

Introduction to Panel 1

Programmes to promote industrial energy efficiency

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Introduction

Industry is responsible for one third of global primary energy use and forty percent of global energy-related carbon dioxide (CO₂) emissions, across a relatively small number of entities relative to the household or commercial building sectors. Over the coming decades, industrial production is expected to double or triple in most sectors to satisfy growing demand. This growth will occur particularly in energy intensive sectors such as steel and cement whose products supply the building blocks of modern and growing economies. Modest energy efficiency improvement rates will not be sufficient to stabilise or decrease industrial energy demand.

Despite obvious and proven benefits, energy efficiency is still not a mainstream priority in industry. The causes for this include lack of awareness, information and know-how, inadequate methods to calculate costs and benefits, preference to invest resources in production growth rather than cost reduction and perceived risks that focus on energy will distract from core business processes and lead to production interruptions.

There is a strong case for central or local governments to help address barriers and create incentives for industries and ensure that enabling and supporting systems are in place. Experience shows that national and regional programmes can significantly contribute to the implementation of energy efficiency measures in industry. This panel explores experiences from wide variety of programmes and approaches, discusses success factors and scope for improvement, as well as outlines possible new and innovative approaches.

Framing industrial energy efficiency programs – integrated policy solutions

When it comes to industrial energy efficiency programmes, no one size fits all; however, analysis and assessments of programmes can provide valuable insights for policy makers developing or upgrading programmes. The barriers to improved energy efficiency are complex and interwoven – effective programs need to encompass or sit within a suite of complementary measures that improve access to information, enhance risk management and promote systems-oriented solutions.

This is eloquently outlined in the paper by Reinaud et al. (1-053-12) which draws on the experience of programs from Asia, North America, Europe and Australia to describe a pathway to effective energy management programmes – flexible instruments that can be adapted to changing policy needs, changes in industry and national and regional circumstances. Key success factors include: ensuring that programmes are a part of broader policy frameworks that provide an incentive for continuous improvement in the context of that region's economy; establishing ongoing dialogue with industry and other stakeholders; and providing support and technical assistance.

Helgesen and Sandbakk (1-115-12) take a different approach, but arrive at a similar conclusion that a key success factor in implementing energy efficiency projects in industry is a good mix of instruments that reinforce each other. The authors emphasise that information and advisory services combined with financial instruments are important to trigger and deliver larger shares of the savings potentials. The paper summarises the studies undertaken by Norway's Enova, to first identify cost effective opportunities in industry and then analyse the barriers such as unproven technology and internal competition for capital which prevent profitable investments from being implemented.

The paper then outlines measures such as information, obligations and financial instruments that Norway has introduced to address those barriers. In their evaluation of the Norwegian financial support to large energy intensive industries, the authors demonstrate that most energy efficiency projects exceed their goals, and, despite annual fluctuations, deliver sound long-term energy savings.

Abeelen and Both (1-065-12) highlight the need for different policy instruments if short, medium and long term energy efficiency opportunities are to be captured and the range of regulatory, information, innovation and risk barriers are to be addressed. The authors outline existing measures which have been employed successfully in the Netherlands to capture short term immediate optimisation opportunities but also look to the introduction of roadmaps to achieve deeper cuts in industrial energy use. The authors suggest that the way forward could be through 20-year roadmaps targeting a 50 % reduction where governments together with industry identify both regulatory bottlenecks and solutions and, which can form the basis for an energy-efficiency oriented research and development agenda.

The US and Canada have a rich tradition of voluntary industrial energy efficiency programs which are supported by the strong technological know how of the Lawrence Berkley National Laboratories.

To capture and apply lessons learnt from US and Canadian state and regional industrial programs to other regions and economies such as China, Trombley and Taylor (1-161-12) ask their audience to look less at the delivery agency – utilities in the US and government in China; and more at the design and structure of industrial energy efficiency programmes. They examine a number of regional state based case studies that utilise energy obligations and or technical assistance and funding to improve industrial energy efficiency. It would be interesting to build on this work by undertaking a cost benefit analysis of the effectiveness of each approach relative to the cost, as the analysis demonstrates that ultimately the tax payer, rate payer or industry pay for the cost of assisting industry to improve energy efficiency.

Building relationships to deliver outcomes

Marsh and Taube (1-005-12) show the value of peer-to-peer manufacturer networks and extended networks including energy efficiency programme administrators as illustrated in the south east region of the United States. Companies set targets of 25 % energy use reduction over 10 years and the network involves utilities and product manufacturers as well as energy users. Such networks open up new lines of communication and create cross-sector opportunities for cooperation thereby also generating new opportunities and techniques to achieve and maintain energy savings. Ongoing dialogue between industry and programme administrators supports the creation of resources and optimisation of programmes.

Mattes et al. (1-047-12) explore how networks can be instrumental in creating a bridge between research and development and industry and improving knowledge transfer to improve production efficiency. An initial assessment indicates that such networks can effectively reduce transaction costs and increase the adoption of energy efficient solutions.

Networks can raise awareness about the importance of motor system optimisation and promote the uptake of efficient technologies, as emphasised by van Werkhoven and Hartkamp (1-046-12). Similarly, Gründig et al. (1-132-12) stress the value of national and international networks in the implementation of the dena International Energy Efficiency Award. Drivsholm and Maagøe Petersen (1-015-12), on the other hand, highlight some of the challenges related to networks, especially, the time, effort and human resources needed to establish active and effective networks.

Small and medium sized enterprises

A challenge facing energy efficiency policy makers and programme designers is how to effectively stimulate energy efficiency in SMEs. Up to now, countries have placed more focus on large energy intensive industry rather than tried to tackle the very heterogeneous and complex SME segment. However, as this segment consumes a large share of total industrial energy use, for example, more than 20 % in Denmark (Drivsholm and Maagøe Petersen, 1-015-12), progress in this area is essential.

Drivsholm and Maagøe Petersen (1-015-12) describe Danish efforts to set up a cost effective programme to promote energy efficiency in SMEs. Preparatory work included analysis of types of companies and their capacities and needs leading to a categorisation in three types of enterprises – the poor enterprise, the convenient enterprise and the proactive enterprise. Elements of the programme include targeted support tools such as guidance and checklists, the establishment of local industry networks in cooperation with municipalities, information, and access to information on officially registered energy consultants.

Contrary to general conceptions, programmes targeting SMEs can be cost effective. Karlsson et al. (1-048-12) in their evaluation of a large energy audit programme for small and medium sized enterprises (SMEs) in Sweden assess cost effectiveness to be in the range of 199–237 saved kWh for each publicly invested EUR.

Flanders, Belgium has established a voluntary agreement from 2006 to 2013 targeting medium-sized companies with a 10 % savings target. Cornelis and Reunes (1-138-12) analysis of the Flanders voluntary agreement indicates that flexibility could be a key success factor in ensuring that voluntary agreements are effective. The paper also explores the impacts of the recession on energy efficiency investments by participating companies and finds that the effect varies depending on the sector and company resilience.

Dirckinck-Holmfeld (1-006-12) also explores how to tackle constraints in improved energy efficiency in SMEs, particularly, an initial unwillingness to invest in screenings or audits. The author explores how energy savings obligations on energy utilities could be utilised to overcome this. The author finds that for such an approach to be effective, efforts need to be invested into designing the programme so that the different interests are accommodated. Furthermore, specific solutions are needed to address small companies. Karlsson et al. (1-048-12) also emphasise the importance of clear programme goals, involving regional and municipal actors, and standardised energy audit tools.

The need to improve access to financing is frequently cited as a prerequisite for increased industrial energy efficiency, particularly in regard to SMEs. Numerous approaches for achieving this exist, however, not only the type of approach but also the design of the scheme is crucial. Ozoliņa et al. (1-096-12) describe the process for setting up a green investment scheme for SMEs in Latvia. The authors show how the design of the scheme has had an impact on the number of proposals and the types of energy efficiency measures proposed by companies. For instance, due to short notice for documentation preparation, initial focus has been mainly placed on less complex proposals such as reduction of heat consumption through building heat insulation. Complexity of the application process and monitoring phase is deemed to have acted as a deterrent for companies.

Rewarding efficiency

Gründig et al. (1-132-12) highlight the value of awards to publicise best practices and best available technologies. Analysing applications can also provide indications on trends within industry and help map the spread of energy efficiency awareness. The authors identify an emerging shift of focus from implementing specific measures covering a certain production area towards optimising processes and the whole production system. Similar to other studies, the authors find that most energy efficiency projects are very cost effective.

Non-OECD countries are facing a dual challenge. Industrial development is needed for economic development and increased levels of welfare, while unsustainable growth with increased levels of pollution and resource depletion could jeopardise further industrial development and welfare gains. Most of the increase in industrial production over the next 25 years will happen in non-OECD countries (UNIDO, 2011). The identification and replication of successful practices in stimulating industrial energy efficiency emerging and developing economies, is an important step in ensuring that this growth is sustainable. Deshpande et al. (1-072-12) show the positive impact of the Indian National Energy Conservation Award, which has been in place since 1999, and has not only spurred early movers Indian industry to engage in a process of continuous energy efficiency improvement but has also played an important role in raising awareness about benefits, best practices, types of measures and payback periods thereby providing impetus for other companies to engage in energy efficiency. Furthermore, the awards programme also provides valuable information to policy makers that can be used as the basis for developing effective programmes. The Indian programme has also spurred an interest in industrial energy efficiency programmes in neighbouring countries such as Sri Lanka, Pakistan and Mauritius.

Awards can also be used to be motivated industry to contribute to downstream energy savings and promote the uptake of efficient equipment. Pantano et al. (1-029-12) present the Super-efficient Equipment and Appliance Deployment (SEAD) Global Efficiency Medal competition aimed to encourage the production and sale of efficient products. The initiative is building on lessons learned from the first round on televisions to developing awards for motors and computer displays.

Optimising processes and systems

Systems and process optimisation is becoming an increasingly hot topic in industrial energy efficiency discussions. For example, Gründig et al. (1-132-12) highlight increasing focus placed on optimising processes and the whole production system, similarly, Cornelis and Reunes (1-138-12) analysis of the Flanders voluntary agreement also indicate a shift from equipment optimisation to process optimisation. While process improvements can lead to significant savings, they constitute a challenge for companies, investors and programme designers as they are more difficult to target, it is more challenging to calculate savings and implementation and stimulating implementation requires new approaches and tools.

Electric motor systems in industrial applications are responsible for 45 % of global electricity consumption. Systems optimisation and use of best available technology could slash this by 20 to 30 % (IEA, 2011). However, despite the investments in more efficient motors and system optimisation being profitable, most companies still have inefficient and oversized, outdated and even neglected equipment. van Werkhoven and Hartkamp (1-046-12) explore the three-pronged approach implemented by the Dutch government and motor industry to accelerate the uptake of efficient electric motor systems. The approach includes: Long-Term Agreements on energy efficiency, which have been in place since the 1990s; a dedicated knowledge network drawing together manufacturers, suppliers, installers and end-users; and international cooperation and experience exchange among policy makers. The paper indicates that voluntary agreements with industry alone may not be sufficient and that achieving motor systems savings potentials requires dedicated activities, multiple stakeholder engagement and the continuous development of new tools and approaches.

Harris and Gonzales (1-033-12) show that, in general, compared to non-process improvement projects, process upgrades are more complex, more expensive and take longer to develop, thereby conflicting with enterprises' capital budgets. Process improvements are difficult to target and require new types of approaches, which require establishing long-lasting relationships, awareness of investment plans, understanding market forces, partnerships, good consultants, sub-sector specific messaging, motivating trade allies, and enhanced coordination. Hill et al. (1-112-12) in their assessment of the process of developing enabling techniques for enhancing production systems efficiency in the quarrying industry, indicate that while optimising overall efficiency is more complex, there are far greater benefits than in just focusing on individual equipment or process stages. As production systems optimisation typically yield productivity benefits which can contribute to shortening payback periods and motivate implementation.

Roadmaps towards a much more efficient industry

Industrial energy efficiency programmes deliver results; however more long-term strategic approaches through roadmaps offer a mechanism to achieve more substantial energy savings. Technology or sectoral roadmaps have been utilised by a number of governments and agencies around the world, to establish more ambitious goals and strategies that address the technological, financial and regulatory barriers to achieving

those goals. Maintaining focus and relevance across a range of key stakeholders to deliver results over the medium to long term can be a key challenge. Gerrits and Krebbekx (1-024-12) outline the newly created roadmap for the Dutch chemical industry which has identified 400 projects to halve emissions by 2030. The authors highlight the potential role of roadmaps in bridging political visionary goals and short term industrial strategy development. Arens et al. (1-071-12) in their analysis of the voluntary agreement for the German steel industry conclude that voluntary agreements may not be sufficient for all types of industries, but would need to be complemented by additional instruments. Such a mix could include emissions trading systems, strategic energy management requirements, energy audits, financial support for energy efficient technologies or energy taxes. The authors emphasise the need for an integrated policy programme that would link short-, medium- and long term initiatives including a clear linkage with re-

search and development. Wijshoff (1-039-12) in his analysis of roadmaps for the Dutch metallurgical and glass industry shows that roadmaps can open up for new energy efficiency opportunities and new ways of cooperation, including an expansion of boundaries and increased focus on supply chain energy efficiency.

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