Energy Management

Energy management standards ensure that senior management commits to energy efficiency and that all staff play a significant role in the process.

Source: Siemens AG

The development of effective energy management across EU organisations should be viewed as a strategic opportunity and priority. About 11% of all EU energy consumption can be economised cost-effectively through the adoption of more effective energy management.

Energy management is a structured process through which organisations seek to optimise their energy use, by reducing energy waste, increasing energy-efficiency and increasing the share of renewable energy. Energy management standards, such as EN ISO 50001, offer a comprehensive approach to address the various behavioural, technological and regulatory requirements related to energy efficiency. They help companies embed energy management within the entire organization.

In general energy management has five distinctive steps, implemented iteratively and repeatedly in a process of continuous improvement.

• **ENERGY POLICY (1)** - Established by senior management, defines the overall guidelines for the efforts to achieve greater energy efficiency and other energy policy objectives.

• **PLANNING (2)** - Identify the significant sources of energy consumption and savings potentials. Determine the order of priority of the energy saving efforts, set targets and elaborate action plans in line with policy.

• **IMPLEMENTATION AND OPERATION (3)** - Involve employees and the whole organization commitment in the implementation of the objectives and ensure better use of energy becomes a part of daily routines including within purchasing, operation and maintenance, energy efficient design activities, etc.

• **CHECKING AND CORRECTIVE ACTIONS (4)** - Monitoring all significant energy use and consumption flows and activities. Take preventive and corrective actions.

• **MANAGEMENT REVIEW (5)** - Management periodically evaluates the implementation of the plan, objectives and operational control to ensure its continuing suitability in the light of the commitment to continual improvement.

The implementation of energy management is facilitated by specific techniques and tools. The key techniques are energy audits, monitoring and benchmarking while the key tools are energy management and related standards. The energy manager is primarily a change manager, not a technical manager.

Most companies who implement energy management standards not only immediately reduce their energy bill, but also lower their water consumption and improve waste prevention. They improve overall performance and productivity of their plant and increase their competitiveness. Moreover, they get easier access to third party financing and benefit from increased investor confidence. On a long term, energy management standards guarantee that improvements are sustained over time and that organizations continuously improve energy performance at an ever-faster pace, cutting costs year on year.

ENERGY MANAGEMENT

1. Energy management projects most commonly produce savings between **10-30%** of total energy consumption, some peak at **85%**.

2. Only **1.5%** of Europe's medium-to-large companies have adopted the ISO 50001 standards on energy management.

6. Energy bill savings that come with improved energy management total **€58 billion** on annual average in the 20-year period between 2016-2035.

7. In a resounding majority of SMEs across Europe, there is no systematic energy management planning at all.

Adoption of energy management contributes to average net cost savings of €53 billion per year to 2035 and average CO_2 emissions savings of 165 Mt CO_2 per year.

3. The industry and service sectors could save over **25%** of their energy by 2035 by adopting energy management systems.

4. Better and more widely adopted energy management has the potential to save **~26%** of EU combined energy use in the industrial and service sectors of which **19%** could be delivered through more robust policies.

5. Energy management can decrease financial risk by maximizing power availability performance, contributing significantly to reduced electrical maintenance costs.

8. About **11%** of all EU energy consumption could be avoided by adopting more cost-efficient energy management systems.

9. Investment decisions should be based on Life Cycle Costing (LLC), including energy consumption and maintenance. For electric motors for instance, CAPEX is only about **3%** of the LCC, energy consumption **95%!**

10. Energy management can decrease the number of unplanned power outages, improve the effectiveness of maintenance activities, and reduce energy consumption.

Sources: Waide Strategic Efficiency, Schneider Electric

1. Include as a strategic organizational objective, beyond regular energy audits.

Consistent with the Energy Efficiency Directive's objectives (Art.8), energy management systems can enable organizations to achieve sustainable competitiveness, decouple growth from energy consumption, improve resilience versus energy prices volatility, foster innovation (circular economy, IoT, smart energy use, decentralized prosumers), and reduce CO_2 emissions.

2. Encourage continuous improvement of operational energy management in buildings.

Energy management has the great advantage to initiate behaviour change and a culture of permanent improvement, and is therefore well adapted to buildings and their entire lifetime. Energy in buildings account for 40% of overall energy consumption and 36% of CO_2 emissions. About 75% of today's building stock will be still standing in 2050: energy renovation is a key priority.

3. Unlock and promote the vast potential of energy savings in SMEs.

Optimizing energy consumption in SMEs will reduce their vulnerability against energy prices and markets, thereby contributing to an increase of their competitiveness and more sustainable value chains. SMEs are most often referred to as the backbone of the European economy with about 20 million SMEs in EU27 accounting for at least 1/3 of total industrial energy demand.

4. Bridge the gap between energy audits and energy management.

Energy audits set the baseline and identify sets of actions for more comprehensive energy management systems. This implies a new strategy to advance best practices, transparent result, staff training, and acknowledging that energy efficiency is a means to sustainable growth. Opens source databases with trustworthy energy benchmarks and financial benefits of energy savings will bridge this gap for Member States to achieve national targets by 2020 and beyond.

5. Establish a European certification scheme across Member States.

The Italians ESCOs certification scheme embeds energy management in performance contracting and thus guarantees substantial savings by optimizing energy consumption. The approach has a significant impact on job creation and local businesses by creating and developing new markets. Organizations in other countries could also choose from different benefits and risk options from building and operating energy efficiency measures or buying energy services from ESCOs.

Dr. Bernard Gindroz

Chairman of the CEN/ CENELEC Sector Forum on Energy Management

What is the role of energy management in the energy transition?

Energy efficiency has the biggest and most cost-effective potential to decarbonize Europe, but is also the hardest since it has to take place on the demand side – inside Europe's millions of businesses and hundreds of millions of households. To face this challenge, EU policy has targeted energy efficiency to a large extent through product policy over the last decades. This is the low-hanging fruit where significant progress has been made to the extent that product policy is now subject to the law of diminishing returns.

There is an order of magnitude to tackling energy efficiency at the system level rather at the product level. The energy saving potential at the system level is huge but also elusive. How can we regulate the EU's many millions of actors to design, install, commission, operate, maintain and decommission energy systems with energy efficiency in mind throughout the lifetime of a system? This is where energy management comes in. We need to make energy management an inherent part of the licence to use energy. Only through the systematic approach of "plan-do-check-adjust" can we really tackle system efficiency. Energy Efficiency First means first and foremost Energy Management everywhere.

How is energy management a cost-effective solution?

Energy management is cost-effective by definition. The principles of energy management as embedded in the ISO 50001 standard (adopted at EU level as EN ISO 50001) could be employed, though the approach will need to be differentiated. Households need standardized approaches supported through their utility or other actors. On the other extreme, energy-intensive industry tends to use ISO 50001 adoption and certification. In-between, tailored approaches can be considered for buildings, SMEs, transport, education and health campuses or even cities.

Through the systematic approach of mapping energy saving opportunities and acting on them in a cyclic manner, energy management embeds a culture of gradual and permanent improvement. In the early stages of an energy management project, the focus is on organizational change by integrating the energy management cycle into an organization. Initial measures require little or no investment since they focus on behavioral or logistic aspects. For instance, procedures

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can be put in place for switching off idling equipment. Or in a metals processing plant, the process can be set-up so that metal from one step does not cool down before it is processed in the next step. Such simple measures easily save 3-5% of energy use over the first few years by which time energy management starts to stick and lifecycle costing becomes embedded into processes. Efficiency becomes a criterion in procurement. Efficiency improves and starts to produce non-energy benefits such as improved productivity, better product quality and reduced maintenance costs. In the case of ISO certification, companies that adopt ISO 50001 often also certify against ISO 9001 and 14001. Through the ISO management tools, operations are improved and become less vulnerable when facing energy and economic crises, which means they are ultimately more competitive.

What are the main challenges for energy management?

Above all, we need energy managers to act as 'change-makers' in their organizations. We need a managerial approach to energy management rather than a technical approach. This means an upgrade of the skill sets for energy managers with recognized and harmonized competences. The new managers will understand the baseline and energy savings potential, forecast energy needs, strategically source energy, calculate return on investment and understand the regulatory environment. This is a new job function with skills that very few people currently have. Standardization will play a key role in improving skills and competences through harmonized approaches followed by certification.

We need sufficient energy auditors with appropriate skills and certified competences, who can oversee energy processes in buildings, industry and cities and make cost-effective improvement proposals on which energy managers can act. This requires specialized professionals for the various sectors in industry, for buildings and for homes.

ENERGY MANAGEMENT STANDARDS
Germany

Aurubis is Europe's largest copper producer and as an energy-intensive company, its annual energy cost amounts to more than €150 million for electricity, natural gas, oil, coal, oxygen etc. In 2008, Aurubis established an Energy Management department at the Hamburg plant in charge of developing an energy monitoring and management system and implementing energy saving projects. Meanwhile, several Aurubis plants have achieved ISO 50001 certification. Aurubis has been fully committed to increasing the energy efficiency of its sites for decades, and from 1990 to 2015 saw the energy consumption per ton of copper produced fall from 4.6 MWh to 2.7 MWh. The Aurubis' energy monitoring system contains over 3,000 measurement points in the Hamburg facility. One of the major challenges was the organization of all measurement data into a centralized monitoring system that provides actionable information to the team. This challenge was successfully overcome – in a recent audit, TÜV (The German Association for Technical Inspection) praised Aurubis' recording and evaluation of energy use, as well as its energy reporting and regular assessment of possibilities for energy optimization. Digitalization of Aurubis' energy use has led to the control of energy consumption via energy flows in a transparent manner and helps identify and assess potential savings systematically. To ensure an experience and information exchange on energy efficiency and energy managements workshops coordinated by Corporate Energy and Climate Affairs are carried out regularly for the entire Group.

POWER GENERATION
Italy

Since 2009, EniPower (a power generation company, established in November 1999 and controlled by the Italian Oil&Gas major Eni), completed an ambitious and innovative program to replace conventional and relative inefficient units with modern "F class" combined cycles mainly fueled by natural gas. Through investment and management actions, EniPower is improving energy efficiency in its power plants to produce electricity for the market and to supply heat and electricity to the nearby petrochemical sites of Brindisi, Ferrara, Mantua, Ravenna and to the Eni refinery of Sannazzaro de' Burgundi and heat to the district heating systems of Mantua and San Donato Milanese (MI).

Continuous improvement is being fostered, particularly targeting auxiliary consumption and distribution network losses, as electric efficiency is mainly due to externalities, such as demand, load factor, weather conditions and technological plant features. In July 2013, the "EnMS project" was launched to further integrate management systems (ISO 14001, OHSAS 18001) that achieved the ISO 50001 certification in July 2015. EniPower has reported a cumulative annual saving, compared to the initial energy baseline, of about 10.500 Toe, roughly 8% of overall auxiliary consumption, or in other words about 24,5 Kton of avoided CO_2.

(Left) Aurubis plant in Hamburg. Source: Michael Lange
(Right) Energy management has improved the efficiency of EniPower combined cycle power plants in Italy. Source: SEF Power Plant