

TOWARDS MORE ENERGY-EFFICIENT INDUSTRY A NEW IEA PROGRAMME

An Interview with Dr. Thore Berntsson, Executive Committee Chair,
IEA Industrial Energy-Related Technologies and Systems¹

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What prompted this special focus on energy use in industry?

Dr. Berntsson

Industry's one-third share in global energy use is an impressive statistic, but the potential for improvement is just as impressive. Generally speaking, energy efficiency measures in industry can be more cost-effective than in other sectors of society. One major reason for this is the large size of the systems, which means low specific investment costs. Another reason is the scope for meeting heat needs by harnessing heat excesses at many different temperatures and by improved combined heat and power production. There is therefore a large potential for more efficient energy use in industry, leading to more profitable and safe production practices, as well as substantial decreases in global greenhouse gas (GHG) emissions.



Dr. Thore Berntsson, Executive
Committee Chair, IEA
Implementing Agreement on
Industrial
Energy-Related Technologies
and Systems

But identifying opportunities in industry is complex. And so is the techno-economic and reliability evaluation of those opportunities. Much more research, development and demonstration work (RD&D) and international co-operation are needed. That is why this new IEA Implementing Agreement on Industrial Energy-Related Technologies and Systems (IETS) has been launched.

In fact, the IETS programme is a merger of three earlier existing IEA programmes dealing respectively with process integration, with pulp and paper and with heat transfer and heat exchangers. To these three we have added a fourth IEA activity focusing on separation technologies, which had been in the planning stages.

¹ [IEA Implementing Agreement on Industrial Energy-Related Technologies and Systems](#)

There were several reasons for this merger. One was the basic need to strengthen international co-operation on energy saving and GHG mitigation in industry. Experience has shown that collaborating internationally makes for faster progress. The merger is expected to facilitate co-operation between different industrial RD&D disciplines, too. Our aim is also to attract more industry branches and thus create a truly representative body. A consolidated structure favours knowledge transfer and information exchange between countries, researchers and industries. Such cross-fertilisation will enable us to participate more usefully in IEA's efforts to identify opportunities for improving global GHG mitigation, environmental protection and energy security.

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Are the industries you list the only ones on which you will place the spotlight?

Dr. Berntsson

Absolutely not. Our aim is to include all types of industry, especially all the process industries with high energy consumption like iron and steel, non-metallic materials, aluminium, pulp and paper, petrochemicals, chemicals and food. We shall also be dealing with the manufacturing industries and the small and medium-sized enterprises. The global energy bill can be reduced substantially and industries of that sort have major contributions to make.

We have plenty of good experience to draw upon from the many successful international co-operative projects of the IEA pulp and paper programme since 1982, and we want to use that experience to create new co-operations in other types of industry, as well as further collaborative projects in pulp and paper.

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What are the reasons for bringing together the four specific industrial areas you have chosen to start with?

Dr. Berntsson

While the aim is to expand our scope to other areas and families of industries, these four are of high importance in the IETS strategic plan. Let me explain why.

One of the earlier areas of work is process integration. This is the common term used for the application of methodologies developed for system-oriented and integrated approaches to industrial-process plant design, for both new and retrofit applications. Typical energy

saving potentials through process integration are as high as 20%-40%. Hence the strong motivation here.

Pulp and paper, the second area, also presents a large potential for energy saving and can contribute to reduction of GHG emissions in several ways: by economising on fossil fuels, by savings on biomass and by efficient production of green electricity from biomass. Many industrialised countries have ageing pulp and paper facilities due for replacement over the coming 10-15 years, so now is the time to turn energy-saving potential into a reality in this industry. Benchmarking and dissemination of best practice are among the high priorities.

The third area - heat exchangers and heat transfer - is equally important. Heat exchangers are key components for energy conservation in most process industries and they also play a major role in process integration projects. In this area, new knowledge is needed to develop more efficient components and to enhance heat exchanger system design. We are working to identify RD&D needs beyond existing areas of research, using our networks to build a stronger body of expertise.

Finally, separation technologies have a natural place in the IETS programme. They have been considered an important new area for IEA attention for several years now. A large amount of energy use in industry is associated with separation technologies, which often play an essential role; for example, in the chemical, petroleum-refining and materials processing industries, where physical, chemical or electrical forces are used to isolate or concentrate selected constituents. Not only is energy use heavy, but separation technology investment and operational costs in some process industries are typically between 40% and 70% of total costs. Better understanding of these technologies and systems is needed to meet today's goals of cost-effective, energy-efficient and environmentally sustainable production of materials, both traditional and new.

IEA Implementing Agreement on Industrial Energy-related Technology and Systems (IETS)

The IEA Implementing Agreement on Industrial Energy-related Technologies and Systems ([IETS](#)) addresses energy use in a broad range of industrial sectors and plays a central role in IEA industry-related activities.

IETS was established in 2005 to consolidate IEA's existing or planned collaborative energy technology activities in the fields of pulp & paper, process integration, heat exchangers and heat transfer, and separation technologies. The new program is expected to evolve as new activities are initiated.

The objective of IETS is to enable OECD Member countries and OECD non-Member countries to work together to foster international co-operation for accelerated research and technology development of industrial energy-related technologies and systems. Its main focus is on end-use technologies.

The IETS brings together nine countries: Brazil, Canada, Denmark, Finland, Mexico, Norway, Portugal, Sweden and the United States. New participants are welcomed (contact the [Executive Committee Chair](#)).

As you see, we have a good balance with these areas as the basis for our initial IETS international projects. But I would again stress that our aim is to broaden the scope to other types of industry, technologies and systems.

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The IETS programme is focusing on investigation of technologies and systems for the process industries. But what does that focus entail?

Dr. Berntsson

All IEA Implementing Agreement programmes are about working together internationally. So our mandate covers collaboration on scientific research, and on technological and systems research, development, demonstration and deployment. We are co-operating on technology and systems foresighting and on assessing policies affecting technology and systems. I would stress again that exchange of technical and policy information, of best-practice, feeds into our analysis and helps us to produce quality output.

Our work also needs to be seen within the broader context of IEA's response to the G8 leaders' request at their 2005 Gleneagles Summit. They asked the Agency to identify areas where further analysis of energy efficiency measures by industry could add value across developed and interested developing countries. All our activities and analysis will contribute to meeting that objective.

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What do you regard as today's major obstacles to better use of energy in industry?

Dr. Berntsson

There are several. One major obstacle is high demands for return on investment in industry, which are normally for very good reasons. Another hurdle is risk - whether real or perceived - of reduced reliability and availability with new energy-saving technologies and system solutions. This underlines the need for pilot demonstration plants and knowledge transfer between different industries and countries.

A third big difficulty is that when long-term, high-level decisions are to be taken on complex new system solutions affecting several departments of a plant or mill, the organisational structure is often far from optimal. This is because relatively complex system solutions are in some cases needed to fully realise energy-saving potential. R&D to address organisational and decision-making aspects is therefore really important.

Uncertainty about future policy instruments is also a difficulty, notably where GHG mitigation and energy prices are concerned. R&D is needed to identifying "robust" solutions that are economically attractive in various different reasonable future scenarios.

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In practical terms, how does the IETS programme plan to make a difference? And what are its tools?

Dr. Berntsson

IETS should be seen as a facilitator for international co-operation and information in non-competitive industrial energy R&D areas, drawing on the vast portfolios of national efforts in these areas.

To that end, we are identifying important R&D areas for international co-operation and shall be initiating new projects in which researchers, industrial experts and other stakeholders can share new knowledge and create synergy effects between different countries and different industries. This means being active both in technical development of new technologies/system solutions and in techno-economic analysis, drawing notably on experience from pilot plants needed to overcome some of the obstacles we have already discussed. Experience has shown that sharing of such tasks can save time and money. It can enhance the quality of research and analysis and avoid duplication of effort.

Results from our co-operation will be presented in written form as reports or brochures, either as totally open information or as restricted output for participating countries, depending on the nature of the project. In general, the "raw material" feeding into our co-operative projects will come from existing or planned projects in our participating countries.

We shall be arranging frequent workshops to identify new R&D areas and establish paths for carrying forward findings from co-operative or national projects. Theme workshops will feature topics like major national R&D activities, GHG-mitigation strategies and opportunities, or the role of policy instruments and energy prices.

Of course, we shall also be providing expertise for events organised by others. For instance, we are very pleased to be working closely with the IEA Secretariat on two linked IEA events this autumn on the pulp and paper industry and on energy and forest products in general. The first, a workshop in Paris on 9 October, will focus on technological systems for energy efficiency and CO₂ emissions in the pulp and paper industry. In fact, I shall be presenting the outcomes from this workshop at the second event, an international seminar in Rome on 30-31 October, which will take a broader look at energy and the forest

products industry. We shall be identifying the industry's challenges, examining the impact of new energy policies on technology and the industry. The agenda includes a hard look at bio-energy solutions and their potential. Our aim is to leave the seminar with enhanced insight into how forestry products can fit into evolving energy scenarios and how governments and the various stakeholder institutions can work together to shape well integrated, carefully balanced policies to better integrate these products in a sustainable manner, at national, regional and global levels.

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Is the IETS programme designed to serve governments, or industry, or both?

Dr. Berntsson

The results of IETS activities will be of interest to industry, to civil society and to governments alike. Our aim is to improve understanding of energy-saving potential in industry that can be achieved through improved technology, techno-economic efficiency, reliability and decision-taking. Armed with that understanding, industry will be in a better position to reduce its energy bills and contribute to a better environment. In numerous scenarios, industry and civil society can co-operate to find more economically attractive and sustainable solutions. For governments, full awareness of industrial energy-saving opportunities is crucial in the drive for GHG mitigation and the choice of policy instruments leading to win-win situations for industry and for society.

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Two non-IEA countries - Brazil and Mexico - are contracting parties in the IETS programme. Could you tell us what special benefits your programme offers developing countries?

Dr. Berntsson

In most sectors of society around the world, factors like geography and latitude have a strong influence on energy use and energy efficiency. In the industrial sector, however, these differences are generally much smaller, so that it is easy to transfer experience, know-how and R&D findings from one country to another. A developing country can therefore benefit more or less directly from better access to past or ongoing R&D in developed countries. It can "leapfrog" to better solutions and avoid the learning process already worked through by others. Results from international co-operative projects within IETS can thus be directly applicable to all countries having the type of industry in question, including developing countries.

In order to ensure good technology and knowledge transfer, some of the IETS workshops will be held in developing countries, especially the "Plus-Five" countries invited to join the G8 nations in their dialogue on addressing climate change and securing clean energy and sustainable development. These countries are Brazil, China, India, Mexico and South Africa. We also offer the opportunity to any non-contracting country to participate - as an observer - in meetings of our Executive Committee and in workshops or other activities for a while before a possible decision to participate.

I would add that, while all participating countries contribute a relatively small secretariat fee, developing countries can be charged a lower fee than other countries. In addition, each country can choose to join only the projects that fit best with its ongoing national projects and orientations.

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Looking to the longer term, what are the IETS Implementing Agreement's goals?

Dr. Berntsson

Long-term goals for IETS are to be an established leading international forum for knowledge transfer and synthesis of national efforts aimed at identifying and implementing industrial energy-efficiency technologies and system solutions in wide-ranging types of industry. We shall constantly seek to expand expertise in advanced strategic measures for radical reductions of energy use in the industrial sector. To achieve the maximum gains, we shall broaden awareness of long-term GHG mitigation opportunities in different types of industry and in different countries. We shall work to ensure that national policy-makers are fully aware of the impact of policy instruments and energy prices on measures to improve energy efficiency in industry

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Thank you, Dr. Berntsson, for telling us about the IETS Implementing Agreement. We wish the programme well with its future work.

Dr. Berntsson

Thank you for this opportunity to tell *OPEN Bulletin* readers about the IETS programme. New participants are welcome and I should be pleased to respond to any queries (thore@chemeng.chalmers.se)