

Energy Efficiency in Environmental Permits in Europe

Marianne Lindström, Finnish Environment Institute

Mikko Attila, Finnish Environment Institute

Jaana Pennanen, Finnish Environment Institute

Elise Sahivirta, Finnish Environment Institute

ABSTRACT

The general principle of efficient use of energy is stated in the European Directive on Integrated Pollution Prevention and Control (96/61/EC of 24 September 1996). This principle is new for environmental permitting and the European Union Member States have problems in implementing it in practice. To date, there has been little experience with energy efficiency provisions in integrated permits. Therefore, under the European Implementation and Enforcement of Environmental Law Network, Finland has taken the role of lead country for a project that aims at improving implementation of the Directive's principle of energy efficiency. The countries of Austria, Denmark, Finland, France, Germany, Ireland, Italy, Lithuania, the Netherlands, Poland, Portugal, Sweden and the United Kingdom took part in this study.

The project's overall objective was to identify what constitutes good practice when determining energy efficiency for industrial operations and to identify areas of key difficulties incorporating energy efficiency into the permitting process of Member States. The results of the project were that it would be good practice to create practical guidelines to define energy efficiency such as benchmarking and energy balance checking. Negotiations between operators and authorities, and application forms made available on the Internet, also would be good practice. Since energy efficiency as permit condition was found to be a difficult question, one measure of good practice would also be to link the permit condition about energy efficiency to voluntary energy saving agreements that are already successfully in use. In addition, various new and more specified Best Available Technique Reference Documents are needed.

Introduction

The European Union (EU) Network for the Implementation and Enforcement of Environmental Law (IMPEL Network) is an informal network of the environmental authorities of EU Member States and Future Member States that has been active since year 1992. This paper is based on the report of a project named "Energy Efficiency in Environmental Permits" within the IMPEL Network (Lindström et al. 2003). The content of this paper and the larger report does not necessarily represent the view of the national administrations or the European Commission.

Energy is central to social and economic wellbeing, but its production and consumption put considerable pressures on the environment because of emissions to the atmosphere and biosphere. These may lead to dangerous changes in the global climate, damaging natural ecosystems, tarnishing the built environment and harming human health. In the industrial sector, these emissions may arise from the combustion of fuels to generate heat or power or

through the direct use of energy within a production process. In both cases there is potential for energy saving, increased production of combined heat and power (CHP), and reductions in environmental emissions. The EU's target under the Kyoto Climate Change Protocol for cutting greenhouse emissions is 8% below the 1990 levels by the 2008–2012 period. EU's emissions of greenhouse gases fell by 3.5% between 1990 and 2000, but without additional counter-measures they are likely to rise back to around the 1990 level by the year 2010 (Haworth et al. 2000).

The main objectives of the project were to investigate consideration of energy efficiency in IPPC permitting in practice and through voluntary systems. Also the relations between the EU's CO₂ emissions trading scheme and the IPPC permitting were studied.

Legal Background

The general principle of efficient use of energy is stated in Article 3 of the European Council Directive 96/61/EC on Integrated Pollution Prevention and Control (henceforth the IPPC Directive) which mostly concerns large industrial installations (European Council 1996). The Directive had to be transposed within three years and has to be fully implemented by 2007. Therefore this principle is new for addressing environmental permitting and the EU Member States have experienced some problems with implementing it into national legislation. Article 6 of the Directive stipulates the application requirements that an applicant must be aware of, and Article 9 deals with the duties of the permit authorities concerning Best Available Technology (BAT) and energy efficiency. Article 15 includes provisions about the access to information and public participation in the permit procedure. As of the time of this study, there is only little experience so far with energy efficiency provisions in integrated permits.

The EU has been active in the field of combating climate change in various ways, too extensive to be listed here. The EU is also a party to international treaties in the field of climate protection. The United Nations Framework Convention on Climate Change dates from year 1992 and the Kyoto Protocol was signed in 1997. The EU ratified the Kyoto Protocol in summer 2002.

The key priority for the EU's Sixth Environment Action Programme (July 2002) will be the ratification and implementation of the Kyoto Protocol to cut greenhouse gas emissions by 8% over 1990 levels by 2008–12. This must be considered as a first step to the long-term target of a 70% cut (European Commission 2002).

The legal and administrative “command and control” regulatory approach has been the traditional way to guide environmental protection in the EU. The same approach was adopted in the IPPC Directive (Backes & Betlem 1999). In contrast, market-based voluntary methods emphasize less control by authorities and the operators' obligation to “play by the rules”. In these cases, the minimum compliance requirements are fixed through the permitting system that is supplemented by voluntary methods. Some of the Member States have chosen market-based measures, such as energy saving agreements, the EU Eco-Management and Audit Scheme (EMAS) and ISO 14001, in addition to “command and control” regulation to implement the articles concerning energy efficiency of the directives. This will be explained later in the paper. The problems with energy efficiency regulation is that various methods have little, if any, connection with each other and the control system of energy efficiency is basically sector-oriented.

Article 9(8) of the IPPC Directive gives the Member States an opportunity to use General Binding Rules (GBR) in implementation of energy efficiency requirements. The GBRs are, or would all be considered as, minimum energy efficiency requirements, but there would still be a possibility to impose stricter requirements case by case. The GBRs are not generally used in clarifying energy efficiency, but there are some branch general binding rules, for example in France, that include at least some consideration of energy efficiency, like clarification of energy consumption and justification of the choice of energy source. Only France has actually used GBRs with some consideration on energy efficiency. However, France pointed out that general binding rules should here be understood as binding guidance. Also, other countries are considering the possibility of using GBRs in the future.

All of the Member States have several organizations involved in issues concerning energy efficiency. While the assumption was that there might be some problems in cooperation, because of the involvement of several different authorities, this was not generally seen as problematic. There is a great deal of cooperation between the authorities, and even countries where no cooperation was pointed out, did not see any problems arising from the division of authorities.

Objectives

In the terms of reference, the main objectives of the project were:

- to investigate different opinions on how energy efficiency can be regulated in IPPC permits;
- to make a study on how energy efficiency is dealt with in the existing documents, the Best Available Techniques Reference Documents (BREFs) and voluntary environmental management schemes;
- to examine how voluntary environmental management schemes and energy saving agreements can be linked to the legal obligations in environmental permitting;
- to study the cooperation between environmental and energy administrations in the implementation of the IPPC Directive and
- to study the role of the authorities in the assessment of energy efficiency in applications and environmental permitting of large installations.

Methods

A three-step process was used to obtain the necessary information. First a draft questionnaire was drawn up and discussed in a meeting of members in the advisory committee, which consisted of members from Austria, Finland, Germany, the Netherlands, Sweden, and the IMPEL coordinator. The finalized questionnaire was sent out to the participants of the project in June 2001. The replies to the questionnaire were analyzed. The second step was to hold a seminar to get more in-depth information, where the most problematic questions were discussed, key difficulties identified and good practices for different situations were agreed on. The third step was to examine eight BREF documents and make studies on technical possibilities to use energy efficiently and on options for emissions trading in the European Union. A detailed breakdown of the various BREF documents is provided in Table 1.

Table 1. Summary of Energy Efficiency (EE) Aspects in the BREFs

	Cement and lime	Iron and steel	Non-ferrous metals	Pulp and paper	Chlor-alkali	Ferrous metals	Glass	Cooling systems
Importance of EE compared to other environmental issues	Very important (air emissions)	Very important (air emissions)	Important (air emissions)	Important (water discharges)	Important (air/water emissions)	Important (air emissions)	Very important (air emissions)	Important
Which is the most important and energy intensive process/technology?	Clinker burning, lime burning	Blast furnace	Pyrometallurgical processes	Depends on the plant, evaporation/paper machine	Mercury (amalgam) technology	Heating and heat treatment furnace	Melting	Closed circuit dry cooling, dry air cooling
Is energy data available?	Yes, only for consumption	Yes (good description)		Yes	Yes, only for consumption	Yes (good description)	Yes (good description)	Yes, only for consumption
Are energy recovery/savings techniques for this process mentioned?	Not in detail, partly also considered as BAT	Yes, a lot, partly also considered as BAT	Yes, consumption and recovery	Yes, techniques in general considered as BAT	Yes, in terms of process selection	Yes, a lot, partly also considered as BAT	Yes, a lot	Yes, but rarely
Is energy data for other processes (incl. Techniques) available?	Yes, in general for consumption	Yes	Yes, consumption and recovery	Yes, consumption data	Yes, consumption data	Yes (good)	Yes, mainly for consumption	Yes, consumption data
BAT General BAT available	Yes (primary measures)	Yes	Yes	Yes	Yes (primary measures)	Yes	Yes (design phase)	Yes (design phase)
BAT for specific processes	Yes, limited	Yes, BATs for all types of plants	Yes	Yes	Yes, limited	Yes, good description	Not mentioned as BAT (to consider in the determination of BAT)	Yes
Energy data in BAT	Yes, only consumption (limited)	Yes, table for each BAT	Yes	Yes, almost in every BAT	Yes, limited	Yes, data about consumption, saving recovery	Not concerning EE, only emission levels	Yes, partly
Are energy recovery/savings measures site specific?	No	Not mentioned	Yes	Yes, a few (CHP)	Yes, because of difficulties in storage and transport	Not mentioned	Not mentioned	Yes, but difficult to quantify
Are any recommendations for the next update mentioned?	Survey of current techniques consumption is useful	Not available	More information about consumption data	More information on the assessment of energy efficient techniques	Not available	Provide more information on emission and consumption level	More techniques for EE improvement would be useful	Not available
Special comments	Energy costs = 30–50% of total production costs. Associated BAT heat balances value is 3000 MJ/t clinker.	There are many different kind of plants; each has different processes and techniques.	Limited information about EE in BATs, in general OK.	A lot of information concerning EE for each single process. A lot of energy recovery techniques are not considered as BATs yet.	Information about process conversion (technologies) and about legislation for some EU countries. Associated with BAT: < 3200 kWh/t chlorine large consumption of electricity.	Balance between EE and air pollution (for certain techniques). Very detailed description of BATs.	BATs are concentrated more on emissions. Melting process needs about 75% of all energy usage.	BATs are described, but only a few have a lot of data → the final BAT solution will be a site-specific solution. Calculation model for energy conservation and saving is given.

The questionnaire covered specific topics from the IPPC Directive and its implementation in the countries. In particular the contents of Articles 3(d), 6(1), 9(1), 9(8) and 15(1) were looked at because they are most relevant to Member States in incorporating energy efficiency into the permitting process. The questionnaire also covered other topics such as competent authorities, voluntary environmental management systems, energy saving agreements, energy taxes and emissions trading. The aim of the questionnaire was to clarify the similarities and differences between the countries in implementation of the IPPC Directive and in the practices of the authorities permitting IPPC installations. The following countries replied to this questionnaire: Austria, Denmark, Finland, France, Germany, Ireland, Italy, Lithuania, the Netherlands, Poland, Portugal, Sweden and the United Kingdom.

After the questionnaires were processed, a seminar was organized in February 2002 to further address energy efficiency issues for the Member States. The seminar themes were the legal base for energy efficiency, consideration of energy efficiency in environmental permitting, energy issues in environmental management schemes and energy saving agreements and emissions trading. At the seminar, where participants from 9 Member States and 2 Future Member States attended, key difficulties in the handling of energy issues in environmental permitting were discussed and possible solutions to the problems were suggested. Finally, good practices for the consideration of energy efficiency in environmental permitting of large installations were agreed upon. The seminar report was sent out to the participants for comments, which have been incorporated into the final report. The final report was adopted at the IMPEL Plenary Meeting in December 2002.

Results

Key Difficulties

According to the replies to the questionnaire and the discussions in the seminar, the following issues were seen as key difficulties.

The definition. The definition of energy efficiency is not clearly defined. Overall guidance on energy efficiency is not possible, but the solution could be found in sector-wise guidance and efficiency could be looked at on a case by case basis. The definition of efficient use of energy must balance the reduction of energy use with the other environmental impacts; reducing emissions of pollutants can for example, increase energy consumption. Also, the lack of references and inspection methods make it more difficult. The economic aspects play a more dominant role than in the other environmental fields. Energy efficiency in environmental permitting is not a concept familiar to the environmental authorities.

Binding permit conditions. One of the most difficult questions was defining a binding permit condition for energy efficiency. In most cases it is not considered possible to set up enforceable conditions for energy efficiency in a permit for an individual installation. The energy data could also be confidential. The permit conditions are not always concrete enough. It is difficult to make a specific condition for energy usage, for example, energy used per produced unit, because of many varying variables, such as basic consumption, several product lines and fast changes from one product to another.

Enforcement and supervision. As a clear definition of energy efficiency is not available, direct enforcement and supervision by environmental authorities is more difficult. Too general and vague permit conditions are not enforceable and they are difficult to supervise. Non-binding permit conditions are not enforceable at all. There is also a lack of knowledge among inspectors.

Publicity/confidentiality. In some countries industry is prepared to disclose more information than in others and it is a slow process to change attitudes. Data on energy issues might be considered as sensitive. The operator can of course separate the information in the applications into confidential and non-confidential. In France the energy authority will not publish any results on energy consumption if the number of operators is below three or one operator represents about 70% of the consumption. In Austria concrete data are only available for legitimated parties in the permit procedure.

Relations to emissions trading. Greenhouse gas emissions trading will affect the application of the IPPC Directive. Until now there has not been a clear picture of how the links between emissions trading and IPPC permitting will work. It was anyhow pointed out by the EU Commission that CO₂ falls within the IPPC Directive's broad definition of pollution (Art. 2 (2)).

Voluntary systems versus permit. Also the interrelationship between the voluntary agreements and permit conditions is part of this problem. The targets of voluntary agreements and the means of permitting do not always coincide, for example, the requirement of continuous improvement is too vague as a permit condition. The permit conditions should be based on BAT. The participants had different opinions on the use of voluntary energy saving agreements as a part of the permit. Some countries saw it as impossible to link the voluntary agreement system and permit system together, while some thought that there could be a partial connection for some detailed issues.

Lack of information and expertise. Generally there is a lack of expertise and information on how to apply energy efficiency in the permit procedure. The BREFs contain some but not enough process specific energy information. The participants in the seminar pointed out that there is not enough cooperation between energy and environmental authorities. The auditing information from the voluntary energy saving agreement is not available in formats that could be used in the permit procedure. There is not enough training for practical implementation of the energy efficiency demand.

Good Practice

In the seminar discussions following topics were considered to be good practice.

The definition. It is good practice to create practical guidelines to define energy efficiency in order to clarify the issue. Overall guidance of energy efficiency is not possible, but the solution could be found in sector-wise guidance and, in general, energy should be looked at on a case by case basis. In France there are some sector-wise general binding rules and in the United Kingdom non-statutory guidance. Several approaches are good and can be used in

parallel. As good practical solutions benchmarking, pinch technology and energy balance checking were mentioned.

Beforehand discussions and application forms. A good application is a requirement for a smooth permitting process. In order to create good applications prior information exchange between the operator and the authorities is good practice. A good practice would be that, application forms where the information requirements concerning energy efficiency are listed should be available on the Internet. In Finland and in Portugal there are such application forms available.

Energy efficiency as a permit condition. This project could not identify any good practice for establishing binding permit conditions. However, the final report gives some concrete examples of more or less binding permit conditions. The permit condition or the text in the descriptive part could also be linked to voluntary energy saving agreements, which functions very well in the Netherlands and Finland.

BREFs. It is good practice for the environmental authorities to use the BREFs which contain a considerable amount of information on energy. The most specific information is available on energy consumption. There is less data on energy saving and energy recovery techniques.

Monitoring and supervision. Monitoring and supervising of energy efficiency in permits is very difficult due to often general and vague permit conditions. In inspections of energy efficiency good practice is self control under the precondition that the inspector can influence the monitoring practices of the operator. Because of the lack of energy knowledge among the permit authorities and inspectors, there is a need for more cooperation between the energy and environmental authorities.

Audits. Information on energy audits can be used as a tool to give information to the environmental authorities. As in Ireland the planning of the audit of energy efficiency of the site should be developed together with the environmental authority. The audit report should also be available on site for environmental inspectors and the summary of audit findings should be submitted as a part of any annual environmental report.

Cooperation. Cooperation between energy and environmental authorities in energy efficiency issues is good practice and should be developed. Each authority has special knowledge that the others may need or could use in their work. Especially in this case development of cooperation is highly recommended since energy efficiency is not a very clear and simple concept. The development can be done in several ways such as joint seminars, working groups and cooperation in drafting the environmental legislation. Audit reports can be used as a tool to give information to the environmental authorities. Also, cooperation between the Member States and future Member States in implementing the requirement on energy efficiency is good practice and the IMPEL Network as such promotes this kind of cooperation.

Access to information and public participation. It is good practice to have transparency in environmental permitting concerning energy efficiency, too, so that the Aarhus Convention really is implemented in the same way in different countries. Good practice is that the appli-

cation forms and the permits are available on the Internet. The development of general guidelines for what can be declared as confidential is also essential. Transparency in all voluntary measures is also good practice.

Relations to emissions trading. The link to energy efficiency requirements under the IPPC Directive needs to be further developed. If the cost of production of energy rises as a result of emissions trading, this will assist energy efficiency requirements under the IPPC Directive. One of the advantages of emissions trading is that reductions can be achieved in a more cost-effective way because market forces will be operating.

Voluntary measures. The environmental management systems provide a good tool for managing energy issues. The policy and targets set by the company should not be transferred as such to the permit. This could negatively affect the companies' interest in setting targets and even in using environmental management systems. There should also be clear and attractive incentives for the companies to join the management systems.

It is in itself good practice when voluntary energy saving agreements are made for most of the industries in a country, which should lead to energy savings and the efficient use of energy. Concrete measures are already included in the agreements and should be followed up.

Training. As the environmental authorities in general do not have enough knowledge of energy efficiency it is good practice to provide general training for environmental authorities and to raise the level of knowledge. It is also good practice to create fact sheets that contain information on energy efficiency as a tool for environmental permitting, to supplement the BREFs and any national BAT guidance. Good practice is that the environmental authorities are provided with information from the voluntary energy audits made by energy experts.

Energy Efficiency in the Environmental Permit Procedure

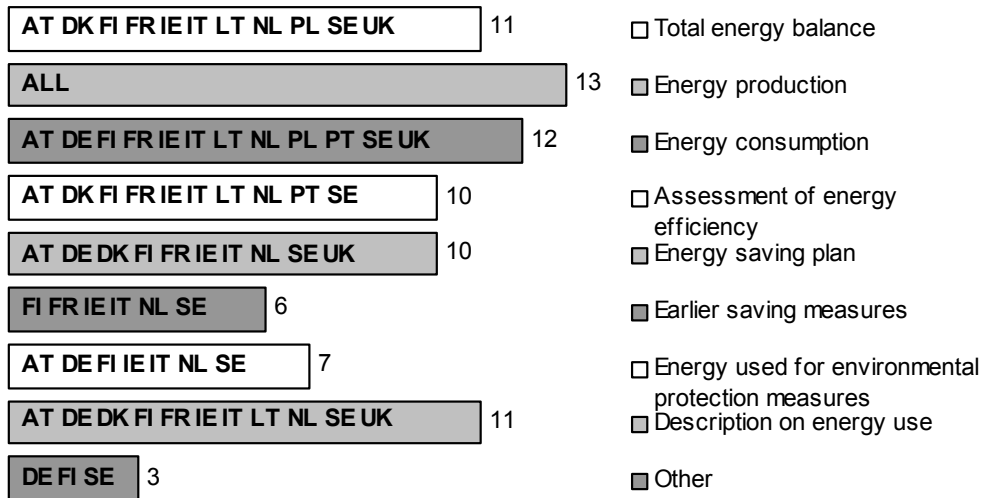
It was found that most of the participating countries in this project required differing levels of information in their permit applications as shown in Figure 1. Earlier saving measures and the amount of energy used for environmental protection measures were not always required. An overview of country specific requirements follows.

As guidance to the operators Finland has a general application form, and additionally a form specifically for energy issues with guidance for the operators to fill in when applying for an environmental permit. A task group with members from the Finnish environmental authorities and the Confederation of Finnish Industry and Employers developed this form for energy issues. Operators must include in the form information concerning the following:

- total energy balance;
- energy production;
- energy consumption;
- assessment of energy efficiency;
- energy plan;
- energy used for environmental protection measures;
- description on energy use;

- earlier and planned saving measures; and
- planned environmental investments.

Figure 1. Information Concerning Energy Required in the Permit Application ¹



The environmental authorities take into consideration specific energy saving matters such as choice of fuel, use of electricity, use of heat, process optimization, index for energy efficiency, use of waste energy, previous measures for energy savings, planned measures for energy savings and planned measures for environmental investments.

Other items the authority takes into consideration when evaluating energy efficiency can include the use of non-fossil fuels, transportation, water consumption, air pollution abatement and waste management. The use of non-fossil fuels is always taken into consideration whilst transportation is seldom taken into account – only Sweden and the Netherlands consider it to be a part of permit consideration. In Sweden energy used in producing raw material or chemicals used might be considered. Sweden also considers issuing permits with permit conditions including specific energy consumption. Water consumption, air pollution abatement and noise abatement are always taken into consideration in the permit procedure because the minimisation of all pollutants is important.

Energy Efficiency in Permitting in Practice

In the seminar discussion it was pointed out that the requirement for energy efficiency is as important as the permit conditions on emissions. There are not yet many examples of permits containing consideration of energy efficiency. In general, the countries do not have guidance for the consideration of energy efficiency in the permitting procedure. Most of the

¹ AT = Austria, DK = Denmark, FI = Finland, FR = France, DE = Germany, IE = Ireland, IT = Italy, LT = Lithuania, NL = the Netherlands, PL = Poland, PT = Portugal, SE = Sweden, UK = the United Kingdom.

countries considered the following items as important when evaluating energy efficiency in the permit procedure:

- choice of fuel;
- use of electricity;
- use of heat;
- process optimisation;
- other technical measures;
- index for energy efficiency or specific use of energy;
- use of waste energy;
- previous measures for energy savings;
- planned measures for environmental investments and, if applicable
- possible production of CHP.

In Germany there are usually references to the application. However, permit conditions will be required if the authority has to fix other or additional measures than those described in the application documents. If applicable, CHP is also taken into consideration in permitting.

In Finland there is a permitting guidance under development in which the issue will be addressed. Additionally, also in the Finnish environmental permits there could be references to the application. In cases where the installation has joined the energy saving agreement no further energy efficiency conditions are usually set in the permits.

In France there are “Provisions about rational use of energy in classified installations for environmental protection regulations”. E.g., in the ministry decision on the paper industry it is required that the plant manager must take all necessary measures in design and management of the plant to reduce air pollution at the source, in particular by optimizing energy efficiency.

In France the efficient use of energy in a plant is mainly studied when designing the plant together with the impact study, at the decennial assessment of the permit or during energy audits on a voluntary basis. France has a “Decree on the Periodic Control of Installations Consuming Energy”. Periodic controls, which are carried out at the expense of the owner of the thermal installation, comprises:

- calculation of the yield characteristic of the boilers;
- control of the existence and the correct operation of the control and measuring apparatus;
- checking of the good condition of the installations intended for the distribution of thermal energy;
- checking of the quality of the combustion and the correct operation of the boilers; and
- checking of the boiler manual.

In Ireland the current permits often have a condition that requires the activity to carry out a thorough energy audit that will identify all opportunities for energy use reduction and energy efficiency. The Netherlands thought that benchmarking is a good way forward, at least for the most environmentally aware companies. In the United Kingdom an energy efficiency implementation plan should be attached to the permit. The most difficult question is

whether the authorities can set limit values for energy efficiency. The general opinion was that there could be no restrictions on energy consumption as such and that it is difficult to have binding conditions. The linkages between the permits and the voluntary energy saving schemes were seen as useful. The checking of energy use could be done through annual monitoring.

In Lithuania there are requirements for energy use and references to the application in the permits. In Poland the permit must specify, in particular, the type and quantity of consumed energy, materials, raw materials and fuels, the sources of origination, of substances, and energy releases to the environment.

Portugal has so far limited experiences with permitting IPPC installations. The use of waste energy, previous measures for energy savings, planned measures for energy savings and planned measures for environmental investments are also considered when providing grants to industry within several financing programmes with the objective to improve energy efficiency.

Energy Efficiency in BAT Reference Documents

The BAT Reference Documents are intended to aid various industrial sectors in their environmental permitting procedure. The inclusion of energy efficiency guidance is important in implementing the IPPC Directive on energy efficiency. There are 32 industrial sectors for which BREFs have to be established by 2004/2005. By November 2002, only eight BREFs have been adopted. Nevertheless, a general tendency can be recognized because of the diversity of the analyzed industrial sectors. These BREFs include the following industries which are also detailed in Table 1 (see also References):

- cement and lime industry;
- iron and steel production;
- non-ferrous metals industry;
- pulp and paper industry;
- chlor-alkali manufacturing industries;
- ferrous metals processing industry;
- glass manufacturing industries; and
- cooling systems.

All the analyzed BREFs contain a considerable amount of information and data on energy (see Table 1). The most specific information is available for energy consumption. As far as energy saving and energy recovery techniques are concerned, there is less information. In general, there is a need for more information regarding all the energy aspects (consumption, savings and recovery measures and values). BATs are generally subdivided into general and process specific BATs. In a few cases, each process specific BAT within an industrial sector is shown in a table and described separately.

The purpose of the BAT review is thus to provide general indications regarding the emissions and consumption levels that might be considered as an appropriate reference point to assist in the determination of BAT based permit conditions or for the establishment of general binding rules. In other words, environmental permit conditions should be based on

BATs, and BREFs (which are not binding) should be taken into consideration as one important source of information on BAT.

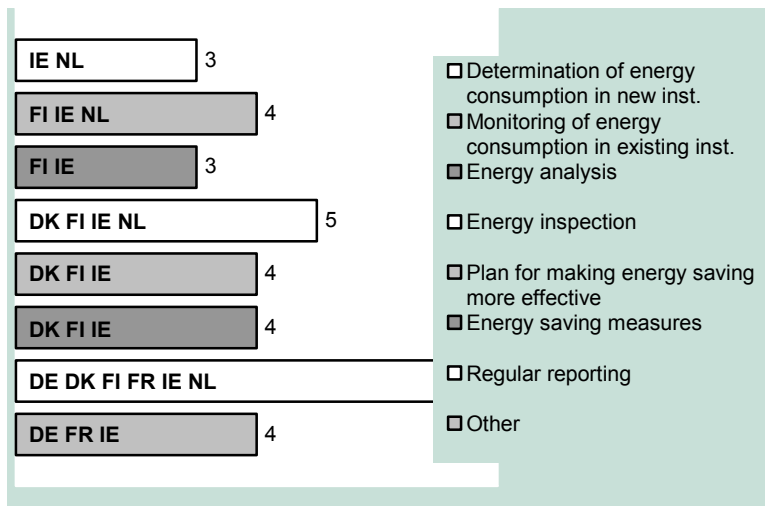
Voluntary Energy Saving Agreements

The consideration of voluntary energy saving agreements in the permit procedure varies between the countries but they are not preferable to permitting. Regardless of the way voluntary agreements are applied, they are considered successful at least in the cases they cover most of the large industries and the results of them are followed up and controlled. The link between the voluntary energy saving agreement and permit conditions is in general weak but could be strengthened.

The concept of voluntary energy saving agreements is in use in eight of the countries participating in this project. It is currently not in use in Austria, Lithuania, Poland, Portugal and Sweden. The first agreements were concluded in the Netherlands in 1992, where the implementation of the energy agreements depends on the category of the installation. In most Dutch cases, companies join an agreement and plan their own objectives. For major energy consumers a long-term agreement on energy efficiency is in use and the reduction targets are agreed at the branch level. The agreements follow a particular national form in the participating Member States. The main content of the agreements is shown in Figure 2.

There are many different ways that companies take part in the agreements. In most countries the objectives of the agreement apply to the companies or industrial branches. In Germany they apply only to the branches and in Finland only to the companies. The Irish approach is that the objectives generally apply to a particular site location and in the Netherlands they will apply also to the operator. If Sweden were to have these voluntary agreements in use, all alternatives and combinations of them would be considered.

Figure 2. Main Content of the Energy Saving Agreements



At the end 2001 the voluntary energy saving agreements in Finland covered about 85% of all industry, 89% of power production, 76% of electricity transmission and distribution, 72% of district heating, 55% of municipalities, 73% of real estate sector, 14% of truck transportation and 35% of bus traffic. The connection to the IPPC Directive can be seen as a

joint venture in seeking methods and tools for the determination of and follow-up to energy efficiency in various sectors.

Conclusions

Defining energy efficiency in practice is considered to be very difficult because of the differences in the nature of the installations to which energy efficiency applies. Energy efficiency is an issue to be considered in the permitting procedure among other technical conditions. For a smooth permitting procedure information on energy efficiency either in general binding rules, sector-wise guidance or application forms including guidance on energy efficiency are required. The participating countries had only few examples of permit conditions concerning energy efficiency.

Voluntary systems, especially energy saving agreements, provide useful information on energy efficiency, use and savings that could be more utilized in the permitting procedure. Also the BREFs contain a considerable amount of information and data on energy. The most specific information is available on energy consumption, but there is a need for more information regarding energy efficiency techniques. The link between permitting and voluntary systems should be clarified.

The trading of emissions is a new instrument in environmental policy and until now there are very limited experiences of the European trading scheme. The relations between the CO₂ emissions trading scheme and the energy efficiency requirements under the IPPC Directive is not entirely clear and should be improved.

References

- Backes, C. and G. Betlem (eds.). 1999. *Integrated Pollution Prevention and Control*. Utrecht: Kluwer Law International.
- European Commission. 2000a. *Best Available Techniques Reference Document in the Cement and Lime Manufacturing Industries*. Seville: European IPPC Bureau.
- European Commission. 2000b. *Best Available Techniques Reference Document on the Production of Iron and Steel*. Seville: European IPPC Bureau.
- European Commission. 2000c. *Best Available Techniques Reference Document in the Non-Ferrous Metals Processing Industry*. Seville: European IPPC Bureau.
- European Commission. 2000d. *Best Available Techniques Reference Document in the Pulp and Paper Industry*. Seville: European IPPC Bureau.
- European Commission. 2000e. *Best Available Techniques Reference Document in the Chlor-Alkali Manufacturing Industry*. Seville: European IPPC Bureau.
- European Commission. 2000f. *Best Available Techniques Reference Document in the Ferrous Metals Processing Industry*. Seville: European IPPC Bureau.

- European Commission. 2000g. *Best Available Techniques Reference Document in the Glass Manufacturing Industry*. Seville: European IPPC Bureau.
- European Commission. 2000h. *Best Available Techniques Reference Document on the Application to Industrial Cooling Systems*. Seville: European IPPC Bureau.
- European Commission. 2002. "Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme." *Official Journal L 242*, 10.9.2002.
- European Council. 1996. "Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (IPPC Directive)." *Official Journal L 257*, 10.10.1996.
- Haworth, A., K. Fletcher, W. Eichhammer, F. Marscheider-Weidemann, K. Michels and A. Faaij. 2000. *Study on Energy Management and Optimisation in Industry*. AEA Technology Report: Energy Management in Industry 06/09/00.
- Lindström, M., M. Attila, T. Ihalainen, T. Kohl, J. Pennanen, E. Sahivirta and D. Secci. 2003. *Energy Efficiency in Environmental Permits*. The Finnish Environment 614. Helsinki: Finnish Environment Institute. (In press). Available also at: <http://europe.eu.int/comm/environment/impel/reports.htm>