

GOOD PRACTICES IN SME

Monitoring and management of Energy consumption



Designed by freepik

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Monitoring energy consumption

Implementing an energy management system is key for improving a company's energy efficiency. One of the most popular management systems are based on the ISO 50001 standard. According to the norm, available data shows that company's implementing this standard can decrease their energy costs by at least 10%. Elements of the ISO 50001 standard are based on the Deming Cycle – PDCA (Plan-Do-Check-Act), one of them being monitoring.

In many enterprises electric energy consumption is not being monitored, which means potential savings are not noticed. Monitoring electric energy consumption improves the understanding of how energy is being used in the company, allowing for the taking of actions aimed at reducing energy costs and improving energy efficiency. The base component of monitoring is collecting data on energy consumption which can be done by:

- reviewing energy bills – energy bills provide us information on the total amount of energy consumed both during the day and night. Particular attention should be given to bills based on “estimated use”. If we receive data for each half-hour, we can use them to determine peak demand and the cost of electric energy. Data collected in this way should be recorded, e.g. in a calculation sheet.
- regularly read the meter yourself – if we don't have access to automatic meter reading, the simplest method is to reading them yourself. It is important that the reading be done correctly. More advanced meters can show us daily, nightly and total consumption. Meter readings should be done regularly and recorded e.g. in a calculation sheet for further analysis.
- using automatic half-hour readings – the energy supplier can take half-hour readings and transmit them to the end user. In the case of intelligent meters, the company could be included in such reading automatically. If the supplier provides such reading, it would be worth gaining access to them through, e.g. an internet portal.
- Using an automatic energy consumption monitoring and management system – if the company's building is equipped with an advanced monitoring and management system it should be possible to access current and historical readings along with reporting and analysis. More advanced systems can also send out emails containing reports or alerts about increased consumption. Taking the time to become acquainted with such as system and introduce a data collection and analysis system.



Pic. 1 ehl: three-phase electricity meter

Having collected electrical energy consumption data, the next important step is its analysis. It serves the evaluation of energy consumption and controlling its changes. A good way of using the data is creating an energy consumption profile and defining energy consumption goals, followed by the evaluation of their achievements over the month, quarter or year, or a comparison between different months. Collecting data alone does not produce energy savings. Only undertaking actions based on

the data can create savings for the company. If increased energy consumption is noted, e.g. outside of normal hours, creating a list of actions aimed at eliminating it may be worth it, e.g. automatically turning off computers at the end of the day.

Source: KAPE based on: Start2Act „Kontrola zużycia energii: pomiary i monitorowanie”; NAPE „ISO 50001 – rozszerzony opis”

Energy consumption monitoring and management system

Modern media consumption monitoring and optimization systems are based on proven information technologies used in the industry and coupled with the plant's sensor and monitoring IT systems which directly control the parameters and use of media. Intelligent meters are used in the case of electricity, which not only measure consumption but can also control the production process. Data collected this way is analysed by specialist software. These types of programmes are meant to, apart from aggregating data, display it in an easy graphical way so that the right persons have access to the most important current and historical information, and control the plant's infrastructure. Appropriately configured, they prevent exceeding set energy consumption limits, or turn off the energy supply to machines currently not in use along the production line. Another standard function are warnings and alerts in crisis situations. Algorithms, often using machine learning, indicate energy consumption anomalies, which could potentially lead to malfunctions (e.g. analysis of uncommon behaviour). A good example could be a motor with a bearing failure which suddenly consumes much more power due to resistance.

Source: Marcin Bieńkowski „Efektywność energetyczna przedsiębiorstwa”, 2019

BMS – integrated building management systems

BMS (ang. Building Management System) are management systems for highly technologically advanced buildings. They allow for the optimization of operation costs and ensure high safety standards. A BMS is a central monitoring system for all the equipment, sensors, and detectors, allowing information collected from these sources to be used to respond to changes in internal and external environmental conditions. Research has shown that basic systems such as climate control, heating and ventilation constitute about 45%-65% of the total energy consumption in a conventional building. Added to this are the significant lighting costs, which can amount to as much as 40% of the building's energy consumption. A well-designed building management system responds to changes in external conditions, allows for appropriate responses regulation of systems, e.g. heating or ventilation, and can turn equipment on and off which all contributes to the building's energy optimization.

Source: Robert Gabrysiak „Współczesne systemy BMS”, 2018