

Introduction to Panel 3

Energy management: the nuts and bolts

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Energy management systems are proving to be very effective in providing a framework for industrial and other organisations to reduce their energy consumption, energy costs and associated environmental impact. ISO 50001, the international standard for energy management, was published in 2011 and has been implemented in over 20,000 organisations globally.

A systematic approach to energy management involves integrating human, financial, technical and informational resources to reduce energy consumption and environmental impact and costs. This panel features contributions on topics including (but not limited to):

- Case studies of implemented energy management systems and related energy savings.
- Economic analysis of the benefits of energy management systems.
- Barriers to gaining the full benefits of ISO 50001 and how to overcome them at both policy and organizational levels.
- How non-energy benefits of energy efficiency improvements are realised.
- The strengths and weaknesses of different methods of energy performance measurement (indicators) and benchmarking.
- Models to assess the level of maturity of an organisation's approach to energy management.
- The need for and difficulty with behaviour and culture change programmes in the context of overall energy management approaches.

- Tools to help organisations to improve the effectiveness of their management systems, e.g. Lean, six sigma, EXEED, etc.
- The role of energy efficient design and how it can be improved.

Behaviour and organisation

Brunsting & Matas Serrada (extended abstract 3-031-18) discuss an online open access platform including training materials, guidelines and tools to help organisations to improve their energy efficiency, including the links to behaviour and organisational change in a pilot program in the food and beverage sector.

Chirez & Brems (extended abstract 3-076-18) present a case study from the healthcare sector on the energy efficiency benefits of communication and behaviour change in the implementation of an energy management system. They emphasise the additional energy savings that were achieved through effective engagement with employees.

Gilless & Schmick (extended abstract 3-102-18) contribute with practical tips to energy managers on how to engage executives in building support for improving energy efficiency. They share experiences from executive sponsors from North America and present success factors for engaging executives in order to overcome organisational barriers and create more effective industrial energy management.

Gürtler & Lopez Brunner (extended abstract 3-129-18) present how energy efficiency can be improved by behavioural change which is achieved by combining motivational programmes with the use of digital reporting tools. Novel experiences will be shared together with first case studies of the programme.

Non-energy benefits

Departing from the Value Stream Mapping method, Zanoni et al. (peer-reviewed paper 3-043-18) develop a method called Energy Value Stream Mapping, which can be used by industrial practitioners to identify energy wastes in their production processes and auxiliary systems. They apply the method on a die casting company identifying the current state of energy use, define energy efficiency improvements and present the future state with implemented improvements.

Marton et al. (extended abstract 3-063-18) present a case study from an oil refinery in Sweden examining the non-energy benefits of heat integration retrofits. They discuss monetary values of non-energy benefits as well as their effects on energy efficiency investment decisions.

Elias & Nehler (peer-reviewed paper 3-093-18) present a study into benchmarking and non-energy benefits of energy management within the Swedish pulp and paper sector. They examine how these might help to close the available energy efficiency gap which exists in the sector.

Matteini et al. (peer-reviewed paper 3-110-18) make methodological contributions by analysing costs and benefits of EnMS implementation at both enterprise and programmatic level with the aim to make a stronger business case for EnMS implementation. Their approach, illustrated by two company case studies and one programme case study from UNIDO's Programme in the FYR of Macedonia, also includes additional non-energy benefits.

Cases from industry

Ratjen (extended abstract 3-034-18) looks at a methodology to measure the energy efficiency of industrial systems and the assigning of responsibility for efficiency to specific roles. It includes setting baselines, normalisation for external effects and continuous monitoring of energy performance.

Dyrbøl & Drejstel (extended abstract 3-068-18) discuss the benefits of energy audits as part of an overall strategic approach to improving the energy efficiency of an organisation. They also discuss the alignment of an organisation's energy programs with the UN Sustainable Development Goals (SDGs).

Emil Nilsson et al. (peer-reviewed paper 3-103-18) investigate key performance indicators and benchmarking of space heating demand in the Nordic foundry sector. They compare energy performance in different organisations in the sector.

Berger & Garcia-Blanco (extended abstract 3-106-18) present practical experiences and lessons learned from a heat loss reduction program with a large manufacturer of insulation material. They identify barriers to realising the energy efficiency potentials and suggest actions to overcome these barriers.

Energy management programs

Lackner & Kulterer (peer-reviewed paper 3-047-18) present and analyse results from the Austrian climate protection initiative "klimaaktiv". Klimaaktiv is a voluntary programme for SMEs with the aim to promote high-quality climate-friendly technologies and services. The program supports participating companies with improving their energy efficiency by of-

fering, information, networking, quality standards, training and advice.

Dias (extended abstract 3-107-18) analyses similarities and difference in energy management programs in the US and Canada. He defines key elements within the programs and explores factors that helped the programs to succeed.

Noble & Jones (extended abstract 3-109-18) analyse industrial case studies to demonstrate the potential of holistic energy management. They identify opportunities with regard to improved energy efficiency, on-site renewable energy generation, flexibility and storage. Correlated savings in terms of energy, cost and carbon emissions along with revenue opportunities are presented for each of the case studies.

Marques et al. (extended abstract 3-130-18) address the importance that the energy department and the finance department, both involved energy management in a company, are aligned to ensure successful implementation of energy management systems. Their study analyses possible barriers between strategies, targets and indicators adopted by the two departments for and with an impact on companies' energy performance and productivity. Information has been collected from organisations in different countries and industrial sectors by involving companies related to, for instance, UNIDO in the Energy Management Systems Capacity Building and Implementation Programme.

ISO 50001

ISO 50001 came into use in 2011 and provides a structured framework which specifies requirements for the implementation of an energy management system. The standard enables a continuous approach in improving energy performance by focusing on energy management procedures. Recently, there is a raised interest in understanding what drives and hinders the implementation of an ISO 50001 energy management system. In relation to this, it is also of relevance to investigate possible benefits of implementing ISO 50001.

Forni et al. (peer-reviewed paper 3-019-18) look at ISO 50001 from another perspective; the role of the energy manager expert as a driver of the implementation of energy management systems. The role of the energy manager in the Italian industrial companies is analysed and the authors also give a historical perspective – how the role has evolved the last 25 years.

Therkelsen et al. (peer-reviewed paper 3-067) highlights the benefits of harmonizing methodologies for the measurement and verification of energy performance improvement resulting from ISO 50001 implementation and compares different ways of achieving this.

Wu et al. (peer-reviewed paper 3-094-18) explores the approach taken by the US Department of Energy through its online energy management tool, ISO 50001 Ready Navigator. The purpose of the tool is to help organisations to gain the benefits of ISO 50001 with reduced cost and effort.

Fuchs et al. (peer-reviewed paper 3-096-18) have analysed case studies from the Clean Energy Ministerial's Energy Management Leadership Awards program and found factors that drive the ISO 50001 certification in organisations as well as barriers to implementation of the standard. These results together with knowledge on benefits of implementing ISO 50001 provide input when communicating with industry.