

Reduce energy costs sustainably and comply with ISO 50001



Energy monitoring for manufacturing companies
Whitepaper from thyssenkrupp Materials IoT

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Preface

The energy transition poses great challenges for companies and has become an elemental economic factor. Renewable energies and energy efficiency are the prime focus of corporate sustainability strategies. However, the sustainable future orientation initially involves higher energy costs through the change to renewable energies. These can hamper competitiveness, particularly for energy-intensive industries. Solutions are therefore required for minimizing additional costs while at the same time using the advantages of renewable energies.

Transparency regarding self-consumption of energy is a decisive factor here. You can only adopt effective measures for reducing energy consumption and target investment in more efficient technologies if you know your own energy consumption levels. Energy-saving potential can be revealed by analyzing energy consumption, which takes the financial aspect into account while also improving the contribution to environmental protection and climate action.

Intelligent energy monitoring is therefore necessary for future-oriented companies. This whitepaper highlights what this energy monitoring can look like, what advantages it offers, and what role is played in this by the energy monitoring module toi[®].Energy from thyssenkrupp Materials IoT.

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Why use energy monitoring?

There can be numerous reasons motivating the introduction of an energy monitoring system in a company, but three main drivers can be clearly identified: fulfilling certifications, permanently reducing energy costs and damaging emissions, and transparency regarding the CO2 footprint, as required by an increasing number of clients. Companies can only introduce measures for successful energy management if the data on electricity consumption in production as a whole as well as at the machinery, order and product level have been recorded and made visible.



Receiving certifications

We'll start with the first driver: fulfilling certifications such as ISO 50001. This standard defines internationally recognized requirements for an energy management system. Companies certified pursuant to ISO 50001 undertake an obligation to continually analyze and improve their energy consumption. An intelligent energy monitoring system is therefore an important tool for fulfilling these requirements and ensures that companies are able to comply with the standards.



Reducing the CO2 footprint

The second driver is reducing the CO2 footprint. In times when the public is increasingly focusing on climate action, there is a growing importance of corporate responsibility with regard to CO2 emissions. Effective energy monitoring enables companies to precisely monitor their total energy consumption as well as consumption by each individual product, and consequently allows them to implement measures targeted at reducing CO2 emissions.



Reducing energy costs

The third driver is permanently reducing energy costs. Energy efficiency and reducing energy costs go hand in hand: Through identifying and exploiting savings potential, both energy consumption and related costs can be permanently reduced. Intelligent energy monitoring is therefore both an instrument for achieving greater sustainability and an effective way to optimize costs. Significant lowering of energy costs is achieved not only by minimizing overall consumption, as is often assumed, but also by reducing peak loads through what is known as peak shaving.

Peak shaving involves flattening the load peaks at companies with high power consumption. These peaks not only impact power grid stability but also the costs of procuring electricity. Grid charges, which account for a considerable part of costs, are based in part on the highest amount of power consumed during the invoicing

period. More uniform electricity consumption leads to lower power price costs for grid charges. This is based on recording electricity consumption data to cover load peaks in production and, if necessary, reducing the load at the proper time as long as the costs incurred for doing so do not exceed the savings achieved by reducing the load peak.

The energy provider EnWB has published a calculation example for this:

A company pays an annual power charge per kilowatt. This charge depends on the distribution grid area and is reported by the distribution grid provider. So, for example, if a company has a load of 2000 kW throughout the entire year without load peaks, it must pay an annual power charge per kilowatt stipulated by the grid operator. For this calculation example we assume a value of EUR 140 per kW and year. In this case the grid utilization charge is $2000 \text{ kW} \times \text{EUR } 140 = \text{EUR } 280,000$. However, if there is an extraordinary load peak of 500 kW that only lasts for 30 minutes, the calculation basis for the electricity price components of the grid utilization charges is immediately increased by this 500 kW to 2500 kW. This leads to considerable additional costs of EUR 70,000 in utilization charges in the annual bill, even though this additional power is only required for 30 minutes over the course of the year.

Avoiding this load peak can consequently mean big financial savings.



ISO 50001 and its significance for energy management

The international standard ISO 50001 defines the requirements placed on an energy management system and provides companies with a guideline for continually improving their energy efficiency. The standard formulates clear targets and content that enables companies to use energy efficiently. Applying these enables companies to reveal, evaluate and control their energy consumption while also reducing costs.

ISO 50001 is particularly important for energy-intensive companies such as stainless steel and steel service centers as well as for manufacturing companies. Apart from the benefits of energy savings and the related cost reduction, these companies at the same time also profit from legislative incentives granted by the government after implementing an energy management system certified pursuant to ISO 50001.

ISO 50001 and renewable energy law

The renewable energy law (EEG) is particularly relevant with regard to this. Under certain circumstances, energy-intensive companies certified pursuant to ISO 50001 only have to pay a minimized EEG reallocation charge. This so-called “special equalization scheme” may be taken advantage of by applying to Germany’s Federal Office for Economic Affairs and Export Control.

ISO 50001 and peak compensation

Another important aspect is peak compensation. This enables energy-intensive companies in the manufacturing industry to reduce their electricity and energy tax burden. To do so they must prove that they applied an energy management system pursuant to ISO 50001 during the respective year and implemented measures to reduce peak loads, such as staggering the startup of production plants in an energy-saving way rather than starting them up simultaneously.



Multiple benefits

The introduction and implementation of an energy management system pursuant to ISO 50001 therefore not only has the advantage of enabling companies to reduce their energy consumption and consequently cut costs. It also opens up access to tax and government incentives, and supports companies in reducing their CO₂ footprint and thus contributing to climate action. The continuous improvement process is a central component of ISO 50001 and ensures that the energy management scheme is always up to date and fulfills the company's requirements.

Management responsibility

It goes without saying that the participation of the management plays a decisive role in this process. Without the commitment and support of the management, it is difficult to implement and maintain the necessary changes in the company.

The role of digitalization in energy management

Digitalization also has far-reaching impacts on companies' energy management. Central to this development is the Industrial Internet of Things (IIoT), which generates vast quantities of data through combining equipment and systems in production. These data offer an immense potential for optimizing energy efficiency.

There are numerous advantages of digitalization in energy management. Companies can use digital technologies to monitor their energy consumption in real time, to analyze consumption patterns, and to derive optimization measures. Data analysis opens up new possibilities here for gaining insights into the energy efficiency of production processes and for continually improving this. Digitalization can also be used to optimize and automate operating processes, which leads to a further increase in efficiency.

However, the digital transformation also involves technological and organizational challenges. Implementing IIoT solutions requires a suitable IT infrastructure, data protection and safety measures, and specific IT competencies. In terms of organization, companies have to define new processes and roles as well as train employees for dealing with new digital technologies.

The need for consultation can be high, depending on how advanced digitalization is within the company. Companies such as thyssenkrupp Materials IoT offer valuable support here in implementing IIoT solutions in energy management. They assist companies throughout the entire digital transformation process and help them cope with new technological challenges.

The role of digitalization in energy management is particularly relevant in stainless steel and steel service centers, and for manufacturing companies. IIoT solutions can be used in these energy-intensive sectors to achieve considerable savings in energy and costs. At the same time, they help reduce environmental pollution and help fulfill the requirements of standards such as ISO 50001. Digitalization in energy management is therefore not only a technical challenge for companies but a strategic one as well.

” Through our digitalization expertise we achieve transparency on the shop floor, reveal energy consumption levels across the various locations, and identify saving potentials – a decisive prerequisite for effective energy management.

Sebastian Lang, CEO thyssenkrupp Materials IoT GmbH

Specific example for energy management: toii®.Energy

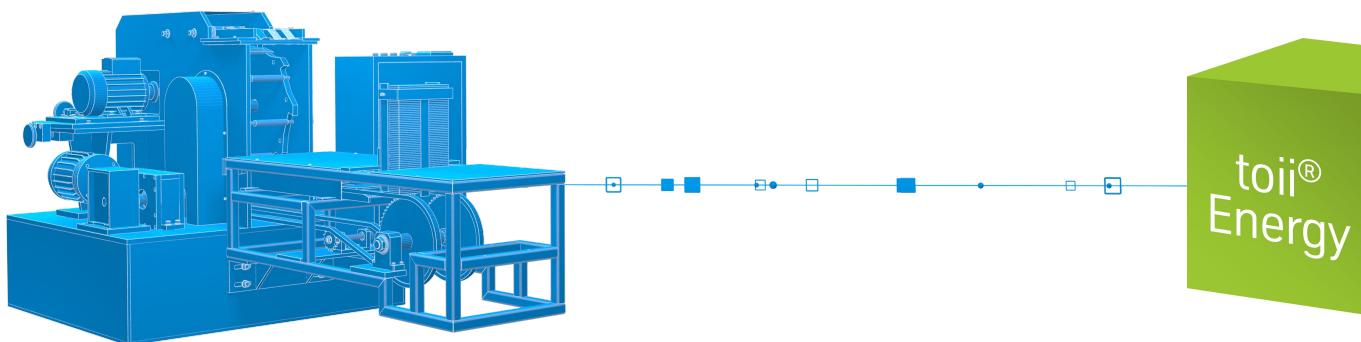
toii®.Energy provides companies with an efficient tool for optimizing their energy efficiency and for achieving their sustainability goals. toii®.Energy is an integrated energy monitoring tool that helps companies reveal their energy consumption, identify saving potentials, and continually improve their energy efficiency. The system supports companies in fulfilling the requirements of ISO 50001 while also increasing transparency on the shop floor.

How toii®.Energy works

- Measuring equipment reads out data from machinery and plants
- toii®.Energy collects and interprets data from measurements
- An overview of electricity consumption is graphically displayed on dashboards

Transparency through toii®.Energy

toii®.Energy is a module of the IIoT platform toii® that enables data on energy consumption to be collected from different sources and analyzed. It records the development of consumption over time and integrating it with the ERP system enables energy consumption to be precisely allocated to customer orders and products. This allows companies to understand exactly where and how energy is consumed in its processes and to develop targeted measures for increasing efficiency.



Visualization and use of energy consumption data

Interpreting the collected data is simplified by the web-based graphical user interface. Connecting toi®.Energy to the modular toi® platform provides numerous options for displaying the data, including diagrams showing the energy consumption and load peaks of individual groups of machinery. This transparency enables the development of strategies to target minimization of both consumption and load peaks. This facilitates a significant cost saving on grid charges.

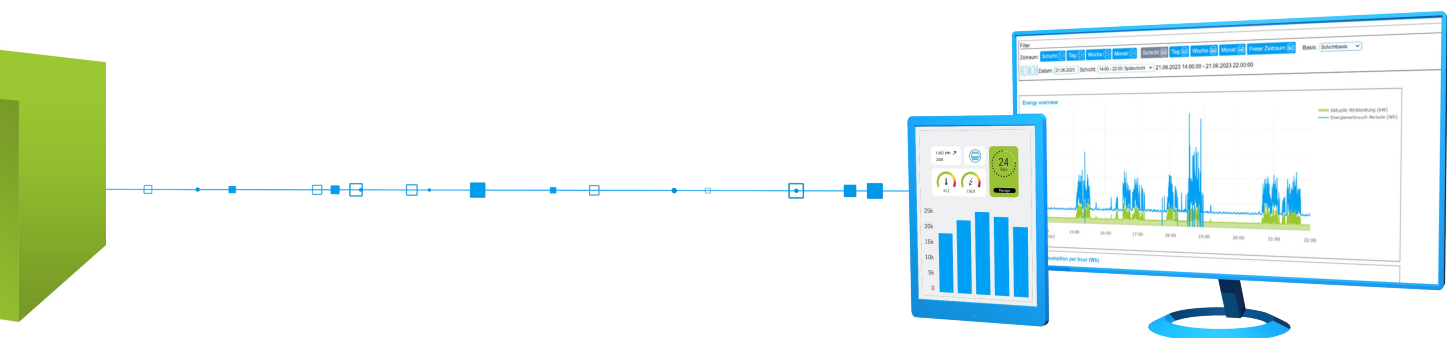
toi®.Energy also supports data export via an SQL interface for further analysis with reporting tools as well as exporting into Excel for additional data evaluations. An alarm function warns users if specific consumption limits are exceeded or unexpected load peaks occur, so that countermeasures can be rapidly introduced.

Technical aspects of toi®.Energy

The technical implementation of toi®.Energy is based on the Modbus interface, a widely used method for communication between equipment. Measuring equipment with an ethernet connection records data on the electricity consumption of machinery and plants that is then transferred into the platform.

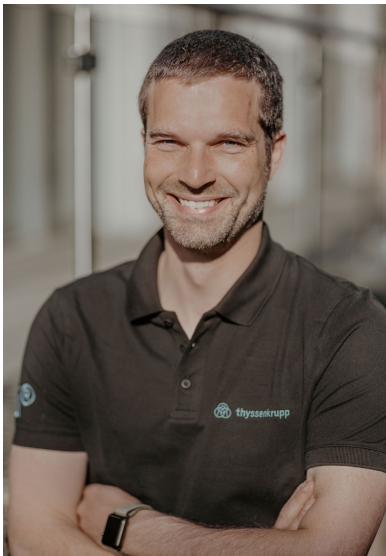
Energy monitoring at a glance

- Connect measuring equipment with an ethernet connection via Modbus interface
- Flexibly configurable groups for different machinery and equipment
- SQL and Excel export for processing data in diverse reporting tools
- Alarm function for messages when threshold values are exceeded
- Record consumption for individual orders and products by integrating production planning (ERP interface)
- Energy monitoring within the framework of energy management pursuant to ISO 50001



Your contact from thyssenkrupp Materials IoT

We would be glad to help you if you require further information or support in implementing our solutions. If you have questions or require further information, please contact us. We look forward to providing you with comprehensive information and to making your company more efficient, sustainable and competitive.



” With our modular software systems, we offer custom-tailored solutions for every requirement – our aim is to help companies increase their productivity while also minimizing their energy consumption.

Sebastian Lang, CEO thyssenkrupp Materials IoT GmbH

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