

Introduction to Panel 3

Energy management: the nuts and bolts

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Note: this summary includes the presentation made at the final plenary by the panel leaders (attached)

Energy Management in industrial organisations is a combination of a number of activities. These activities can largely be grouped into three core areas: management of people, management of energy related data and management of technology.

Energy performance can be improved by improving any of these three areas, but by having a management program or system incorporating all three is shown to offer large savings in most organisations. A systematic approach to energy management, such as that described in the international energy management system standard, ISO 50001, is proving especially effective in identifying areas of energy waste and in identifying low cost opportunities to improve and in sustaining the savings made from these improvements. Effective management of energy requires a combination of abilities in these areas. This panel featured papers on a diverse range of topics related to energy management. There were a few common threads through the papers and sessions. These included:

- International experience is demonstrating very significant potential for low cost energy savings through improved control of operations and behaviour change. A number of case studies here reinforced this experience. This behaviour change is typically required at all levels in the organisation, especially at middle and senior management levels.
- One of the reasons that so many low cost opportunities exist is that most organisations have difficulty knowing their actual energy efficiency. A number of papers address this issue and show the limitations of accepted methods of measuring energy efficiency in organisations. Indeed some common methods such as energy intensity and specific energy consumption are often barriers to energy efficiency improvement.

- There is growing research and evidence of the additional benefits of improved energy efficiency. The non-energy benefits (NEBs) of energy saving improvements often outweigh the financial savings. These extra benefits range from reduced maintenance costs, improved reliability, improved process stability, improved production capacity and many others.
- There was a very lively discussion of energy management in the context of recent doping and cheating during the Olympics. It was agreed that ISO 50001 presents significant potential to contribute to improved energy efficiency, reduced costs and reduced carbon emissions from energy consuming processes. However this potential is threatened by very diverse approaches to certification. The level of competence of certification bodies needs to be improved.

Policy and support for energy management

There is a need for supporting policies for energy management. These include the need to develop competence in all managerial and technical areas and a need to be able to accurately measure the impacts of the systems. These and other related topics were discussed by Paul Shaeffer et al. (paper 3-117-16). There was discussion of the success of the US Superior Energy Performance program and the Clean Energy Ministerial work in promoting ISO 50001.

Arne Grein (extended abstract 3-110-16) presented a strategic and structured approach to improving energy efficiency in industrial organisations in the context of the EU energy efficiency directive.

Lisa Nabitz et al. (paper 3-081-16) reviewed policy instruments to help SMEs in particular to improve their energy efficiency through increased uptake of energy audits and energy management systems. Their work is based on the large untapped potential for improvement in SMEs. Further research is ongoing on the topic.

Measuring energy performance and energy efficiency

If we want to improve energy efficiency it is critical that we have robust methods to measure energy efficiency, energy performance and energy savings. We examine a number of topics related to the measurement and interpretation of energy efficiency and its measurement. Elias Andersson & Oskar Arfwidsson (extended abstract 3-105-16) examined how benchmarking can help SMEs by comparing energy end use efficiency using an energy efficiency index (EEI). The results of energy audits in Sweden were used to develop the data analysis. A Swedish study by Glenn Widerström (extended abstract 3-113-16) examined the problems associated with poor and inconsistent understanding of the term “energy efficiency”. The term has different meanings in different contexts. This can be a significant problem in trying to implement and drive improved energy efficiency. There were good examples of what is and what is not energy efficiency.

We had a comparison of different methods of determining industrial energy savings from Peter Therkelsen et al. (paper 3-079-16). They have taken real data from a number of industrial companies and measured their savings using different methods and compare the results. They discussed the strengths and weaknesses of the different methods. The US Department of Energy uses normalisation to report sectoral savings and not energy intensity. Luis Marques et al. (extended abstract 3-136-16) compared different methods of measuring energy performance and energy savings. They demonstrated that some of the most commonly accepted approaches including energy intensity and specific energy consumption are often not good indicators of energy performance. They proposed a practical methodology to address common shortcomings and to allow organisations to measure and monitor their actual energy efficiency.

Behaviour, training and networks to improve energy efficiency

It has been shown again and again that behaviour, training and networking are able to deliver significant savings. A case study using Ireland as an example has been developed by Tomás Mac Uidhir et al. (extended abstract 3-149-16). This case study links an optimisation model with a simulation model and investigates the efficiency gains from fuel switching, energy efficiency and changes in activity. They developed a detailed insight into the energy efficiency savings potential in the industrial sector.

Rita Verle et al. (paper 3-052-16) research shows that electric motor systems are responsible for more than 70 % of industrial electricity consumption and many are inefficient. A new Swiss training programme for industrial energy optimisation (IEO) aims to close this gap. IEO is the first training programme of its kind and is unique in the sense that it combines both technical knowledge and management skills. The goal of IEO is on the one hand, to teach the technical fundamentals of electric mo-

tors. On the other hand, to train technical staff how to sell an investment project to company management.

Volvo Construction Equipment AB (VCE) in Braås, Sweden has recently implemented a behavioural change strategy to improve energy efficiency of the production process. Krushna Mahapatra et al. (paper 3-024-16) showed us the results that concrete goals, the commitment of the leadership including employment of a fulltime project leader who earlier worked as a production worker at VCE Braås and the involvement of both the leadership and employees (production leaders, group leaders and floor workers) in project management were key to the success of the project.

Thomas Björkman et al. (paper 3-063-16) examined the experience from Sweden’s voluntary agreement program on industrial energy efficiency. Their work aims to explore how behaviour change can be initiated and sustained over time in companies implementing energy management systems. These were also discussed in the context of policy design.

Tools to support energy management

Michael Berger (extended abstract 3-138-16) explored the benefits of including industrial insulation in energy audits and in implementing energy savings opportunities. He discussed the potential for savings in this area and the benefits of a systematic approach to auditing industrial energy use in thermal applications. He demonstrated that energy auditors typically need additional knowledge on the topic.

Karin Arnold & Tomke Jansson (3-022-16) discussed balancing the benefits of demand side management involving reduction of peak demand through changing production scheduling in plants. She discussed the benefits of this and the disadvantages, sometimes also including reduced energy efficiency?

Georg Ratjen et al. (extended abstract 3-109-16) has developed the Energy Management Centre (EnMC) as part of the Steam-Up project. It is an open source, online database with details of energy savings ideas for steam systems and tools to help their implementation in organisations including business case, dashboard, Gantt charts, etc. It has the potential to be used for other utilities also in addition to steam and also as a source of ideas that can be used by others.

Conventionally, the relevance of energy efficiency improvements (EEIs) is assessed on the basis of the potential energy savings compared to the investments made. However, the value of the secondary effects of these EEIs is frequently just as high or even higher. This is a topic that is gaining more attention and was discussed by Ida Stokkebye Christiansen et al. (paper 3-091-16).

The role and benefits of Energy Management Systems

Yeen Chan & Michael Dewitt (extended abstract 3-167-16) reviewed ISO 50001 and its family of supporting international standards. They look at how to develop effective energy management systems and the subtleties of different measures of energy performance. They also discussed the links between EnMS and national energy policies.

Chad Gallinat et al. (extended abstract 3-089-16) demonstrated the need to integrate efficiency improvements in electric motor driven systems into energy management systems. They

looked at policy level case studies to show the benefits of successful cases and the obstacles that are typically encountered.

Sophie Chirez (extended abstract 3-045-16) discussed why the potential benefits of energy efficiency are not fully realised even in Europe with a high focus on the topic and with the Energy Efficiency Directive. What is needed to refresh our approach and to question our energy consumption were covered.

In the United States and Canada we have seen some organizations challenge the notion that ISO 50001 is the ultimate goal. These companies have instead used it as a platform, a starting point from which they can accelerate their energy management efforts and reach even farther towards more advanced and aggressive energy management practices. These practices then produce even greater results and these were discussed by Chad Gilliss (extended abstract 3-085-16).

Technical aspects of energy management and efficiency

The benefits of improving the overall process and operational efficiency on industrial energy efficiency were discussed by Johan Wollin et al (extended abstract 3-083-16). In general,

if energy is wasted in an organisation, it has knock on effects on the overall efficiency of the plant and vice versa. Absolute electricity savings of 25 % were achieved in the Volvo plant without investment. This was achieved by a systematic approach to identifying and eliminating energy waste in all activities.

Frédéric Bless et al (extended abstract 3-093-16) compared different methods of generating steam. They analysed the costs, energy efficiency and CO₂ emissions related to different methods of steam generation including using waste heat, vapour recompression, heat pumps and direct electric heating.

There is a deficit in implementing energy savings ideas arising from energy audits. This barrier to energy efficiency improvement was reviewed by Ronald Vermeeren (paper 3-124-16). He discussed energy saving interventions related to behaviour change, management and technical improvements.

Chloé Desdouits et al (paper 3-038-16) showed the results of a very detailed analysis of energy and production data for a Schneider Electric manufacturing plant. She showed what data was collected and how it was analysed and what the results of the analysis were and how they aided decision making.

Panel 3 Energy Management

Erik and Liam

Why are we here?

- “It is possible to be too late !!!”
- Sustainability and climate change
- A lot of great points across diverse but interlinked topics
- Definition of EE
- The twins little sister

Energy management

- People - Technology - Data plus a little magic
- Savings from operational control
 - Is 25% possible?
- Behaviour change
- Non-Energy Benefits (NEBs)
- Skills of energy practitioners - internal and external

Benefits and threats

- Olympics and doping
- EnMS and certification
- SEC v Reality

Japanese wisdom

電源を切る



Pre-conference - performance measurement

- Over 80 people
- Good discussion
- Critical that we can measure savings and react to excessive consumption.
- Barriers
- Next Steps