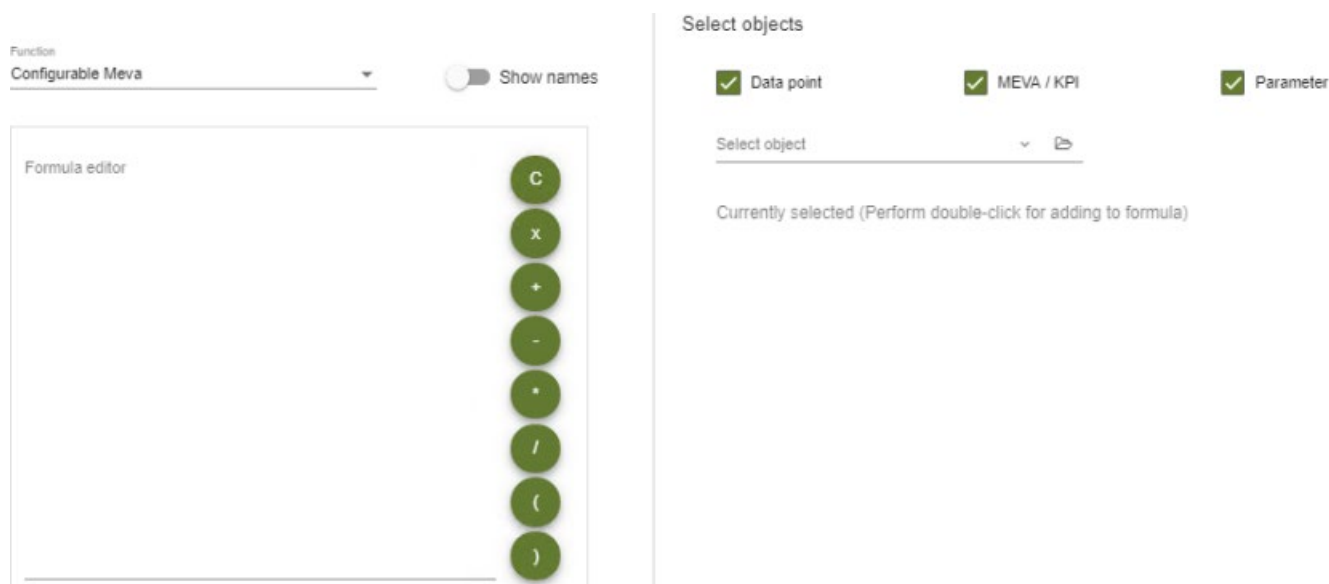
From this table, you can create new key performance indicators, configure them or open the chart in a new window.

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

4.13.8 Data processing and validation in the Desktop Client

4.13.8.1 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 Desktop Client

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 25)

Manual data acquisition (Page 109)

Change management and validation in the Desktop Client (Page 118)

Counter Management (Page 112)

4.13.8.2 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.

4.13.8.3 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.

4.13.8.4 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 118)

4.13.8.5 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).

4.13.8.6 Change management and validation in the Desktop Client

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 Desktop Client:

- 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 109)

4.13.8.7 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 for automatic filling in of gaps or correction of bad 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.
- **Matrix** for editing previously acquired measured 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 violations, based on the configured limits of the reference data point.
- Gaps: Number of gaps, based on the expected setpoint value, such as four 15-minute values within an hour.
- Min/Max: Low and high limit violations, based on the configured limits.
- Status not OK: Number of entries with this status including time stamp.

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

SIEMENS

Validation Report

Author: SIEMENS

Period: 01/01/2017 02/01/2017

Date: 2.5.2015 3:37:22 PM

Total Overview

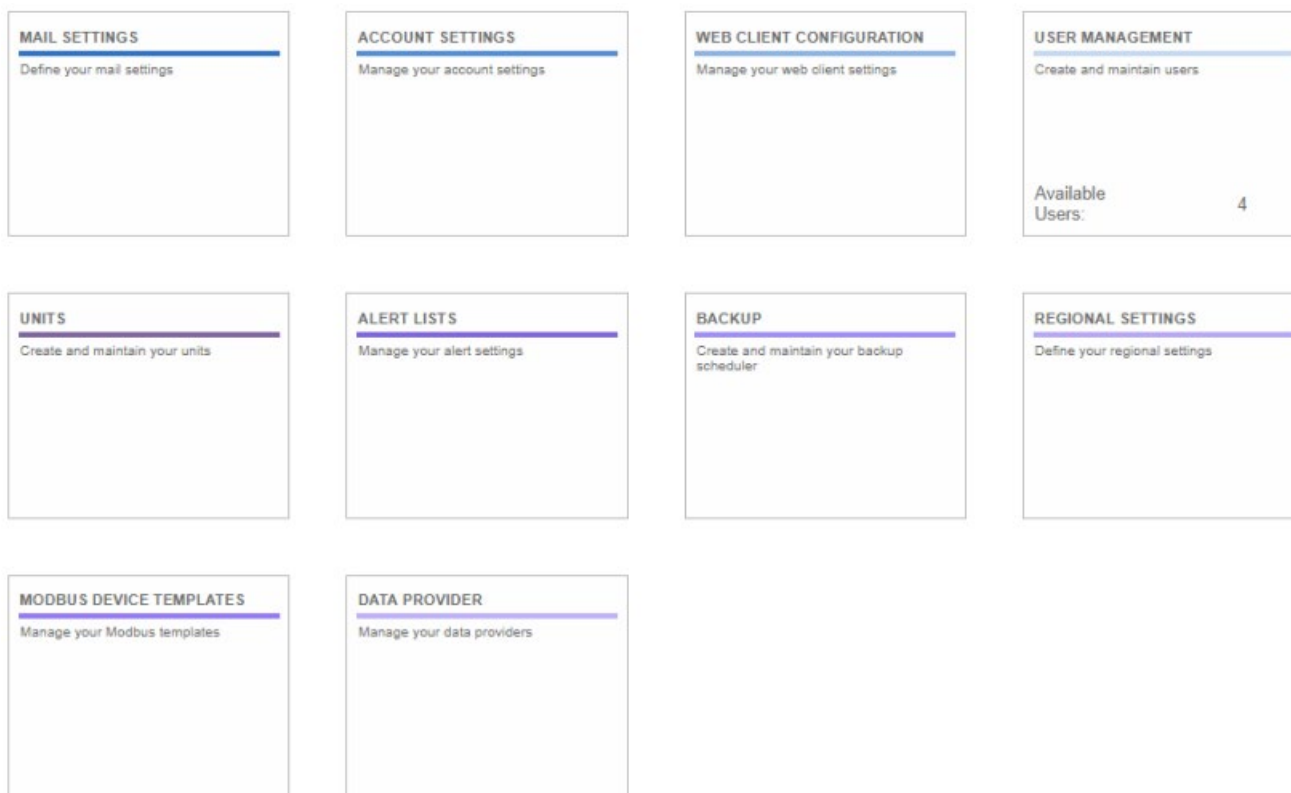
Gaps	2
Min. Deviation	3
Max. Deviation	1
Max. Rise	1
Status not OK	0
Deviation to a reference DP	0

4.14 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:

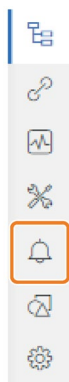
- Mail settings
- Account settings
- Web Client settings
- User administration
- Units
- Alarm lists
- Fuse
- Regional settings
- Modbus device templates
- Data provider



4.15 Notification Center

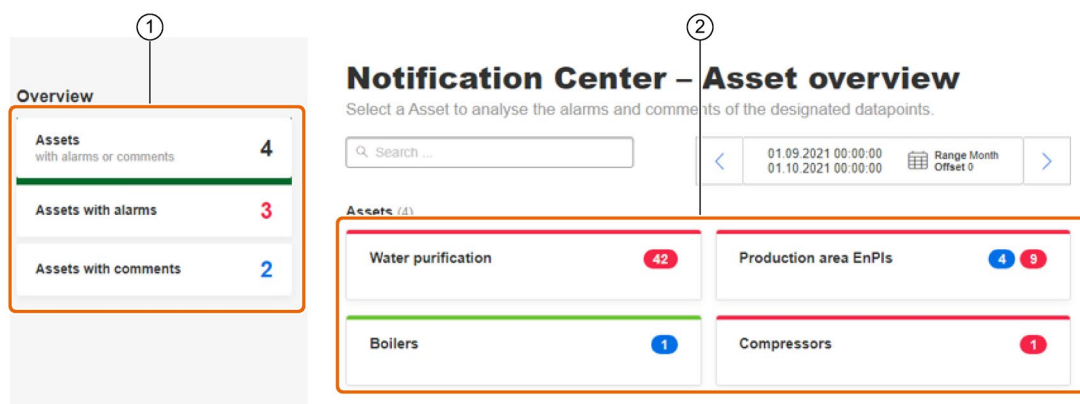
The "Notification Center" provides an overview of all generated alarms, warnings and comments for each asset.

To open the "Notification Center", click on the "Notification Center" icon in the menu bar.



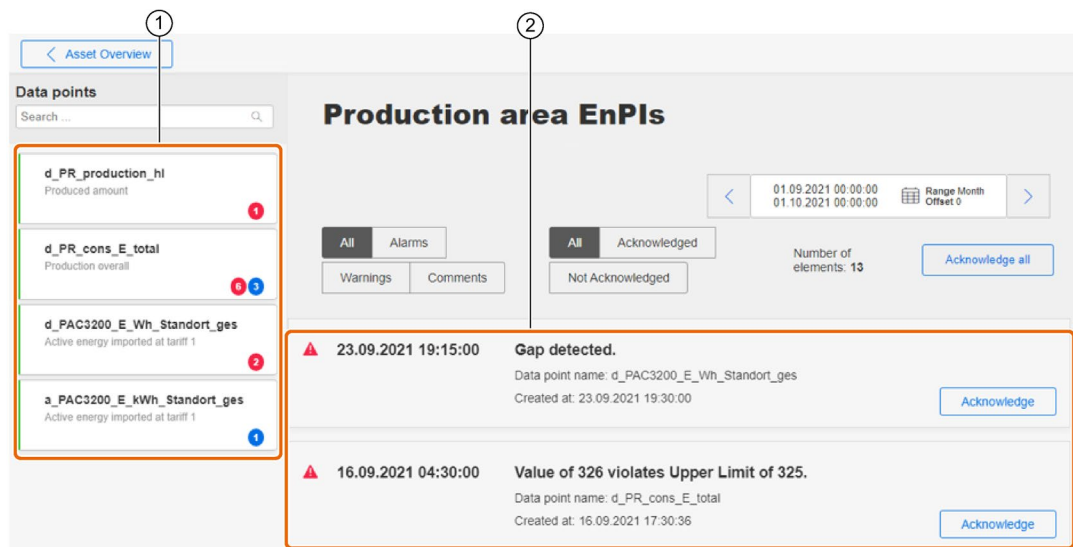
Structure

When you open the Notification Center, you will see an overview of all alarms for each asset.



- ① The overview shows you how many assets have data points with alarms, warning or comments.
- ② The asset overview shows you how many alarms, warnings or comments are occurring in an asset.

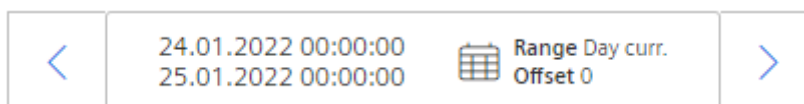
To open the detail view of an asset, click on it.



- ① This area shows all data points with alarms, warning or comments.
- ② The detail view of the asset shows all alarms.

You have the following options to filter for specific alarms:

- Filter for alarms during a specific period in the detail view of the asset.



- Filter for type of alarm
 - All
Shows all types of alarms.
 - Alarms
Shows only alarms.
 - Warnings
Shows only warnings.
 - Comments
Shows only comments.
- Filter for alarm status
 - All
Shows all alarms.
 - Confirmed
Shows all confirmed alarms.
 - Not confirmed
Shows all not confirmed alarms.
- Filter for alarms at specific data points in the "Data points" area.

When you select a data point, you will see the chart icon  in the detail view. To open the chart of the data point in a new window, click on the icon.