SIEMENS
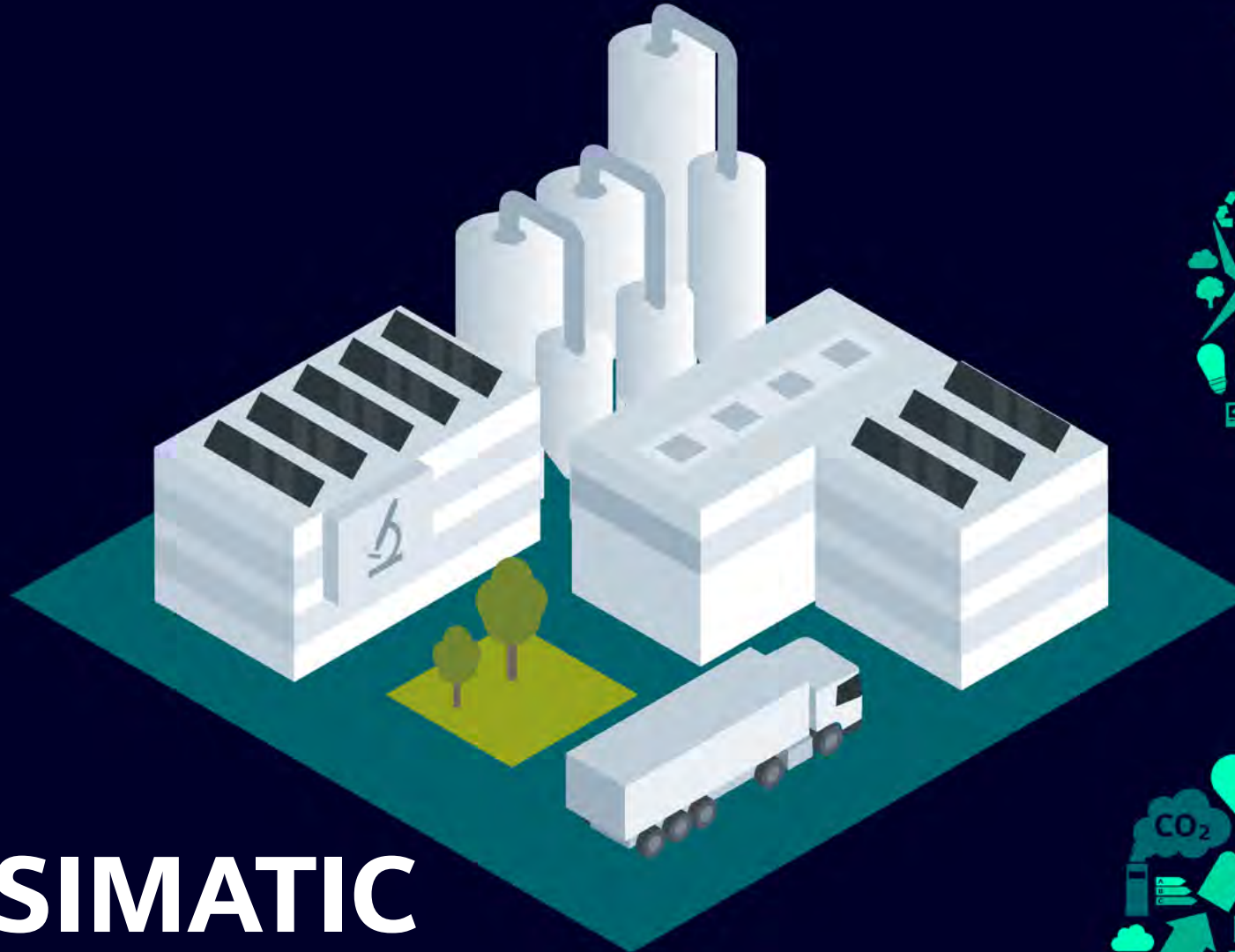
SIMATIC
Energy Management

Integrated energy management from the field to the management level
siemens.com/simatic-energy-management
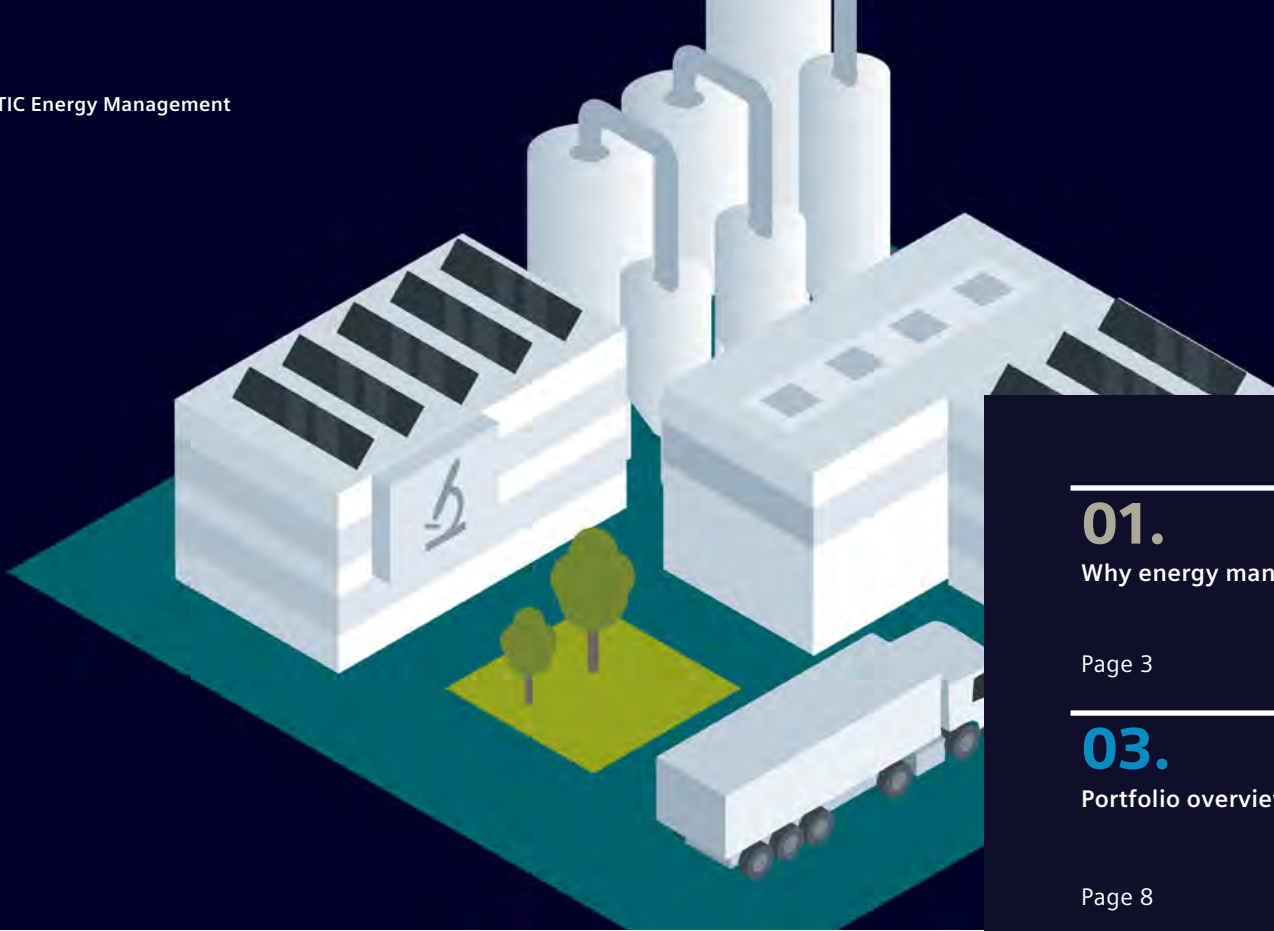
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01.

Why energy management?

What drives the customer?
Different dimensions must be considered

Energy costs

Electricity prices 2000–2021[1],
Germany, industry

~6 %

Annual increase of
electricity price (Ø '00 – '20)

**Significant cost factor
in production**

Laws and climate protection

UN Climate Summit 2021[4],
Glasgow, Scotland

1,5 °C

Limiting the temperature rise
worldwide

**Statutory measures to
achieve environmental
targets**

Change of energy supply

Share of renewable energies:
2020[3] in power consumption
in Germany

>45%

From 6.3% in the year 2000.
Should rise to 80% by 2050

**New boundary conditions
as a consequence of
changing energy re-
sources and continued
requirements for supply
reliability**

Responsibility for environment and image

CO_2-neutral business
operations by 2030[2] at
SIEMENS

54%

Reduction of the worldwide
CO_2 emissions since the
start of the energy efficiency
program

**Energy-efficient
production as a key
marketing argument**

→ [1] **Prices including taxes, source: statista.com**

→ [2] **Source: Siemens AG**

→ [3] **Source: Federal Environmental Agency**

→ [4] **Source: COP26**

Good for the economy, people, and the climate

To achieve a sustainable reduction in CO_2 emissions, we must make better use of resources – above all in industry. The goal: lower CO_2 emissions, higher productivity.

//

*Energy management
is more than just lowering
energy costs!"*

02.

Advantages with SIMATIC

Advantages
with SIMATIC

- Energy management as a component of sustainable production: Energy management is a holistic issue that concerns more than just building management systems and infrastructure. The linking of production data and energy data alone provides great potential to increase productivity and efficiency.

- It is important that companies use energy effectively and efficiently – and to do so they require transparency regarding how much energy is being used when and for what purpose.

- Energy transparency is a prerequisite for energy efficiency and helps in the successful implementation of measures as well as in verifying the results and in ensuring their sustainability.

- Siemens have therefore developed a special solution within their TIA Portal framework for energy management, which can be seamlessly integrated into the automation environment.

- SIMATIC Energy Management supports you with a comprehensive and scalable portfolio of ISO 50001-certified products and solutions – ranging from energy data collection and visualization at the field level to company-wide energy data analysis and reporting at the management level.

- Benefit from SIMATIC Energy Manager PRO for companywide energy management, SIMATIC Energy Suite

for production-level energy monitoring, and the SIMATIC S7 Energy Efficiency Monitor for the stan-dardized efficiency assessment of machines.

- Active load management with SIMATIC Energy Suite helps you monitor agreed demand limits for electrical power and avoid penalty payments – automatically and without affecting production.

→ **Reference video Canal de Isabel II – Energy Management in the treatment plant 4.0**

→ **Reference video Pikolin – SIMATIC Energy Management/SCADA systems**

→ **Reference video RITTER SPORT – SIMATIC Energy Manager**
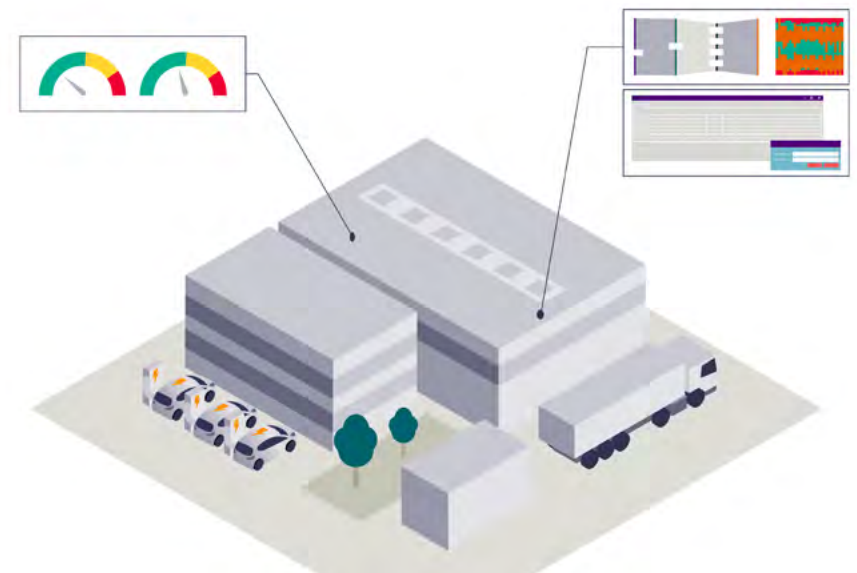
03.

Portfolio overview

Portfolio overview

Scalable software solutions from individual machines to plantwide solutions – SIMATIC allows you to achieve integrated and expandable energy management that is scalable to your needs as they grow.

- **Integrated energy measurement:** Our energy measuring systems integrate perfectly into your automation environment and can also be retrofitted individually, depending on the application.

- **Production-level energy monitoring:** SIMATIC Energy Management provides you with a simple way to equip your machinery and plants with a comprehensive solution for energy monitoring. From the recording of individual loads to detailed evaluation of the efficiency of entire machines, SIMATIC Energy Suite and the S7 Energy Efficiency Monitor bring energy transparency to your automation system. The engineering integrated into TIA Portal supports you with simple implementation of your production-level energy monitoring – from consumption measurement to detailed efficiency analysis based on the condition of the machine or plant.

- **Company-wide energy analysis:** With our solutions for company-wide energy analysis, we support you with planning, implementation, and evaluation of efficiency measures; cost allocation to source; and compliance with the requirements of ISO 50001 – in a scalable and futureproof manner.

- Load management helps to monitor the power limit for electrical energy and to avoid penalty payments – automatically and with no effect on production.

- **Increased transparency and efficiency for production lines:** Our intuitive apps provide valuable insights wherever you need it: Information that can be used to optimize product quality, performance, availability, and energy consumption in a targeted manner. Depending on requirements and application, the apps are available for MindSphere or Siemens Industrial Edge. Some apps can already be used for both systems. Optionally, specially developed client apps for smartdevices facilitate access to your systems.
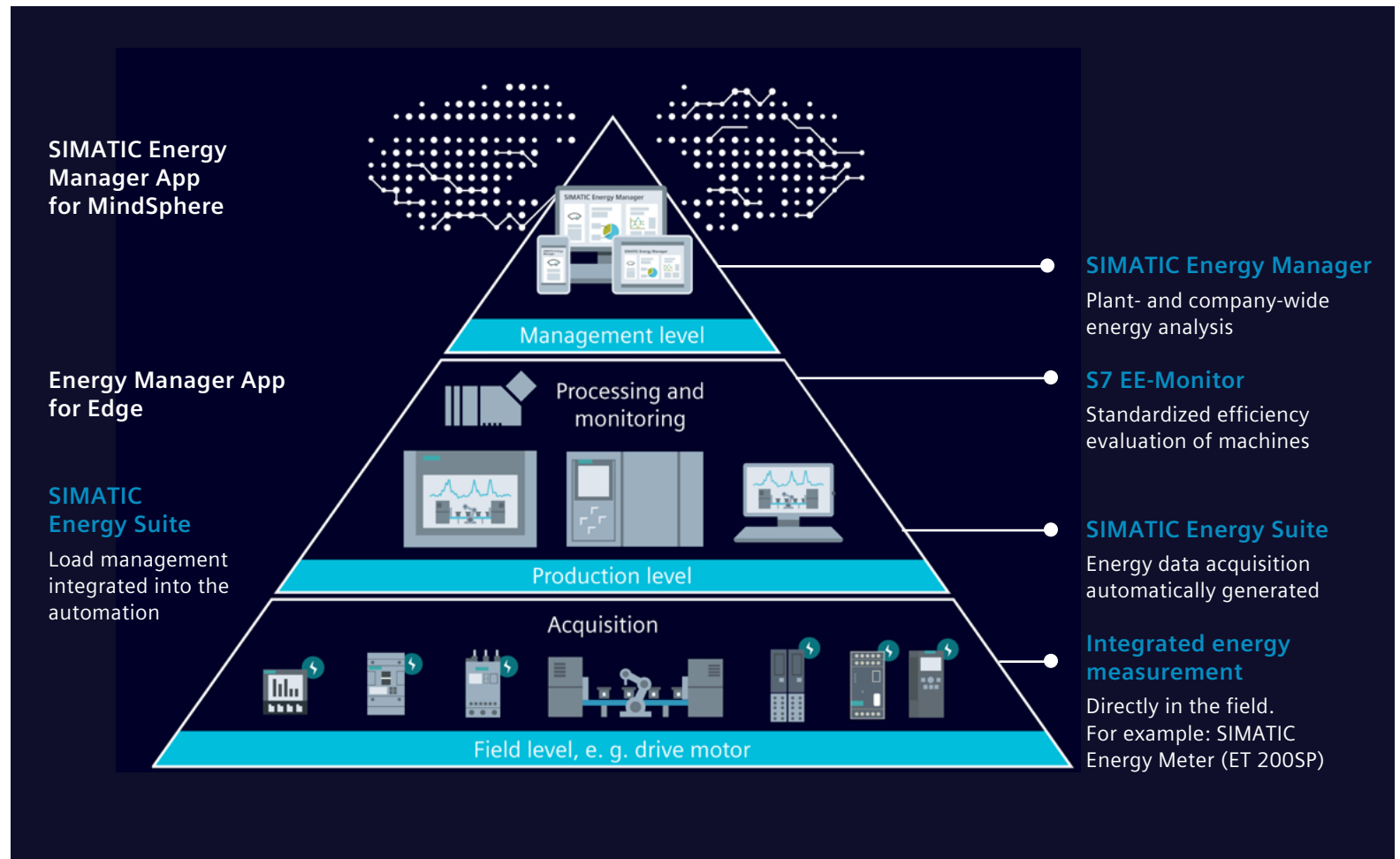
Reference: Energy efficiency evaluation made easy

SIMATIC Energy Management – Transparency and efficiency from the machine to the company as a whole

SIMATIC Energy Manager App for MindSphere

Energy Manager App for Edge

SIMATIC Energy Suite

Load management integrated into the automation

SIMATIC Energy Manager

Plant- and company-wide energy analysis

S7 EE-Monitor

Standardized efficiency evaluation of machines

SIMATIC Energy Suite

Energy data acquisition automatically generated

Integrated energy measurement

Directly in the field.
For example: SIMATIC Energy Meter (ET 200SP)

Production-level
energy monitoring

Production-level
energy monitoring

Intelligent energy management in production

Operators of industrial plants must manage their energy consumption efficiently to maintain their competitiveness in the market. Manufacturers of machinery and plants have to demonstrate the energy efficiency of their solutions in detail. You can do so by using an energy management solution integrated into the automation system: With S7 Energy Efficiency Monitor and SIMATIC Energy Suite. You can only take targeted measures to save energy and subsequently costs in your production if you know how much energy is consumed as well as where and when it is consumed.

SIMATIC Energy Suite: Energy data acquisition generated automatically

SIMATIC Energy Suite as an option for the TIA Portal efficiently links energy management with automation, thus creating energy transparency in the production system. It allows different energy data to be grouped, buffered and visualized in a standard way. The considerably simplified configuration and automatic generation of the energy management program significantly reduce configuration costs. Due to the integrated interface to SIMATIC Energy Manager, the recorded energy data can be seamlessly expanded into a cross-site energy management system certified according to ISO 50001.

→ **Energy Suite**

S7 Energy Efficiency Monitor: Standardized efficiency evaluation of machines

With the S7 Energy Efficiency Monitor, machine manufacturers can simply document the energy efficiency of their machines based on six defined machine conditions and thus comply with the requirements of the VDMA Measurement Instruction 34179. The S7 Energy Efficiency Monitor is part of TIA Portal* and enables integration of condition-based analysis of energy data into machines without great effort. The energy and media demand can automatically appear as an acceptance form on the SIMATIC operator panel and in Excel. Plant operators also benefit: The efficiency data are part of the automation and can be called up on the operator panel at any time and can optionally be transferred to the SIMATIC Energy Manager via the integrated interface and used for long-term evaluation across multiple machines. In this way, the operator can see the energy consumption over the plant life cycle at a glance, pick up any inefficient operating behavior and take suitable measures to correct it.

*TIA Portal V15 or higher

→ **Video of S7 Energy Efficiency Monitor**

05.

Proactive load management

Proactive
load management

SIMATIC Energy Suite load management: avoid load peaks and spread loads evenly

Energy suppliers typically offer reduced tariffs for constant, predicted demand quantities. Power demand limits that are contractually agreed with the energy supplier are thus an instrument for limiting energy costs. However, if you cannot adhere to these power demand limits, you may face significantly higher prices or even penalty payments. Active load management in SIMATIC Energy Suite helps lower energy costs by avoiding load peaks – automatically and without affecting production.

Proactive load management as an element of plant automation

The SIMATIC Energy Suite Load Management is an option of the TIA Portal (from V16) and efficiently links energy management with automation. It enables comprehensive load management for your production from the supply and brings load management directly into production. It is PLC-based load management and is therefore particularly reliable and flexible.

→ SIMATIC Energy Suite load management

06.

Company-wide energy analysis

Company-wide
energy analysis

SIMATIC Energy Manager is the energy management system for industry, certified according to ISO 50001

With SIMATIC Energy Manager, you can visualize energy flows and consumption values in your processes in detail, assign them to the relevant consumer or cost center and see why changes have occurred. Evaluate implemented efficiency measures, optimize your energy procurement and compare your energy efficiency across plants and locations – in a scalable, transparent and future-proof way.

Lower operating costs, optimize energy procurement and comply with legal requirements

SIMATIC Energy Manager not only helps you to save energy costs but also supports you with improving the productivity and efficiency of your processes overall.

With SIMATIC Energy Manager, you can do so much more than just saving energy costs. Our powerful, scalable energy management system links energy and production data, thus helping you to calculate the productivity of energy consumption: How much energy does it cost to produce a certain product? What line can most efficiently be used for this? Why do two comparable lines consume different amounts of energy? SIMATIC Energy Manager helps you to find the answer to these questions – with clear, user-specific dashboards, meaningful energy indicators and versatile interfaces for measuring energy data.

Our powerful energy management system is available in two versions for applications of varying complexity: Basic and PRO. That way, you benefit from tailored functionality and an optimum price-performance ratio.

The scalable, TÜV-certified SIMATIC Energy Manager energy management solution facilitates compliance with the statutory requirements according to ISO 50001/50003/50006 and an energy-efficient and cost-effective operation of your systems.

→ **Energy Manager**

Company-wide **energy analysis**

SIMATIC Energy Manager Basic

The SIMATIC Energy Manager Basic provides a simple way of getting started with energy management. It can be simply configured for the application in question by Web engineering – both in interaction with the automation system and for manual data acquisition. Predefined templates for reports and configurable dashboards support reporting. SIMATIC Energy Manager Basic can be upgraded simply at any time with a license key to SIMATIC Energy Manager PRO.

SIMATIC Energy Manager PRO

SIMATIC Energy Manager PRO provides additional functions for comprehensive, ISO-compliant energy management. The software supports the user with extensive reporting for acquisition and visualizing key data and consumption data, as well as with tools for ascertaining indicators for more complex correlations. In addition, Energy Manager PRO allows a batch-related or material-related consumption analysis and projections for energy consumption.

Various systems on the automation level can be integrated via numerous interfaces.

→ **www.siemens.com/ energymanager**

SIMATIC Energy Manager App

The SIMATIC Energy Manager App for IOS and Android rounds off the portfolio with a simple and intuitive solution for mobile acquisition of consumption data of measuring instruments that are not or cannot be networked with the energy management system. The employee can identify the energy meter simply using the QR code or barcode and enter the relevant numeric value.

→ **Find out more about SIMATIC to go**

Energy Manager for MindSphere and Industrial Edge

Energy Manager gives you visibility into global energy consumers, such as machines, lines, or entire sites. Thanks to the connection with MindSphere, the leading industrial IoT-as-a-service solution from Siemens, you can retrieve consumption data worldwide. This allows you to benchmark energy consumers and visualize optimization potential.

→ **Energy Manager App**

Efficient lightweight construction – less energy for die casting

GF Automotive provides the automotive industry and automotive supply industry with high-quality die-cast products all over the world. The production of such molded parts requires considerable amounts of energy. A comprehensive energy management system was installed in the Altenmarkt factory in Austria.

The actuality of now being able to record, display and assess energy flows in a detailed manner reflects the basis for further increasing energy efficiency.

Assurance of the EN ISO 50001 standard –
certified energy management process

Verification of energy efficiency potential for the plants

Savings attained with SIMATIC Energy Management:

4.500 m³
Compressed air/weekend

10%
CO_2 emissions

07.

Functions,
system requirements
and setup

Functions, system requirements and setup – Energy Suite

SIMATIC Energy Suite

1. Overview of the range of functions

The following properties characterize SIMATIC Energy Suite:

- Optional extension in the TIA Portal and therefore integrated into the automation
- Energy transparency through energy data collection
- Configuration of electrical and non-electrical media (e.g. kWh, m³, kg, unit)
- Archiving and basic reporting in the data log of WinCC Professional
- Flexible consumption through load management
- Priority-based load management for energy consumers and energy producers
- Integration in the PLC ensures high flexibility and high reliability
- Simple and intuitive configuration instead of complex, manual programming
- Automatic generation of the PLC energy program for S7-1500 controllers
- Generation of Energy Suite screens with SiVArc (no SiVArc license required)

Feature enhancements in the new version:

- Flexible energy data connection through integrated interface blocks
- Enable an even simpler integration of third-party devices or devices that are not included in the Energy Support library
- User-defined data can be processed and visualized via alternative communication channels (e.g. OPC UA, Modbus, cyclic process image)
- Enhancements to peak load management

- Support and visualization of regenerative feedback operation at the infeed
- Expansion of the integrated driver library (Energy Support library)
- Update of the supported firmware of devices that are already in the driver library (including SENTRON PAC 4200, SENTRON 3VA, SINAMICS G130)
- Newly supported hardware: SENTRON PAC 3220

2. Setup

SIMATIC Energy Suite consists of the following components:

- Engineering components (TIA Portal)
  - Adds new, integrated editors to the TIA Portal for configuration of the energy measurement and load management objects
  - Includes S7 program generator for automatic generation of the complete S7 program for acquisition, processing, buffering and archiving (WinCC Professional or SIMATIC memory card) of the energy values relevant to billing (power rating and energy) as well as all load management functions of the PLC

- WinCC Runtime components (toolbox for WinCC Professional)
  - Export tool for creating basic energy reports of the energy data archived periodically in WinCC Professional to Excel
  - Transfer tool for buffered communication of the periodic energy values relevant to billing from S7-1500 CPUs to the data log of WinCC Professional

→ **You can find details about currently supported devices here**

Functions, system requirements and setup – Energy Suite

Technical data

SIMATIC Energy Suite

Requirements for PC hardware
- According to the requirement of the TIA Portal components:
  - SIMATIC STEP 7 Professional
  - SIMATIC WinCC Professional/Advanced/Comfort

Requirements for operating system
- According to the requirement of the TIA Portal components:
  - SIMATIC STEP 7 (TIA Portal)
  - SIMATIC WinCC Professional

Supported STEP 7 version
- SIMATIC STEP 7 Professional

Supported WinCC versions
- SIMATIC WinCC Professional/Advanced/Comfort

Supported SIMATIC CPUs
- S7-1500 CPU (without S7-1500S and S7-1500R/H); as of FW2.0
- ET 200SP CPU; as of FW2.0

→ **More informationen in the Mall**

Functions, system requirements and setup – S7 energy efficiency monitor

S7 Energy Efficiency Monitor for evaluation of energy efficiency of machines with the S7 instruction "S7 Energy Efficiency Monitor for Machines"

- The Energy Suite is primarily aimed at the needs of plant operators and supports plant-wide energy transparency, starting with the supply. The new "S7 Energy Efficiency Monitor for Machines" function is aimed specifically at machine builders and allows machines to be equipped with functions for energy transparency, thus rounding off the range of functions of the Energy Suite on the machine.

- The function can be easily integrated as an S7 instruction in the S7 controller of the machine since it is already included in the STEP 7 (TIA Portal) product package (in the S7 instruction library).

The S7 instruction offers the following functions:

- Production-related and standardized determination of energy consumption and efficiency ratios in machines according to VDMA 34179 (e.g. kWh/unit, m³/unit)

- Up to 10 types of energy per machine (e.g. electric, compressed air, water)

- Up to 8 individually definable operating states (e.g. production, standby, off)

- Easy integration into machine control system (S7-1200/1500) and on-site visualization of the efficiency status

- Automatic long-term measurements (e.g. batch, shift)

- Preparation of an efficiency report (.csv) for detailed evaluation and documentation

→ **Application example S7 EE monitor**

Functions, system requirements and setup – S7 energy efficiency monitor

Technical data

SIMATIC Energy Suite

Requirements for PC hardware
 • According to the requirement of the TIA Portal components:
   • SIMATIC STEP 7 Professional
   • SIMATIC WinCC Professional/Advanced/Comfort

Requirements for operating system
 • According to the requirement of the TIA Portal components:
   • SIMATIC STEP 7 Professional
   • SIMATIC WinCC Professional/Advanced/Comfort

Supported STEP 7 version   • SIMATIC STEP 7 Professional
Supported WinCC versions   • SIMATIC WinCC Professional/Advanced/Comfort
Supported SIMATIC CPUs   • S7-1500 CPU and ET 200SP CPU; as of FW2.1   • S7-1200 CPU; as of FW4.2

Ordering overview

Runtime license

S7 EE-Monitor for Machines S7-1500/1200

→ **More information in the Mall**

Functions, system requirements and setup – Energy Manager

SIMATIC Energy Manager energy management system

SIMATIC Energy Manager provides users with a scalable, non-sector-specific energy data management system. SIMATIC Energy Manager forms the basis for cost-effective energy management aimed at increasing energy efficiency and thus reducing energy expenditures.

The system offers the following specific benefits:

- Appropriate energy efficiency measures can be devised based on performance indicators and display options. When these measures are implemented successfully, cost savings are achieved.

- Power monitoring offers the basis for a secure power supply.

- Transparency at the cost-center level raises employee awareness and forms the basis for specifying clear, easy-to-understand targets, as well as for monitoring their achievement.

- Production processes can easily be connected and allow for energy performance evaluation.

- Transparency combined with forecasting functions increases planning reliability and opens up new opportunities in energy procurement.

- Energy controlling, with flexible reporting and analysis functions, helps ensure that efficient systems remain efficient.

- Free definition of performance indicators to facilitate verification of increases in the efficiency of power generation systems and machines.

- Openness is a top priority. With the OPC UA (HA) server, data can be made available to additional applications.

- The system fulfills the legal obligations for monitoring and reporting on greenhouse gas emissions (CO_2 emissions).

Functions, system requirements and setup – Energy Manager

Functions at a glance

SIMATIC Energy Manager forms the basis for cost-effective energy management aimed at reducing energy expenditures and increasing energy efficiency.

- **Acquisition and preprocessing of energy and operating data**

  - Preprocessing of energy data as specified via formula editor
  - Energy Manager app for iOS and Android for mobile meter data acquisition
  - Automatic plausibility check and generation of substitute values, long-term archive
  - Matrix and measured value editor

- **Monitoring**

  - Display of current and projected operating values in one chart
  - Energy management dashboards
  - Reporting on quantities produced, consumption, and costs

- **Controlling**

  - Freely parameterizable balancing of the energy flows of various media
  - Determination of performance indicators with direct reference to production

- Evaluation of the energy purchasing calculation
- Target/actual performance analysis of energy consumption and costs
- Determination and display of statistical parameters
- Benchmarking of various plants or sites
- Machine-status-related energy analyses

- **Cost-center-oriented accounting**

  - Flexible modeling of hierarchical accounting structures
  - Tariff allocation of quantities and flexible price assessment with tariff and price time series
  - Transfer of consumption figures/costs to the ERP system

- **Baseline management**

  - Model creation with historical data for calculating theoretical energy consumption (baseline) as a default value for energy monitoring or controlling

- **Energy forecast**

  - Generation of demand forecasts based on production-dependent factors (production planning) and basic load profiles (typical days)
  - Modeling with multivariable regression analysis

Functions, system requirements
and setup – Energy Manager

- **Management of energy efficiency measures**

  - Central recording of all energy efficiency measures
  - Automatic cost-effectiveness calculation
  - Predefined status for implementation progress

- **Power monitoring**

  - Simple visualization of measured values
  - Precise time analyses for identifying the cause of faults

- **Energy Reporting**

  - Freely parameterizable report generator
  - Fully automated reporting, e-mail dispatch, and document
    management
  - Web client for company-wide access
  - KPI message system

- **Support for the S7 Energy Efficiency Monitor**

  - Data transfer from the S7 Energy Efficiency Monitor via
    a communication module
  - Uniform display of efficiency indicators of machines
    lines / cost centers
  - Energy consumption and costs displayed at the
    machine level and cost center level, per workpiece or shift
  - Benchmarking of same machines/workpieces from
    different manufacturers

Functions, system requirements and setup – Energy Manager

Easy start with SIMATIC Energy Manager Basic

Energy Manager Basic can be configured entirely via the web and provides you with a simple introduction to energy data management. You can upgrade from the Basic edition to the PRO edition at any time with the appropriate license key.

- Easy configuration of dashboards, charts, and reports
- Analysis of detailed data made possible by power monitoring
- Configuration of data points and the OPC UA, OPC DA, OPC HDA, Energy Suite, WinCC/PCS 7, Modbus/TCP, Desigo CC, and ASCII interfaces, as well as manual data acquisition
- Definition of derived data points in order to save performance indicators as a time series for data export, for example
- Simple authorization concept
- Multiple languages (EN, DE, IT, FR, ES, and CN) available for web client
- Configuration of performance indicator data with a formula editor
- Configuration of parameters to display prices or factors
- Tabular overview and options for structuring data sources, data points, performance indicators, and parameters
- Configuration of key settings, for example, e-mail settings, backup, units, regional settings, account settings
- OPC UA (HA) server for making data available to other applications

Highlights of the current version

- The new search function in the Web Client enables the users quickly and without previous knowledge access to the right information
- In the new Notification Center, the user receives an overview of limit value violations and comments, which have been entered by the users. Here the user can switch to the chart with just one click to be able to capture the overall context
- A new energetic batch analysis with various filter options such as produced plant, material or batch selection gives the user the opportunity to get transparency down to the product level and to analyze in a chart of his own. The transparency can e.g. used for this purpose to find out why the energy consumption of a batch in which product A is produced, on plant X is less than if the material is produced on plant Y
- If the user notices during the data analysis in the chart, that data is not collected or displayed correctly he can change with just two clicks in the data point or key figure configuration to check the settings. When configuring the data points or key figures, the user can switch to the chart to check immediately whether the configuration provides the desired result
- The following new functions for KPI calculation are available: potency, root, logarithm, energy to performance, maximum performance

Functions, system requirements and setup – Energy Manager

Technical data

SIMATIC Energy Manager PRO
Operating system • Windows Client Pro/Enterprise 64 Bit (German/English) • Windows Server 64 Bit (German/English)
Connection • VMWare Workstation • VMWare ESX • Microsoft Hyper-V for Windows Server • Microsoft Hyper-V Server
WinCC versions[1] • SIMATIC WinCC V7 • SIMATIC WinCC RT Professional
PCS 7 versions[2] • SIMATIC PCS 7

[1] When installing a recording computer on a WinCC system, the relevant requirements stated must be complied with

[2] For a connection to PCS 7, the SIMATIC Energy Manager PRO system must always be installed on a separate PC

→ **More information in the Mall**

08.

More information

Energy Management Media System
All information in one place

SIMATIC Energy Management

With the modular product portfolio for energy transparency of Siemens throughout the whole company.

Energy measurement

Energy measuring is the base of every energy management system and is ideal for integrating into the automation environment.

Energy data acquisition

Reliable energy data acquisition is a requirement for every energy management system.

Energy efficiency evaluation for machines

The standardized efficiency evaluation enables integration of status-based analysis of energy data into machines without great effort.

Energy analysis

In addition to increasing the efficiency of production, energy analysis must also meet legal requirements. Monitoring, archiving and documentation are important criteria for this.

Customer references

Learn more about the SIMATIC energy management projects.

All information in one place

- **Product information**
- **Tutorial videos**
- **Links to application examples**
- **Links to manuals**
- **References**
- **Updated continuously**

https://support.industry.siemens.com/cs/de/en/view/109765100

Find out more:
siemens.com/simatic-energy-management

SIMATIC Energy Management – integrated and transparent

- Integrated energy management

- Reducing energy costs

- Fulfilling statutory requirements

- An overview of energy consumption for your entire company at all times

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Further information under:
siemens.com/simatic-energy-management