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TECHNICAL WORKING GROUP ON ENERGY EFFICIENCY IN INDUSTRIAL INSTALLATIONS

KICK-OFF MEETING

18-20 May 2005

MEETING REPORT

A. FOREWORD

- 1 The Technical Working Group (TWG) on Energy Efficiency in industrial installations (ENE) held its first plenary meeting at the Institute for Prospective Technological Studies (IPTS) of the European Commission in Seville, Spain from 18-20 May 2005, with Mr D. Litten, Head of the European IPPC Bureau, in the chair.
- 2 The meeting was held within the framework of the implementation of Council Directive 96/61 of 24 September 1996, as amended by Directive 2003/87/EC of 13 October 2003 and Regulation (EC) No 1882/2003, concerning Integrated Pollution Prevention and Control (the IPPC Directive), in order to initiate an exchange of information on energy efficiency techniques. Energy efficiency is an element to be taken into consideration when determining BAT, and the IPPC Directive also requires that energy is used efficiently in an IPPC installation.

However, the Commission pointed out that the main driving force for this work is the Commission Communication on the implementation of the European Climate Change Programme (COM(2001)580 final) ECCP adopted on 23 October 2001. This Communication highlighted a series of measures to be implemented and one of those was the proposal to promote effective implementation of energy efficiency provisions in the IPPC Directive and prepare a special horizontal BREF addressing generic energy efficiency techniques.

- 3 The meeting was attended by 51 participants from Member States, industry, EEB and the European Commission. The agenda for the meeting followed the outline of

the background paper dated April 2005 that had been prepared by the European IPPC Bureau as introductory material for the meeting.

B. REPORT

This paper is not intended to be a detailed report of the meeting and the content of the presentations are not generally repeated; only the main discussion points and conclusions are addressed.

Background and mandate of the work

- 4 To improve the understanding of the context of this work several presentations were given in the introductory session (list of presentations, see the Annex 1 to this paper). It was clarified by EIPPCB that the background and mandate of this work on Reference Document on Energy Efficiency (ENE REF work) differs from traditional BREFs. The major mandate for the work is to implement a special request on the Commission Communication on the implementation of the European Climate Change Programme (COM(2001)580 final) ECCP concerning energy efficiency in industrial installations. The ECCP asks that effective implementation of the energy efficiency provisions of the IPPC Directive are promoted and that a special horizontal BREF addressing generic energy efficiency techniques is prepared.

The target of this work is to respond to this request and give general guidance to operators and regulators on how to approach and implement energy efficiency requirements set out in the IPPC Directive.

It was especially stressed by DG ENVIRONMENT that the development of this ENE Reference Document is one of several measures foreseen in the European Climate Change Programme aimed at reducing the emissions of greenhouse gases.

- 5 This work on energy efficiency has links to many other Commission instruments and the most relevant Commission activities were presented and discussed at the meeting. The following actions were mentioned:
 - Directive 2003/87/EC on greenhouse gas emission trading
 - Directive 2004/8/EC on the promotion of cogeneration
 - Directive on energy performance on Buildings
 - proposal on end-use energy efficiency and energy services
 - proposal for the framework directive for setting of Eco-design requirements for energy using products, EuP (separate presentation)
 - an Energy Efficiency Toolkit for SMEs developed in the framework of the EMAS Regulation
 - green Paper on Energy Efficiency which was presented at the June 2005 European Council, COM(2005)265final
 - several studies and projects under the umbrella EIE, SAVE etc.

The EIPPCB stated that all these will be taken into account with the view of not duplicating any work. A lot of other information is also available which should also be taken into account and eventually converted into a format useful for this work.

- 6 DG Enterprise presented the content of the Directive on Energy Using Products (EuP) which will enable the Commission to propose and adopt implementing measures to set eco-design requirements on energy using products. It was stressed that the work on the ENE REF should not conflict with the possibilities of developing such requirements on particular products. More concretely, any requirements on the energy efficiency of products should be established under the coherent and harmonised framework of the EuP Directive. At the same time, the TWG could present useful information on the categories of products which could be candidates for such products policies. In the discussion of the content of the EuP Directive the DG Enterprise representative took the view that, neither fuel nor general commodity chemicals are 'energy using products' in the context of the EuP Directive. Implementing measures of the EuP Directive will include eco-design requirements, (generic or specific) for, e.g. pumps; such requirements may also be subject to energy efficiency recommendations from the ENE REF work. If there are eco-design requirements for pumps introduced in the EuP framework, it means that pumps which do not fulfil these requirements can not be put onto the market. Specific eco-design requirements, which among other things may include requirements concerning energy, can be seen as minimum requirements for marketing the products in question.
- 7 The contents of presentations showed that energy efficiency issues are considered important by companies and they have also developed approaches on how to manage them. Integration and cost efficiency are usually the driving forces. It was also indicated that there may be some confusion with terminology, e.g. consumption, use and recycling of energy. However, it was clarified by the EIPPCB that the target of this work is not to define issues implicitly, but the target is more to give clarity on how to approach energy efficiency in permitting procedures.
- 8 It was also declared that reports exist and there are ongoing projects dealing with energy efficiency in industrial installations. All relevant reports and projects submitted in the work will be considered by the EIPPCB. Concern was also expressed that industry will improve energy efficiency but not reduce their total energy consumption. However, it was clarified by the Commission that this work cannot answer or improve everything but could be a good tool to improve efficiency in industrial installations. It was also stated that different forms of energy, like heat and electricity, should be considered and calculated differently. There was also a discussion on different equivalent factors.

The nature of the final product, Reference Document on Energy Efficiency was clarified by the Chairman. The document will give guidance to target groups and other interested parties. It is neither legislation nor binding in any other way.

Scope of the work

9 There was discussion about the following aspects concerning the scope of the work:

- target of the work
- target group
- boundaries with sectoral BREFs and other Commission tools
- boundaries of energy efficiency (installation, plant, site, company, local community).

10 It was concluded that the main question the ENE REF should give an answer to is:

How to demonstrate if energy is used and produced efficiently?

Finding answers to this question deals with the following issues which should be included in the scope of the ENE work:

- what are appropriate definitions for energy efficiency?
- what are, and how to use, energy efficiency indicators?
- what methodologies, techniques, etc. contribute to good energy management?
- what are the possible measures, both techniques and practices, to improve energy efficiency?
- what are possible motivation tools?

To answer to all relevant questions, the ENE work must deal with the following issues: management systems including different types of auditing and measurements, methodologies, definitions of energy efficiency, applied techniques and good practices.

It was agreed that the primary target of the ENE work is to improve energy efficiency by giving generic guidance on how to approach, assess, implement and deal with energy efficiency in industrial installations along with corresponding permit and supervising procedures. Improved energy efficiency often results in a reduction of CO₂ emissions somewhere, however is not the focus of the ENE work to relate energy reduction specially to reduction of CO₂ emissions.

Target groups

11 It was agreed that the main target groups of this work are regulators and industrial operators. Others are governments (local, regional and national), “Collectivities”, municipal services, non-governmental organisations (NGOs) and other interested parties. It was also discussed how companies under the IPPC threshold should be addressed. It seemed to be widely agreed that many of the proposed measures, tools and methodologies dealt with may also be implemented in non-IPPC installations. The IPPC companies may especially inform, train and require good energy efficiency practices from companies with whom they do business.

Boundaries

- 12 It was concluded that ENE work will deal with generic energy efficiency techniques and practices which can be applied in several industrial sectors and it will not duplicate the work done in sectoral BREFs. However, it can feed other work that is in progress with information and ideas. It was also discussed if it would be wise to concentrate on energy use and consumption. Finally it was agreed that power production will be included when addressing generic techniques to improve energy efficiency. Energy efficiency of buildings will also be addressed. It was agreed that
- the ENE work covers industrial sectors which use or produce energy and apply generic techniques which are possible to transfer to other sectors. Nothing is explicitly excluded or included.
 - the ENE work will not develop or conclude on sector specific techniques but will use examples from various industry sectors to derive generic conclusions.
 - the ENE work will deal with equipment (e.g. pumps, fans) as parts of systems and installations without drawing conclusions which could conflict with EuP implementing measures.
 - the ENE work will also deal with the energy efficiency of production buildings, including ventilation, lighting, insulation and temperature controls.
 - the ENE work will not respond to fuel specific (e.g. bio, fossil, waste) issues. It is clear that with some fuels, higher efficiencies can be naturally achieved.
- 13 Boundaries concerning energy efficiency (installation, plant, site, business partners, company, local community) were also discussed. This issue was not concluded but there was a broad understanding that in most cases, the boundary is an installation but in certain circumstances, it is necessary to consider larger boundaries like integration with other installations, site or even regional or national boundary e.g. power generation. All kinds of integration regarding energy efficiency were seen as a good approach.

Approach

- 14 There was a broad understanding that the ENE Reference Document (REF) should not duplicate sectoral BREFs and should address generic issues on energy efficiency using examples from various industry sectors. The ENE REF should not discuss general energy policy issues such as the choice of fuel.
- 15 It was discussed how broad and in depth the introduction for understanding the basics of energy should be. It was agreed that the approach should be practical bearing in mind the primary users of the document who will be operators and regulators. An introduction which is too long, complicated and scientific may cause confusion. However, it was broadly agreed that a good introduction to basic energy issues is needed. That means starting with the exergy and thermodynamic laws and ending up with different forms of energy and energy demand. It was also expressed that there should be an LCA (life cycle analysis) approach and energy should be presented together with other natural resources.

- 16 An integrated approach was also agreed. The integration can be seen at many levels: energy issues as part of the overall management system, energy integration inside the plant and the site and together with neighbouring energy users/producers. Energy efficiency and its environmental effects should also be assessed together with other environmental impacts. All these aspects should be addressed.
- 17 Motivation tools were also discussed. Usually these kinds of non-technical issues are not included in (B)REFs but in this special case the majority agreed that it would be useful to include them as they have an important role to play in implementing energy saving measures. Usually companies require the same economic conditions for energy saving investments as they do for investments of production purposes. Different kinds of motivation and supporting tools may help to decrease the threshold to start energy saving measures. Dealing with motivation tools gives the target audience a picture of possible measures to decrease economic barriers and to implement energy saving measures.
- 18 It was agreed that in this ENE work it is not reasonable to draw BAT conclusions but come up with some sort of recommendations for useful and practical approaches, methodologies and practices to analyse and improve energy efficiency in industrial installations. In any case BAT will not be the main objective. A good, practical toolbox of good practices could be the end product of this work. The toolbox should include answers to the main question: How to demonstrate that energy is used and produced efficiently? Good examples from different cases are extremely important.
- 19 It was also agreed that the ENE Reference Document should serve as a guidance on how to better address energy efficiency issues during the up-coming revision of the sectoral BREFs. It may indicate if there is a need for sector specific BAT on energy efficiency.
- 20 The main groups targeted for the use of the ENE REF are competent authorities and industrial operators. In addition, the ENE REF could be used in the context of the EU Emissions Trading Scheme in order to provide guidance on techniques to improve the energy efficiency of industrial installations.

Content of the work

- 21 The proposed content of the work was discussed and several additions were recommended. However, the main content suggested by EIPPCB was endorsed. It was agreed that the ENE REF document should have the following main contents: introduction for understanding the basics of energy, energy management as a crucial prerequisite for the improvement of energy efficiency, approaches and methodologies for energy use optimisation and energy efficiency, and descriptions of good energy efficiency methods and techniques applied in several sectors. The relation of the ENE product to other legal instruments will be addressed, too.

The contents of the above mentioned headings could be the following:

22 Introduction for understanding the basics of energy

There was broad agreement that a good introduction is required on what energy is, the forms of energy and indication for what energy is needed. This introduction should give a picture of the basics of energy to get the reader to understand and consider the needs and choices of energy in different situations but this should not be copied from a thermodynamics book. That means starting with the exergy and thermodynamic laws and ending up with different forms of energy and energy demand, but looking from customer point of view. The difference between energy efficiency and energy demand should be explained. It was also said that the definition of energy efficiency used in this work should be at the beginning of the document. This may be difficult to fulfill because there will be several definitions of energy efficiency depending on the different needs. A LCA (life cycle analysis) approach and energy as a one natural resource should also be presented. This introduction for understanding the energy world should include following aspects:

- what is exergy and what are laws of thermodynamics
- types of energy (primary energies, secondary energies, final energies, the value of different types)
- energy demand (fulfil different needs of people and industry: production of products and services, comfortable temperature, air quality, etc.)
- choice of energy type
- definition of energy efficiency/energy demand
- integrated approach: consider energy issues together with other environmental issues and natural resources, LCA approach.

23 Energy management

It was firmly stated that energy management is a crucial prerequisite for improving energy efficiency in industrial installations. The way energy issues should be dealt with in an industrial installation and how they should be managed in an efficient way from both an environmental and economical point of view will be described under this heading. However, it was expressed that specific management systems as such should not be mandatory but the existence of good energy management is crucial.

Including energy saving agreements as good practices when dealing with energy efficiency issues was agreed. Several members of the TWG informed the meeting that they could provide some good examples of success stories on how energy saving agreements had operated.

There was also adequate support from the group on including motivation tools as examples of what is done in different countries, the drivers for, and the results of these tools. Several members said they would provide information on these. Different concepts and schemes to motivate energy savings and offers of financial help in the risk sharing at company level (e.g. ESCO concept) were discussed. There are also other types of incentives, such as state aid in the form of funding or benefits in kind.

Examples to characterise the above mentioned issues are essential and some TWG members have already promised to provide information.

24 Approaches and methodologies for energy use optimisation and energy efficiency

It was agreed that methodologies are essential tools to manage energy issues. In the ENE document the methodologies which are used to plan and implement energy issues at a company/site level will be described. It will report on how to build an energy inventory and develop energy indicators. Commonly used methodologies for the assessment of energy use are Sankey diagrams and pinch technology.

Tools and methodologies for the assessment of energy efficiency will be dealt with and these will contain at least the following issues:

- definitions of energy efficiency in the ENE REF. It was discussed whether there should be the definition for energy efficiency but it was agreed that maybe it is more practical to have some definitions which fit in certain cases. It was also regarded important to clarify the difference between energy efficiency and energy demand.
- how to measure/calculate energy efficiency
- how to find relevant indicators and boundaries (installation, site etc.)
- energy efficiency indicators and how to use them
- benchmarking may be possible/desirable within a company/plant but not between several companies
- best practices
- provide energy audits

25 Applied methods and techniques

Applied methods and techniques were discussed at the meeting. If techniques are included they should be applicable to several sectors. Finally the list of techniques to be dealt with in this work if information is provided was the following:

- heat recovery systems
- steam production
- ventilation
- process control systems
- pressurised air systems
- heat pumps
- energy storage
- combined heat and power (CHP)
- buildings
- steam networks
- combustion systems
- heat exchangers
- poly generation (combined heat, power and cooling)
- cooling systems
- motors, drivers, transformers, inverters
- cleaning

- transport
- storage of ice and heat
- power generation
- (Drying systems)
- (Grinders, mills)

In case of drying, it was discussed that maybe drying is not enough of a generic issue and perhaps all drying systems in industry are sector specific. Finally it was agreed that it will depend on the information available as to whether it is included or not. Another main discussion concerned power generation. Power generation will be included if there are some generic elements shared with other sectors. Generation of hydro power, wind power and nuclear power are excluded. The final result depends on if there is enough relevant information available and provided to this project.

The structure will be developed but these are the issues which should be found in the final product, Reference Document on Energy Efficiency.

Required information

26 Producing the reference document on Energy Efficiency will be the result of an information exchange process. The quality of the product will very much depend on the inputs from TWG members. It was agreed that the information on good techniques and practices on energy efficiency will be provided on a template (annex 2). The focus in using the template is energy efficiency measures, not the description of the plant. EIPPCB promised to develop another template for information on motivation tools. Information should be provided by 31 October, 2005. At the meeting following promises for information submission were announced:

1. Baudry: - document on how to evaluate energy efficiency
- Energy service Directive: definition of energy efficiency
2. Ahmadzai:- case of a foundry in Sweden
- cdm document on utilising flaring
3. Gindroz: case studies regarding the textile industry (motivation tools), case studies regarding drying systems and information on compressed air
4. Di Franco: Examples of the applications of methodologies to assess energy use (electric and thermal models)
5. Honskus: information on methodologies on monitoring energy efficiency (UK, CZ)
6. Strohschein: three documents on energy efficiency
7. Vis: examples
8. Honkasalo: energy efficiency indicators and definitions
9. Maes: information on specific energy-saving measures for steam-production and distribution
10. Honaizer: CHP
11. Claus: combustion system

12. Goessl: report on examples of energy efficiency measures
13. Widerstrom: definitions of energy efficiency
14. Smedt: paper on energy efficiency/energy demand
15. Valero: basics of energy
16. Polczman: case studies regarding poly generation (heat, power and cool)
17. Brierley: case studies regarding pinch technology

ENE work planning

- 27 The target timetable for this work was explained by EIPPCB and is below. It was emphasized by the Chairman in the meeting that it is very important to comply with these dates when providing the information to keep to the tight timetable.
1. The TWG should submit general information and good examples and practices in the requested format **by 31 October, 2005**.
 2. The EIPPCB ENE coordinator will prepare a draft reference document on energy efficiency which will be sent for consultation in early 2006.
 3. The final TWG plenary meeting could be held in the middle of 2006.

Site visits

- 28 The TWG was invited to propose site visits which would help to produce a useful document and which would validate the information provided. Earlier experiences have proved that site visits are very important to get a broad picture of issues to be dealt with. Some TWG members already indicated possible site visits which are to be discussed in detail later on.

Sirpa Salo-Asikainen
Seconded National Expert
European IPPC Bureau

Presentations in the ENE kick-off meeting

- 1) Energy efficiency and the IPPC, Don Litten, EIPPCB
- 2) General introduction on the role of energy efficiency in reducing climate change, Alexandre Paquot, DG ENV
- 3) EuP: A framework for setting eco-design requirements for energy using products, Michail Papadoyannakis, DG ENTR
- 4) Driving energy efficiency & conservation across the Dow Chemical Company, Ruud van Beelen
- 5) Cefic proposal, Jean-Marie Demoulin
- 6) Energy efficiency BREF, Sweden, Husamuddin Ahmadzai
- 7) Czech Republic views, Petr Honskus
- 8) Overview of energy management issues (BESS – EIE Project), Tomaz Fatur, Slovenia
- 9) Energy efficiency calculations in Raabe Steel Works, Jorma Perander
- 10) Introduction to the ENE work, Sirpa Salo-Asikainen
- 11) Conclusions of the meeting, Sirpa Salo-Asikainen

The information of energy efficiency techniques (technology and/or practice) should be given in the form specified as follows:

- description of the energy efficiency technique
- achieved environmental benefits (including and focusing especially energy efficiency improvements)
- cross-media effects
- operational data
- applicability
- economics
- driving force for implementation
- example plants
- reference literature.