Energy Efficiency in Permitting and Inspections

Final report

Institute of Energy Systems and Environment
Riga Technical University

and

project team
DR. GISELA HOLZGRAEFE
SIRPA SALO-ASIKAINEN
SUSANNA EBERHARTINGER-TAFILL
JUDITE DIPANE
VILIS AVOTINS

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FOREWORD

Introduction to IMPEL

The European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) is an international non-profit association of the environmental authorities of the EU Member States, acceding and candidate countries of the European Union and EEA countries. The association is registered in Belgium and its legal seat is in Bruxelles, Belgium.

IMPEL was set up in 1992 as an informal Network of European regulators and authorities concerned with the implementation and enforcement of environmental law. The Network's objective is to create the necessary impetus in the European Community to make progress on ensuring a more effective application of environmental legislation. The core of the IMPEL activities concerns awareness raising, capacity building and exchange of information and experiences on implementation, enforcement and international enforcement collaboration as well as promoting and supporting the practicability and enforceability of European environmental legislation.

During the previous years IMPEL has developed into a considerable, widely known organisation, being mentioned in a number of EU legislative and policy documents, e.g. the 6th Environment Action Programme and the Recommendation on Minimum Criteria for Environmental Inspections.

The expertise and experience of the participants within IMPEL make the network uniquely qualified to work on both technical and regulatory aspects of EU environmental legislation.

Information on the IMPEL Network is also available through its website at:
www.impel.eu

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Project Manager / Authors: Dr. Gisela Holzgraefe, Ministry for Agriculture, the Environment and Rural Areas of Schleswig-Holstein, Kiel, e-mail: Gisela.Holzgraefe@mlur.landsh.de; Tel.: +49431-9887133, Sirpa Salo-Asikainen, Ministry of the Environment, Helsinki Susanna Eberhartinger-Tafill, Federal Ministry of Agriculture, Forestry, Environment and Water Management, Vienna Judite Dipane, State Environmental Service, Riga Vilis Avotins, State Environmental Service, Riga Consultant: Dagnija Blumberga and team, Riga Technical University	Report adopted at IMPEL General Assembly: 18/11 – 19/11/2010 Number of pages: 157

EXECUTIVE SUMMARY

A first IMPEL project on energy efficiency was carried out in 2002 with Finland as lead county. After eight years and the development of the horizontal BREF document on "Energy Efficiency" IMPEL had identified that the item of energy efficiency in permitting and inspection needed to be explored again. The ToR for the project was adopted by the Extraordinary General Assembly of the network in October 2009.

The main objectives of the project were:

- to explore how Member States have implemented in practice the energy efficiency provisions of the IPPC directive and handle obstacles;
- to identify how Member States enforce their legal requirements in this field;
- to find out what kind of information is required in permit applications e.g. energy efficiency indicators;
- to analyse how Member States work with the BREF Energy Efficiency and information of other BREFs related to energy efficiency;
- exchange of information on existing guidance material;
- to find out what is needed most to support Member States in the enforcement;
- to find out which project IMPEL can carry out in the field of energy efficiency and climate change;

Another aim was to find out whether alternative instruments such as voluntary agreements, environmental management systems, emission trading schemes and taxes produce already improvements in the energy efficiency performance of sites to such a degree that it might not be necessary to deal with the item in IPPC permitting and inspection. Due to the lack of systematically generated data this question could not be answered in the project.

In this project the following good practices were identified in relation to dealing with energy efficiency in permitting and inspection:

- Good guidance on energy efficiency (horizontal and sector specific)
- Beforehand discussions and application forms with specific requirements concerning information on energy efficiency

- Good and enforceable permit conditions concerning energy efficiency (concerning measures, monitoring and reporting etc)
- Adequate self monitoring
- Performance of energy audits and implementation of energy efficiency management systems is considered as BAT.
- Good cooperation through involvement of energy agencies or other authorities in the permitting procedures
- Voluntary measures such as energy management systems, voluntary agreements, eco tax systems and incentives have a positive impact on the energy efficiency performance of sites.
- It is good practice to provide good working material and training for environmental authorities.

The project showed that these good practices are not in yet place in many member states.

The results of the evaluation of the current situation in Member States indicated 7 main challenges. These challenges should be addressed in the nearest future to increase the quality of the IPPC permits and to increase energy efficiency:

a. Legal background – In the current IPPC directive it is not explicitly stipulated how energy efficiency is defined or should be addressed. However it is quite clear that BAT shall be used not only for emissions and waste prevention and minimisation but also for energy efficiency. The situation will be slightly improved in the future IE directive but not clearly enough. The requirements have been implemented in different ways in Member States. As a special case, realisation of combined heat and power is not always possible because of local reasons (e.g. whether the use of surplus heat is possible). Some (existing) industrial sites cannot fulfil this goal; however the application cannot be rejected on the basis of suboptimal site conditions; requirements for land-use planning (e.g. local, regional energy concepts) could be an option.
b. Sector specific BREFs have until now not been concrete and precise enough regarding energy efficiency - although the horizontal BREF on energy efficiency techniques includes all major techniques to implement energy efficiency. However, to date this document has not been utilised much. The horizontal BREF on energy efficiency has been used mainly as a check list. It would be more user-friendly to incorporate the energy efficiency issues in the sector specific BREFs. The Guidance document on collection of data for the BREF work, IEF 20/4, emphasizes the need to improve the collection of data on energy aiming at BAT conclusion given e.g. as GJ/tonne of product.
c. Lack of expertise in technical energy efficiency in authorities and companies – Many authorities do not have the technical expertise to check the energy efficiency in detail. This means that operators must be very clear and comprehensive in their discussions with authorities and in their applications for permits.
d. Lacking or only occasional cooperation between energy and environmental authorities or organisations which have specific knowledge in energy efficiency;
e. Permit revision – In many Member States there is no general approach to handle the item of energy efficiency in the permit revision. The individual legal background in the countries sometimes makes it difficult to consider energy efficiency in the procedure. It remained unclear whether in case of alterations of installations the overall efficiency will be assessed or only the efficiency of the changed part.
f. System boundaries and benchmarking - Defining the "system" and the resulting benchmark is a challenge. There is lot of information related to that in the BREF "Energy Efficiency". However: Due to site specific solutions it might at least for some installations be burdensome to compare the performance with available benchmarks. Concerning the system boundary the legal definition of an IPPC installation is rather narrow and does not extend to third parties.

g. Unclear influence of environmental management systems, voluntary agreements, tax- and more profoundly, the overlap with the EU Emission Trading Scheme on energy efficiency - It is often assumed that the effects of measures carried out under these systems produce improvements in the energy efficiency performance of sites to such a degree so that it might not be necessary to deal with the item of energy efficiency in IPPC permitting and inspection. It remained open whether these systems are effective enough to fulfil the requirements of the IPPC directive concerning energy efficiency.

Proposals for further IMPEL work

During the project the following proposals for further work of IMPEL were identified

- Development of a template for documents and data required regarding energy efficiency in the permit application
- Workshop on assessment of the application documents regarding energy efficiency (for new and existing installations) and development of permit conditions based on BREFs and other sources using a sector specific approach (e.g. food sector, metal processing sector, paper sector, chemical sector, waste treatment plants).
- Training course for dealing with energy efficiency in permitting and inspection.
- Integrating the discussion on energy efficiency into other sector specific IMPEL-projects, e.g. pig farming.
- Explore the overlap between EU ETS and IPPC which may negate the requirement to deal with energy efficiency under IPPC.

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ACRONYMS AND ABBREVIATIONS

BAT	Best Available Techniques
BATAEL	BAT associated emission levels
BREF	Reference Document on Best Available Techniques
CCA	Climate Change Agreements
CENIA	Czech Environmental Information Agency
CHP	Combined Heat and Power
CRC	Carbon Reduction Commitment
DECC	Department of energy and climate change
EE	Energy Efficiency
EHS	Northern Ireland Environmental and Heritage Service
EIA	Environmental Impact Assessment
EMAS	Eco-management and Audit Scheme
EMS	Environmental Management System
EN 16001	Energy management systems
EPA	Environmental Protection Agency
EPR	Environmental Permitting Regulations
ETS	Emission Trading Scheme
EU	European Union
GHG	Greenhouse gas
GJ	Giga joules
IDAE	Instituto para la Diversificacion y Ahorro de la Energia
IEF	Information Exchange Forum
IPPC	Integrated Pollution Prevention and Control
ISO	International Organization for Standardization
ISO 90001	Quality management standard
ISO 14001	Environmental management system standard
kWe	Kilo watts electrical
kWh	Kilo Watt hour
LCP	Large Combustion Plant
LEE	Long term agreements on energy efficiency for ETS enterprises
LTA-3	Long term agreements on energy efficiency
MEF	Managed Extensibility Framework
MS	Member States
MW	Mega watts
MWe	Mega watts electrical
NEEAP	National Energy Efficiency Action Plan
PDCA	Plan-do-check-act
PEA	Polish Environmental Act
PFE	Programme for Improving Energy Efficiency in Energy Intensive Industries
RTU	Riga Technical University
SEK	Swedish Krona
SHP	Separate heat and power
SME	Small and medium sized enterprises
SYKE	Finnish Environmental Institute
TEHG	The Greenhouse Gas Emission Trading Scheme (German law)
VOC	Volatile Organic Compounds

1. INTRODUCTION

Energy policy dedicated to sustainable energy production and security of energy supply as well as climate protection are among the top priorities in the European Union and worldwide. A variety of global, EU and national instruments are aimed to reduce energy consumption and emission of greenhouse gases.

In 2004 industrial energy consumption in the EU-25 was 319 million tonnes of oil equivalent (Mtoe) or about 28% of the annual EU final energy use, and 30% of primary energy demand. In 2008 industrial final energy consumption was 305 Mtoe (see Figure 1). 27% of primary fuels are used in public thermal (electricity) power stations. The next two most energy intensive users are the iron and steel and chemical industries which consume 19% and 18% of industrial energy use respectively. This is followed by glass, pottery and building materials at 13%, and paper and printing at 11%. Around 25% of electricity used by industry is produced by industry itself. The main IPPC emitters account for about 40% of all European CO_2 emissions, about 70% of all SOx emissions and about 25% of all NOx emissions [Eurostat].

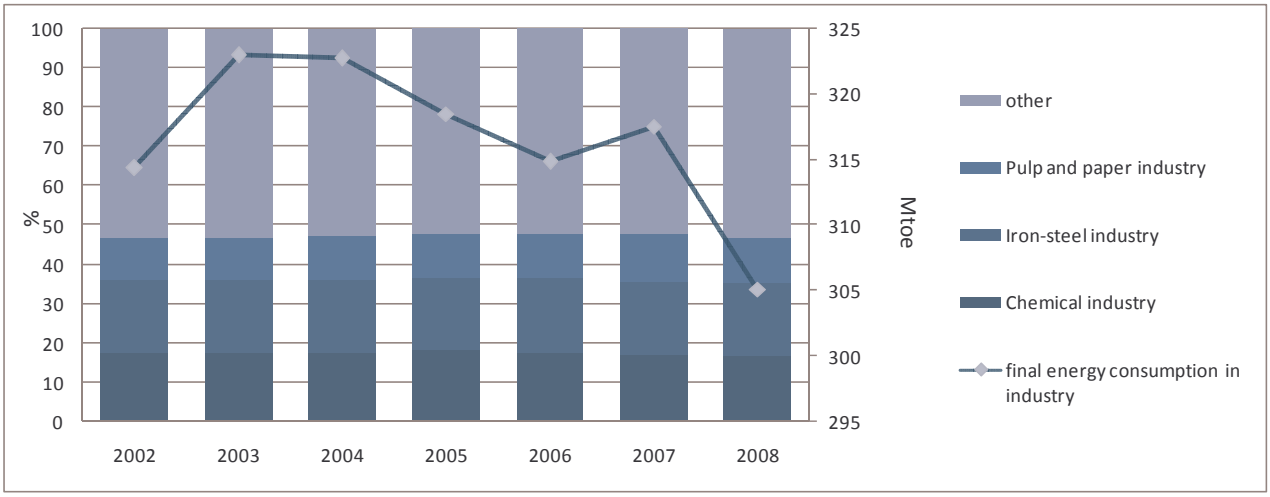

Figure 1. Final energy consumption in industries EU-25

The EU has set new targets in the energy and climate package for 2020 aiming at an energy consumption reduction of 20%. This should be reached by implementing energy efficiency improvement measures. Other EU initiatives will support this goal (see chapter 2.1). The Kyoto Climate Change Protocol target for cutting greenhouse gas emissions is 8% below the 1990 levels by 2008–2012. For the Post Kyoto (2012 onwards) period the EU has new targets for the reduction of GHG.

During the discussion on future work of IMPEL at the General Assembly 3-5 June 2009 in Prague the representatives of the Member States mentioned explicitly energy efficiency as a field that IMPEL should work on. Therefore, a follow-up project on energy efficiency was proposed. A first project on this topic was carried out by the Finnish Environment Institute in 2002.

This project uses the same methodology as the first IMPEL project on energy efficiency in environmental permits.

In this project the main objectives were:

- to explore how Member States have implemented in practice the energy efficiency provisions of the IPPC directive and handle obstacles;
- to identify how Member States enforce their legal requirements in this field;
- to find out what kind of information is required in permit applications e.g. energy efficiency indicators;
- to analyse how Member States work with the BREF Energy Efficiency and information of other BREFs related to energy efficiency;
- exchange of information on existing guidance material;
- to find out what is needed most to support Member States in the enforcement;
- to find out which project IMPEL can carry out in the field of energy efficiency and climate change;

This project investigated how energy efficiency is regulated in IPPC permits, how the BREF documents have been used or can be used in permitting and how voluntary energy saving agreements and voluntary environmental management schemes have been used or can be used in the consideration of energy efficiency. The overall objective was to find out what is good practice in determination of energy efficiency for industrial operations for example by using the BREFs or other guidance material, voluntary environmental management systems or energy saving systems.

Another objective was to explore whether alternative instruments such as environmental management systems, voluntary agreements, tax- and ETS-systems produce already improvements in the energy efficiency performance of sites to such a degree that it might not be necessary to deal with the item of energy efficiency in IPPC permitting and inspection

A three-step process was used to get the necessary information. Firstly, a draft questionnaire was drawn up and discussed between project team members. The finalised questionnaire was then sent out to the Member States and Norway after which the replies to the questionnaire were analysed. The project was led by a project team.

The second step was to hold a workshop for gathering more in-depth information by discussing the most problematic questions, identifying key difficulties and good practices for different situations. The workshop was held in Riga from 16–18 June 2010.

The third step was to prepare a final report based on the questionnaire responses and the workshop results. The questionnaire covered main topics of the first IMPEL project on Energy efficiency in environmental permits and was completed by questions concerning concrete examples. [4]. The aim of the questionnaire was to clarify the similarities and differences in the practices of Member States' permit and inspection authorities while dealing with energy efficiency. The focus lay on IPPC installations, but SME were highlighted in some questions too. The following 16 countries replied to this questionnaire: Austria, Denmark, Finland, Latvia, Germany, Norway, Greece, the Netherlands, Poland, Romania, Cyprus, Czech Republic, Bulgaria, Sweden, Spain and the United Kingdom. The compilation of the answers to the questionnaire is presented in Annex I of this report.

The workshop themes were the legal basis for energy efficiency, consideration of energy efficiency in environmental permitting, energy issues in environmental management schemes, monitoring and verification, energy saving agreements and emissions trading. In the seminar, key difficulties in the handling of energy issues in environmental permitting were discussed, possible solutions to the problems were suggested and finally good practices for the consideration of

energy efficiency in environmental permitting of large installations were agreed on. Additionally a role game about CHP and a study tour to a dairy plant in Riga were carried out. The seminar agenda and the list of participants are presented in Annex II of this report.

The project team consisted of the project leader - Gisela Holzgraefe, Germany, and four project team members: Susanna Eberhartinger-Tafill, Austria, Judite Dipane, Latvia, Sirpa Salo-Asikainen, Finland and Vilis Avotins, Latvia.

The expertise from the Institute of Energy Systems and Environment of Riga Technical University (RTU) was used as consultancy service. RTU arranged the workshop, participated in presentations of topics and prepared the draft report. RTU involved Prof.Dagnija Blumberga, Prof.Ivars Veidenbergs, Prof. Andra Blumberga, Dr. Marika Rosa and Dr. Claudio Rochas, researchers M.Sc. Liga Ozolina, M.Sc. Arturs Biedris, M.Sc. Alise Berzina and 2 research assistants B.Sc. Kaspars Silins and B.Sc. Dace Zahare.

The project team is grateful to all who participated in this project by answering the questionnaire, by taking part in the workshop and by providing examples of permit conditions etc., improved answers to the questionnaire and the evaluation form as well as comments to the documents produced.

2. LEGAL BACKGROUND

2.1. General background

The IPPC Directive (Integrated Pollution Prevention and Control Directive, 96/61/EC) entered into force on the 30th of October 1996. The IPPC Directive has been recently codified (Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control).The codified act includes all the previous amendments to the Directive 96/61/EC text. The substance of Directive 96/61/EC has not been changed.

In about two years the new Directive on Industrial Emissions (IED) will replace current IPPC Directive. The IED will not change the basic obligations of companies to have an environmental permit and apply BAT. However, it will strongly strengthen the application of Best Available Techniques (BAT) by making the BAT Conclusions in the BREFs (BAT Reference Documents) the reference point in the permitting process. This includes commitment to energy efficiency.

Eight years ago IMPEL carried out the project "Energy Efficiency in Environmental Permits". The Finish Environment Institute presented the final report which was adopted in December 2002 (henceforth Finnish report). This report identified several European Union policy measures affecting and improving energy efficiency.

However since 2002 EU policy regarding energy efficiency has become more severe and strict. Objectives have been set. In 2007 European Commission presented a proposal to reduce greenhouse gas (GHG) emissions by 20% of 1990 level by 2020. The Member States agreed to reach these objectives:

- Reducing energy consumption by 20%;
- Increasing use of renewable energy sources by 20%;
- Increasing the share of biofuel in transport sector by 20%.

In the meantime several important directives that have direct or indirect influence on energy efficiency in different sectors were adopted. These are:

- Council directive 2003/87/EC Establishing a Scheme for Greenhouse Gas Emission Allowance Trading within the Community and Amending Council Directive 96/61/EC;

This Directive establishes a scheme for greenhouse gas emission allowance trading within the European Union in order to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner.

- Council directive 2004/8/EC on the Promotion of Cogeneration Based on a Useful Heat Demand in the Internal Energy Market and amending Directive 92/42/EEC;

The purpose of this Directive is to increase energy efficiency and improve security of supply by creating a framework for promotion and development of high efficiency cogeneration of heat and power based on useful heat demand and primary energy savings in the internal energy market, taking into account the specific national circumstances especially concerning climatic and economic conditions.

- Council directive 2006/32/EC on Energy End-use Efficiency and Energy Services and repealing Council Directive 93/76/EEC;

The objective of this Directive is to enhance the cost-effective improvement of energy end-use efficiency in the Member States by: providing the necessary indicative targets as well as mechanisms, incentives and institutional, financial and legal frameworks to remove existing market barriers and imperfections that impede the efficient end use of energy; and creating the conditions for the development and promotion of a market for energy services and for the delivery of other energy efficiency improvement measures to final consumers.

According to the Directive, Member States had to submit their first National Energy Efficiency Action Plan (NEEAP) to the Commission by June 30, 2007. In their NEEAPs, Member States had to show how they intend to reach the 9% indicative energy savings target by 2016. NEEAPs have to describe the energy efficiency improvement measures that are aimed at achieving the savings targets set out by the Directive. The second NEAP is due June 2011.

- Council directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC;

This Directive establishes a common framework for the promotion of energy from renewable sources. It sets mandatory national targets for the overall share of energy from renewable sources in gross final consumption of energy and for the share of energy from renewable sources in transport. In order to reach the overall targets laid down in the Directive more easily, each Member State shall promote and encourage energy efficiency and energy saving.

To ensure that the mandatory national overall targets are achieved, Member States should establish their National Renewable Energy Action Plan including national targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020. In addition, Member States should set out measures to achieve those targets. Each Member State should assess the contribution which energy efficiency and energy saving measures can make to achieve its national targets. Member States should take into account the optimal combination of energy efficiency technologies with energy from renewable sources. Action Plans had to be notified to the Commission by 30 June 2010.

- Council directive 2009/125/EC Establishing a Framework for the Setting of Ecodesign Requirements for Energy-related Products.

This Directive establishes a framework for the setting of Community ecodesign requirements for energy-related products with the aim of ensuring the free movement of such products within the internal market. The Directive provides for the setting of requirements, which the energy-related products covered by implementing measures must fulfil in order to be placed on the market and/or put into service. It contributes to sustainable development by increasing energy efficiency and the level of protection of the environment, while at the same time increasing the security of the energy supply.

- Council directive 2010/31/EC on Energy Performance of Buildings;

This Directive promotes the improvement of the energy performance of buildings within the Union, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness. The Directive lays down requirements regarding the common general framework for a methodology for calculating the integrated energy performance of buildings and building units, the application of minimum requirements to the energy performance of existing and new buildings and existing and new building units, national plans for increasing the number of nearly zero- energy buildings and other factors.

In February 2009 the Reference document on best available techniques for energy efficiency (henceforth BREF on energy efficiency) was adopted and published. This document contains guidance and conclusions on techniques for energy efficiency that are considered to be compatible with BAT in a generic sense for all installations covered by the IPPC Directive. The BREF on energy efficiency also gives references to other BREFs where particular techniques for energy efficiency have already been discussed in detail and can be applied for other sectors. There are no qualitative requirements defined for energy reduction.

A few years ago the European IPPC Bureau (EIPPCB) started work on the revision of the sector specific BREFs. At the moment drafts of 7 sector-specific BREFs are available online where energy efficiency issues have been explained in more details.

2.2. Implementation of energy efficiency related requirements of the IPPC directive

Specific reference to energy efficiency issues is given in Article 3 (1d), Article 6 (1b and 1h), and Article 9 (1) and (3) of the IPPC directive. All EU Member States and Norway have transposed these articles into their national legislation either by using direct wording from the text of the directive or rephrasing it. It is also common practice that Member States include additional requirements for installations like e.g. in Romania and Finland regarding submission of additional information regarding use of energy.

According to Article 9 (3) subparagraph 3 the permits for ETS-installations shall – in general - not include emission limit values for CO2 because this will affect the company's ability to trade on ETS. Subparagraph 4 of Article 9 (3) allows for Member States not to impose requirements relating to energy efficiency in respect of ETS-combustion units or other ETS-units emitting CO_2 on the site. The workshop discussions showed that several member states like Austria, Germany, Sweden and UK do not set emission limit values for CO_2 however do in some cases prescribe energy efficiency measures in improvement programmes or permit conditions. The responses of many countries did not give a clear explanation how these two subparagraphs were transposed into their national legislation.

2.3 *Definition of efficient energy use*

The answers to the questionnaire and discussions in the workshop identified different problems that arise from how energy efficiency is defined, and whether it is defined at all. Only in three countries (see below chapter 2.3.1) some definition for energy efficiency is set in the legislation. On EU level only Ecodesign Directive 2005/32/EC defines energy efficiency as a ratio between an output of performance, service, goods or energy, and an input of energy.

The BREF on Energy Efficiency offers no further definition of efficient energy use in the context of the IPPC Directive, however, it gives an overview of available indicators (e.g. the specific energy consumption for a given output/input) and describes how they can be used.

Energy efficiency indicators are needed to evaluate developments of energy efficiency in industry. To develop useful indicators requires a lot of thinking about system boundaries (site, process), values of different types of energy (electricity, heat, fuel), energy production, utility systems and appropriate monitoring points.

In industry, the specific energy consumption for a given output (or input) is the most widely used indicator. Although the definition looks simple, experience in trying to quantify the concept for monitoring processes is challenging. There are several complicating factors, such as:

- energy is not always counted in the same way or using the same parameters
- it is often necessary to look at the energy efficiency of a production process within the energy efficiency of a production site involving several production processes
- the definition does not provide information on whether energy is used or produced efficiently.

To be informative and useful, energy efficiency indicator must be comparable, e.g. to another unit or installation, or over time and for comparison there must be rules. In the case of comparing energy efficiency, it is especially important to define system boundaries to ensure all users are considered equally.

To evaluate energy efficiency and develop suitable indicators it may be helpful to consider the following issues:

- assess the site to find out if a specific energy indicator (SEI) can be established for the whole site
- split the site in production/utility units, if a site SEI cannot be established, or this may be helpful in any cases to identify in detail the energy flows
- define indicators for each production process and for the site or part of it
- quantify specific energy indicators, record how these are defined, and maintain these, noting any changes over time (such as in products , equipment)

Some countries do specify efficient energy use in guidance material (see below chapter 2.3.2).). Discussions in the workshop showed that it is hard to agree on an energy efficiency definition as in some cases this depends on the system boundaries. One example is for instance, waste incineration installations in rather remote areas where there is no use for the heat. The overall energy efficiency is rather low in this case whereas in populated areas it could be improved by the use of CHP. However, if the BAT requirements for the installation are met it is considered energy efficient.

One tool for checking of energy efficiency is benchmarking. The most obvious benchmarks are specific data for energy consumption of production processes in the BREFs. In the in absence of BAT data in the BREFs benchmarks could be consumption data from other similar installations, standards in legislation or other reference documents. They can be set annually for the same installation or between installations inside the sector. For instance, the cement industry makes different types of clinker trough different processes and benchmarks for each process of the cement industry might be set accordingly. However, benchmarks are still under development and are not used widely. Due to the lack of data some enforcement agencies/authorities (e.g. in UK) started to collect and evaluate available data for this purpose.

2.3.1 Specific definition of efficient use of energy in countries legislation

In most of the countries (Austria, Bulgaria, Cyprus, Denmark, Finland, Germany, Latvia, Norway, Spain, Sweden and UK) there is no reference to or a specific definition of efficient use of energy in their national legislation. However in Germany principles like heat recovery and conservation are defined.

Only 2 countries (the Netherlands and Romania) identified that there is a definition on efficient use of energy in their legislation. In the Netherlands according to the multi-annual negotiated agreements participating companies with an electricity use > 200.000 kWh or a gas consumption > 75.000 Nm3 are required to implement all known energy efficiency measures with return of investments of maximum 5 years. A register of these measures is available (Besluit algemene regels voor inrichtingen milieubeheer).

The Romanian normative act (Governmental Ordinance no. 22/ 2008) defines "Energetic efficiency – the ratio between the value of the performing result obtained – consisting in services, goods or the resulted energy – and the value of the energy utilized for this purpose" and "The improvement of the energetic efficiency – the increase of the energetic efficiency at the final consumers, as a result of the technological, economical and/ or attitudinal changes".

2.3.2 Guidance on efficient use of energy

A European-wide guidance in the context of IPPC is available through the BREF on Energy Efficiency. Apart from that resource most countries provide guidance on efficient use of energy. Most of that guidance, however, is not provided especially for use of the environmental authorities but in general to save energy and money.

The **United Kingdom** provides guidance on efficient use of energy in Horizontal Guidance Note, IPPC H2, Integrated Pollution Prevention and Control (IPPC), Energy Efficiency and in sector specific guidance notes. The horizontal guidance provides cross-cutting information relevant to all IPPC sectors and supplements the IPPC sector guidance notes. (available online http://www.environment-agency.gov.uk/business/topics/permitting/32320.aspx). Operators are required to

- take appropriate measures to ensure that energy is used efficiently in the activities;
- review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities; and
- take any further appropriate measures identified by a review.

The operators must also report their energy usage on an annual basis. The authorities examine via sector benchmarks whether installations have to improve their performance relating to energy efficiency.

In some guidance documents for operators UK provides benchmarks for several sectors in the chapters on energy efficiency. Examples:
a) Dairy and milk processing sector (EPR 6.13):
You should where appropriate:
achieve the benchmark values set out in the table below:

	Energy consumption
Milk	0.07 – 0.2 (kWh/l)
Powdered milk	0.3 – 0.4 (kWh/l)
Ice cream production	0.6 – 2.8 (kWh/l)

b) Red meat processing (EPR 6.12)
You should where appropriate:
meet the energy benchmarks shown in the table below:

	Heat and electricity (kWh/animal)
90 kg pigs	30 – 125
250 kg cattle	70 - 300

Denmark provides sector energy analysis and some horizontal guidelines (e.g. on ventilation, heating, compressors and electric light) from the Danish Energy Agency.

Finland has published a report on how to use the Energy efficiency BREF in practice.

In **Austria** currently a guidance on the climate and energy concept within the Environmental Impact Statement (Environmental Impact Assessment - EIA procedure) is being elaborated (finalisation envisaged for October 2010). This guidance will provide information for developers and authorities on the necessary energy related data and on the state of the art referring to energy efficiency for certain sectors (IPPC installations but also other project types like e.g., urban development projects). Concerning the state of the art the guidance will make use of the available data in the BREFs. Within the Austrian klima:aktiv campaign various guidance material has been issued (on topics such as ventilations systems, pumps, motor-driven systems). The focus of these brochures is on SMEs. The Austrian Chamber of commerce also offers guidance on energy efficiency (e.g. energy efficiency checklist for companies). The Austrian Federal Environment Agency has published some studies on energy efficient technologies in certain industrial sectors.

Bulgaria and **Latvia** provide guidance on defining efficient use of energy as a part of BAT, guidance on the scope of the IPPC application.

Table 2.3: Guidance on efficient use of energy (general and sector specific)

Kind of Guidance	**AT**	**CY**	**DE**	**DK**	**FI**	**NO**	**RO**	**UK**
General				X	X		X	
General for industry & crafts	X	X	X	X	X		X	X
General on Energy Management Systems	X		X	X	X	X		
Compressed air	X		X	X	X	X		
Cooling systems	X	X	X	X	X			
Heating systems	X	X		X	X			
Electric motor-driven systems	X			X	X	X		
Pumping systems	X			X	X	X		
Lighting systems	X	X	X	X		X		
Office buildings		X	X	X	X	X	X	
Hotels and Restaurants	X			X	X	X	X	
Sector specific								

Agriculture –intensive farming			X	X	X			X
Bakeries			X	X		X		
Butcheries			X	X		X		
Chemical industry								X
Combustion activities					X			X
Dairy and milk processing						X		X
Engineering works			X					
Food and drink sector			X			X		X
Galvanic industry			X					
Glass industry			X					
Meat processing industry			X			X		X
Paint shop			X					
Paper industry			X					
Plastics processing			X					
Porcelain industry			X					
Production of Coke, Iron and steel								X
Refining installations								X
Textile industry				X				X

In **Germany** the Federal Ministry for the Environment has not issued national guidance, only a brochure with advice on energy efficiency in industry and crafts. Environmental Ministries of the federal states or their agencies have published guidelines on efficient energy use. They can be found on the individual homepages, e.g. Bavarian State Agency for the Environment: has 10 general guidance papers (energy efficient use of compressed air, lighting systems, etc.), 15 branch specific guidance documents with examples (paper industry, paint shop, porcelain industry, plastics processing, glass industry …) and commerce, crafts and services (butcheries, bakeries ..). The website of the German Energy Agency (dena) provides an overview. On top of that industrial associations and chambers of commerce offer some sort of guidance to their members.

Guidelines of VDI – Verein Deutscher Ingenieure (Association of German Engineers) e.g. VDI 4602 ”Energy Management”, VDI 3807 “Characteristic values of energy and water consumption in buildings”, VDI 3922 “Energy consulting for industry and business”, VDI 4661 “Energetic characteristics – definitions – terms - methodology” etc. are a source of information from a non-governmental organisation. The VDI-guidelines are often taken into account for the determination of BAT.

Romania provides guidance in Annex 1 to the Governmental Ordinance no. 22/2008 regarding energy efficiency and the promotion of the utilization of the renewable energy resources by the final consumers. ”The Indicative List with Examples of Eligible Measures for the Improvement of Energy Efficiency” includes measures for the main sectors (industry, residential and tertiary sector sector, transports) as well as trans-sectoral and horizontal measures.

Cyprus does not provide any official guidance on efficient use of energy but wide information on related issues (utilisation of renewable sources of energy, measures undertaken for energy efficiency, innovated energy efficient technologies) has been published and is available on the website of the Ministry of Industry, Commerce and Tourism (Energy Services). Further guidance is provided by the competent authorities for issuing permits during the permit procedure.

Norway applies an agreement between the energy authorities and the federation of Norwegian Industries (NI) concerning the improvement of the energy efficiency performance in industry. The energy authorities have guidance available on efficient use of energy, e.g. on general energy management systems, compressed air, pumping and electric motor driven systems, lighting systems covering industry, occupational buildings and residential buildings.

This overview shows that in many countries a variety of guidance on efficient use of energy (general and sector specific) is available at different places. The dissemination and promotion have to be improved. The target groups need information about the existence and training on the application.

3. THE AUTHORITIES AND ORGANISATIONS

3.1. The Competent authorities and organisations

The IPPC directive states: "competent authority" means the authority or authorities or bodies responsible under the legal provisions of the Member States for carrying out the obligations arising from this Directive.

This chapter deals with the identification of different competent authorities issuing permits, monitoring compliance and enforcing energy use and efficiency as well as giving guidance on energy efficiency issues. As the analysis of the questionnaire shows the main authorities involved in issuing permits and evaluating monitoring are environmental institutions. In spite of the fact that energy efficiency in permitting procedures has been introduced 14 years ago cooperation with authorities working on energy and energy efficiency issues and knowledge capacity of the environmental bodies is still under development.

3.1.1. Competent bodies for giving guidance on energy efficiency in environmental permits

There are different organisations giving guidance on energy efficiency in environmental permits. The most common approach in the EU (in 9 countries) is to get this assistance from environmental organisations like ministries of environment (Austria, Bulgaria, Czech Republic, Cyprus, Finland, Greece, Latvia), ministries of economy (Poland) or environmental agencies (Norway, Sweden, United Kingdom). However, there are countries where the main competence regarding energy efficiency lays on the level of energy agencies (Denmark, Spain, partly Finland and Austria). In Romania guidance on energy efficiency issues can be received from energy and environmental authorities. In Czech Republic additional guidance can be obtained from regional authorities. In Germany the organisations of the federal states can give guidance as far as the federal Ministry of Environment has not yet issued it. In some of the German federal states environmental agencies have issued guidance on energy efficiency.

Table 3.1. Institutional competence for guidance on energy efficiency issues

Country	Ministry of environ-ment or equivalent	Ministry of economy or equivalent	Energy agency	Environ-mental agency	Other institution
Austria	√	√	√	√	
Bulgaria	√				
Czech Republic	√				√
Cyprus	√				√*
Denmark			√		
Finland	√		√	√	√
Germany	√			√	√
Greece	√				
Latvia	√				
The Netherlands					
Norway				√	

Poland		√			
Romania			√	√	
Spain			√		
Sweden			√	√	
United Kingdom				√	

* Ministry of Labour and Social Insurance (competent for issuing the Air Emission Permit)

3.1.2. Competent authorities for issuing permits including energy efficiency

The Analysis of the questionnaire has identified considerable differences between countries regarding competent authorities for issuing the IPPC permits.

Authorities for issuing of IPPC permits (including EE issues) in the selected countries can be divided into 5 large groups:

- Ministry level;
- Agency level;
- Regional level;
- Municipality level;
- Other institutions – the Environmental courts and the Environmental licensing delegations at the County administrative boards in Sweden.

In some cases (Austria, the Netherlands, Poland, Czech Republic, Germany, Greece) regional or municipal bodies are named, however it is not clear what kind of organisation issues the permits (if it is environmental authority or other).

Table 3.2. Competent authorities for issuing permits

Country	Ministry of environ-ment or equivalent	Environ-mental agency or equivalent	Regional / district level	Municipal level	Other
Austria			√		
Bulgaria	√				
Czech Republic	√		√		
Cyprus	√*				√
Denmark	√			√	
Finland			√	√	
Germany			√		
Greece	√		√	√	
Latvia		√			
Netherlands			√	√	
Norway		√	√		
Poland			√		
Romania		√			
Spain			√		
Sweden					√**

United Kingdom		√		√	

* Ministry of Labour and Social Insurance (competent for issuing the Air Emission Permit)
** Environmental Courts and Environmental licensing delegations at County administrative board

3.1.3. Competent authorities for monitoring compliance with energy efficiency conditions

In 11 countries (Austria, Czech Republic, Cyprus, Germany, Denmark, Latvia, Norway, Poland, Spain, UK) the same authority that has issued the permit is also responsible for compliance monitoring. In Denmark the monitoring is undertaken by the Danish Energy Agency (in case of a voluntary energy saving agreement between operator and agency) otherwise the same authority issuing permits guarantees monitoring compliance. In Finland regional Centres for Economic Development, Transport and the Environment and municipal environmental authorities are responsible for the compliance monitoring.

In the meantime in Czech Republic, Bulgaria and Greece inspectorates have been given the responsibility for monitoring the compliance. In the Netherlands the Agency is responsible for the implementation of monitoring for long-term agreements on energy efficiency and long-term agreements on energy efficiency for ETS enterprises. In Romania the responsibility is split between Regional Agencies for Environmental Protection in cooperation with local structures of the National Environmental Guard and the Romanian Agency for Energy Preservation (ARCE). In Sweden regional or local authorities are responsible for monitoring.

Table 3.3. Responsible authorities for monitoring compliance with EE conditions

Country	Same authority that issues permit	Inspectorates	Other
Austria	√		
Bulgaria		√	
Czech Republic	√	√	
Cyprus	√		
Denmark	√		√
Finland	√	v	
Germany	√		
Greece		√	
Latvia	√		
Netherlands			√
Norway	√		
Poland	√		
Romania			√
Spain	√		
Sweden			√
United Kingdom	√		

3.1.4. Competent body for enforcement of energy use and efficiency

In 9 participating countries (Austria, Czech Republic, Denmark, Germany, Greece, Norway, Poland, Spain, UK) the enforcement of energy use and efficiency is undertaken by the same competent authorities that issue the permits. In Bulgaria, Romania and Sweden the same authority that monitors compliance with energy efficiency conditions (e.g. inspectorates etc.) ensures the enforcement of energy use and efficiency. In Finland enforcement is carried out by Centres for Economic Development, Transport and the Environment and municipal environmental authorities. In Latvia the competent authorities are the Ministry of Environment, Ministry of Economics and State Environmental Service and in Cyprus the Ministry of Commerce, Industry and Tourism.- Energy Service.

3.2. Co-operation between authorities/organisations

In the last decade energy issues like energy efficiency and sustainable energy use have become one of the top priorities at the European Union level, Member States' and regional level and therefore more and more organisations in the countries are involved.

Answers to the questionnaire and discussions in the workshop showed that organisations issuing permits are often not sufficiently competent in energy issues. Due to the potentially large number of involved parties, it is quite common that the cooperation between all these organisations is weak and should be improved. Some countries (Austria, Sweden, and Romania) highlighted the lack of expertise concerning energy efficiency in the authorities competent for IPPC permitting and inspection and proposed specific training to improve their knowledge.

4. ENERGY EFFICIENCY IN THE PERMIT PROCEDURE

4.1. National guidance provided to the applicant in order to evaluate energy efficiency of the operation

Almost all the countries (except 4 countries) have a national guidance available for applicants how to evaluate energy efficiency of the operation. This guidance in some cases has been developed in the framework of some other scheme established in the countries (the Netherlands, Norway). However in most of these countries (Austria, Denmark, Cyprus, Finland, Norway, Spain, Sweden, Poland and United Kingdom) the official status of the guidance is non-binding. Results of analysis of questionnaires are presented in Table 4.1.

Table 4.1. National guidance provided to the applicant

Country	Yes	No	Notes	Non-Binding guidelines
Austria	√		Draft guidance under development for Environmental Impact Assessment procedures	√
Bulgaria	√			
Czech Republic	√		General national guidance for application of integrated permit	
Denmark	√		Guidance intended to be used in connection with an agreement with the Energy Agency	√
Finland	√		Best Available Techniques (BAT) - Energy efficiency in permitting and inspection, several sector specific energy efficiency guidelines	√
Greece	√		Ministerial Decree applied on textile sector	
The Netherlands	√		Energy Covenant contains list of measures	
Norway	√		NS-EN16001 Standard on energy management systems and general guidance on energy management systems from the energy authorities	√
Romania		√		
Sweden	√			√
The United Kingdom	√		Horizontal and sector specific guidance of the Environment Agency	√
Poland		√		
Cyprus		√		√
Germany	√		DIN EN 16001: Energy Management Systems in Practice – A Guide for Companies and Organisations	√
Latvia		√		
Spain	√			√

4.2. Practical aspects of permitting – preliminary contacts

The applicant shall present what is possible to do and his/her view on whether or not the different measures are BAT for the sector and whether or not such a measure is reasonable to take at the installation. In this assessment capital, running and maintenance costs as well as benefits such as reduced energy costs and reduced emissions might be an issue.

During the preliminary contacts between applicant and authority advice on the project will be given and the authority will also communicate early whether it sees any definite compliance problems. In practice, if any difficulties are encountered, improvements of the project can occur during the permitting procedure.

In Germany if the authority has knowledge about a very energy efficient technology that is BAT for an existing installation and the operator can prove that the realisation lacks proportionality the authority shall refrain from such subsequent orders or obligations in a permit.

In Romania negotiations between applicant and the competent authority are in place when the negotiated items are subject of so-called "Action Plans", which include compliance measures to be taken during the "transition period" for the installations concerned. The subjects of negotiation can be: the concrete content of the measures to be taken in order to comply with IPPC requirements and the dead-lines for the measures approved for the respective installation.

In United Kingdom for existing installations, an improvement programme with prescribed dates for completion is set up. The negotiations are site specific and have take into account its circumstances.

In Sweden all energy efficiency measures shall be taken as long as they are not unreasonable. The burden of proof whether a measure is unreasonable lies on the operator.

4.3 Application documents

4.3.1 Required information concerning energy use

Information required concerning energy use can be divided in two groups: general and specific information (see Table 4.2.). In this case "general" is meant information asked according to the IPPC directive (Article 6 (1b): Description of the raw and auxiliary materials, other substances and the energy used in or generated by the installation.

As indicated by the respondents of the questionnaires general description includes information regarding energy sources, energy consumption, energy flows, capacity of installation, power/energy generated by the activity, recovered energy, planned improvements etc. Only Finland already in 2002 [4] indicated the existence of a special application form for energy efficiency (see Box 1).

Table 4.2. Information concerning energy use in the application

Country	General	Specific	Notes regarding specific information
Austria	√	√	Description of the climate-relevant greenhouse gases arising from the project and measures to reduce them with a view to climate protection; For EIA-projects certificate of an authorised consulting engineer or technical consulting office stating that the

			measures included in the climate and energy concept comply with the state of the art (state of technology - BAT).
Bulgaria	√		
Czech Republic	√	√	The operator is required to include energy efficiency in application for new installations of power stations and waste incineration plants.
Denmark	√		Combustion/incineration plants: operators must include a description on how energy outputs fit in the energy system, for instance district heating, in order to see that energy losses will be minimised
Finland	√	√	A specific application form for energy efficiency should be filled in by the operators. Waste incineration operators must include also specific information - information on how heat generated in combustion is utilised.
Germany	√	√	The documents must contain information about planned measures for economical and efficient energy use, especially information about possibilities for achieving high energy efficiency and high rate of utilisation, for minimisation of energy loss and use of generated energy. LCPs: information about possible CHP-measures Waste incinerators: information how the heat generated by the incineration or co-incineration process shall be used. This includes e.g. information about substances used, heating value and produced quantity of steam.
Greece	√		
The Netherlands	√		
Norway	√		
Romania	√	√	Lot of specific information included for applicant: particular data of energy activities, types of installations, operational and maintenance, etc. A plan for energy efficiency has to be set up.
Sweden	√		The application should include: - energy "production" and consumption - technologies used and their consumption - possible additional measures incl. BAT - cost-benefit analyses for these measures - whether or not the measures are regarded as - unreasonable and in that case why - any proposals for measures/conditions
United Kingdom	√	√	Beside description of the basic measures for improving energy - efficient activities, applicant has to provide a breakdown of any changes to the energy activities use and create and to describe the specific measures which are used for improving energy efficiency.
Poland	√		Annual energy use in total and per product.
Cyprus	√	√	Beside general information application includes description on how to obtain energy efficiency

			(technologies/ equipment).
Latvia	√		

Box 1. Finnish application for energy efficiency
Operators in Finland as annex to the application for IPPC permit submit an assessment of the energy efficiency. Application form includes following questions:

1. Energy saving agreement and environmental management system.
2. Total energy balance, MWh (electricity, heat, fuel).
3. Energy generation per boiler, MWh (use (fuel, electricity), output (electricity, heat: steam, hot water, other heat)).
4. Energy consumption in process parts (electricity; heat: steam, hot water, other heat; fuel; process part output (t/year or other)).
5. Energy efficiency estimate is based on the following documentation (replies to the questions for companies which have / have not made an energy analysis or an energy review according to the MOTIVA model and with the support of the Ministry of Employment and Economy).
6. Steps taken during the last three years to improve energy efficiency.
7. Planned steps to improve energy savings.
8. Planned environmental protection investments.
9. Company's or company representative's assessment of energy efficiency.

4.3.2 Required information concerning monitoring

The IPPC directive does not provide clear indication for monitoring and does not set monitoring requirements on energy efficiency. As one of the obligations of the operators is "to use energy efficiently" they must do the monitoring to prove the efficient use of energy.

At the moment in Member States permit conditions related to energy efficiency monitoring are mainly missing in most countries. However, experience and results about specific energy efficiency monitoring are available in several EU and national schemes. Provisions including mandatory monitoring are defined e.g. in EU ETS, Waste Incineration Directive 2000/76/EC and E-PRTR according to IPPC.

Monitoring results of these schemes can be used for IPPC installations. However monitoring systems could be improved in this respect. In several countries operators of IPPC installations have to submit data on electricity and fuel consumption annually with their environmental reports (CY, CZ, ES, UK, RO, DK, NO, SE).

In most countries information form EMAS, ISO 9001, 14001, 16001 and / or other voluntary management systems may be utilised in the permitting procedure. More information on established voluntary management systems in different countries is given in Chapter 6.

4.4 Permit Consideration

4.4.1 Permit Consideration – Energy Efficiency

Energy efficiency is part of a BAT consideration. In addition to that it is stated in Article 3 of the IPPC Directive that Member States shall take the necessary measures to ensure that an application to the competent authority for a permit beside other things includes information on energy efficiency.

Some countries indicated that they look only at the most energy consuming parts of the installation. Almost all countries consider specific energy systems like combustion, steam, heat recovery, cogeneration, electrical power supplies, electric motor driven subsystems, pumping systems, heating, air conditioning and ventilation, lighting, drying and separation.

It is however not clear from the responses to the questionnaire what the level of checking of information regarding auxiliary systems like heating, pumping, lighting etc. in the companies is.

Box 2. The use energy efficiency agreements in permitting and inspections in Finland
For the moment the agreements are not fully utilized in the environmental permitting and in the inspection procedures. However, the system has a great potential. Companies which have joined in the agreement know well already now or at least in some years their energy system (production, process use, utilities etc.). This is a good basis to improve energy efficiency.
Information from the agreements is already now used in permit applications and energy efficiency analyses are encouraged during permit processes and inspections. For permit authority it is important to know energy efficiency as such and as an element in the BAT-assessment. To assess continuous improvement also indicators are needed. Annual reports contain a lot of important information about development of the energy efficiency and should be available for authorities as well. Furthermore, permit and inspection authorities should have a bigger role in the development of indicators. As a conclusion for the permit and inspection authorities' work it is useful that companies have joined into energy efficiency agreements but it is not enough as such. Companies have to inform authorities in detail about energy efficiency issues to verify that all requirements of the IPPC-directive, future IE-directive are met.

- Denmark has mentioned that IPPC installations usually make agreements with the Danish Energy Agency concerning EE.

4.4.2 Permit Consideration - Cogeneration

According to CHP Directive 2004/8/EC and LCP Directive 2001/80/EC Member States shall ensure that the technical and economic feasibility of providing for the combined generation of heat and power is examined. Where the feasibility is confirmed, bearing in mind the market and the distribution situation, installations shall be developed accordingly. This means that possibilities for cogeneration shall be studied in every permit consideration. However the implementation of this requirement has been vague in many Member States.

The answers to the questionnaires and discussions during the workshop indicated that adequate land use planning is an essential precondition regarding construction of cogeneration plants. In UK the Planning Authority determines location and infrastructure. They are working to ensure the location that allows viable CHP. It is a requirement in the permitting process to consider CHP and if the operator is not proposing CHP they have to provide a justification why they are not using CHP.

In some countries like Latvia installation of CHP is a political decision and permitting authorities are not competent to discuss the issue. Most of the countries exercise the discretionary judgement in the permitting procedure and use the restrictions that are defined in the national legislation. (technical and economical feasibility). Problems arise when the permitting authority can not be sure if all possibilities to find heat utiliser(s) have been explored.

In Finland CHP is common practice. UK currently reviews the requirements concerning this issue.

In general in all countries the decrease of energy efficiency at the installation (e.g. by losing an important heat user) or if substantial changes of the state of the art relating to energy efficiency occur would result in the revision of the existing permit. However participants of the workshop could not report a concrete case where only changes in energy efficiency resulted in the revision of the permit. Typically other issues, for example changes in emissions, would lead to the reconsideration of the permit. The countries have different timelines for formal permit review, Latvia 7 years, UK 4 years.

In Finland the evaluation of energy efficiency is made on a case by case basis. An example for the general practice is a biomass (bark) dryer utilising waste heat, which was built on the same site with a paper machine and a power plant utilising the dried biomass. The dryer had a major effect on the energy efficiency of the power plant, but no change on actual emissions to air and water, so the permit for the power plant was not reconsidered (power plant and paper mill).

The individual legal background in the countries sometimes makes it difficult to consider energy efficiency in the procedure. It remained unclear whether in case of alterations of installations the overall efficiency will be assessed or only the efficiency of the changed part.

4.5 Permit conditions

4.5.1 Energy efficiency in the permit

Most countries rely on permit conditions. UK has an additional system.

In the **UK**, all installations under the scope of IPPC shall meet a set of basic energy requirements for energy efficiency. These include:

provision of information on energy consumed or generated by the activities within the permit and the associated direct and indirect carbon dioxide emissions

- energy management provisions
- a description of the proposed measures for the improvement of energy efficiency in operating and maintenance procedures, control of excessive heating and cooling losses and building services
- provision of an energy efficiency plan that identifies energy efficiency techniques that are applicable to the operation of the activities.

All installations under the scope of IPPC must also meet additional energy efficiency requirements either:

- through participation in a Climate Change Agreement or Direct Participant Agreement in the Emissions Trading Scheme or Carbon Reduction Commitment
  or
- through compliance with further permit-specific requirements as determined with the regulator.

In **Romania** permits include a separate sub-chapter: “Efficient use of energy”, with a more detailed evaluation. All operating IPPC installations periodically have to perform an energy audit and to report the results to the competent authorities. In case of non-compliance of existing installations the requirements for energy efficiency are incorporated into the permit as “Action Plan” with measures to be taken in order to comply with the legal demands. Besides this, in the chapters “Monitoring” and “Reporting” of the IPPC permit, specific requirements are formulated

including monitoring and reporting of the emissions from combustion processes; the reporting of specific energy consumptions etc. A general requirement for permit owners is to present to the competent authorities the Annual Environmental Report, which includes the section "Efficient use of energy".

In **Cyprus** each permit includes specific requirements regarding measures that must be taken by the facility operator for efficient use of energy. Most commonly, measures refer to the following:

- monitoring and maintenance of equipment on regular basis;
- prevention of energy losses (i.e. by using insulating materials, alarm systems, etc);
- application of systems and techniques (i.e. for lighting, air conditioning, pumping, etc) of lower energy consumption;
- detailed record keeping.

In **Austria** the requirements concerning energy efficiency are incorporated in the permit as a binding specific permit condition or by declaring the project description as integrated part of permit. Both of these options have been used.

Example: Extension of an integrated work for the initial melting of cast-iron and steel in Linz (integrated EIA procedure): increase of production capacity to 6 million tonnes steel/year. For an EIA project the operator had to submit to the authority an application for development consent that contains the documentation required under administrative law for the approval of the project and the Environmental Impact Statement. The competent authority demanded comprehensive application documents relating to energy demand and efficiency and an „energy and waste-heat study" of the site which evaluated the potentials for energy-saving and use of waste-heat.

The following conditions were included in the integrated EIA permit:

- to keep informed on technical developments in the iron and steel sector referring to energy efficiency
- to carry out an energy monitoring (yearly basis, choice of fuel, use of specific benchmarks) for the important installations (sinter plant, blast furnace, hot rolling mill, power plant)
- new assessment of the energy saving potentials on the basis of the energy monitoring (5 years after issuing the permit)
- Insulation of the steam pipes

In **Finland** the requirement for energy efficiency is an integrated part of the permit consideration. This leads usually to specific permit conditions. Examples from Finnish permits are:

1. Reporting permit condition-"Realised measures that have improved the energy efficiency must be reported annually in the annual report according to permit condition 64." (Oil refinery) and more specific permit condition- "The plant should aim to operate as energy efficiently as possible. The Operator must submit a written statement by 28.2.2008 about measures, which help to improve the energy efficiency of the plant. On evaluation energy efficiency, the possibilities for utilizing the waste heat from VOC afterburner and capacity and annual water consumption of the cooling system on the factory need to be taken into account (Packaging factory).
2. Coal fired power plant - no specific permit conditions were given, but under motivation for issuing the permit it is mentioned that: "Based on the information presented in the application, it was evaluated that the activity is operating on energy efficient manner".
3. Brick factory - no general motivation for energy efficiency was given for permit consideration, but operator got a permit condition stating that: "Energy efficiency of the

brick works must be controlled continuously and it must be documented. The permit condition was motivated by: "Permit condition on energy efficiency is based on environmental protection degree § 43, which states that when assigning permit conditions one must take into account the efficient use of energy."

4. Steel mill - no general motivation for energy efficiency was given for permit consideration, but operator got a permit condition stating that: "The company must submit an action plan to competent authority based on the energy audit, covering energy efficiency measures taken and planned, as a part of the application for reconsidering the permit." The permit condition was motivated by: "By operation on energy efficient manner it is possible to reduce the consumption of non-renewable fuels and environmental impacts of fuel production. Energy analysis conducted according to the energy saving scheme has been assigned to be attached to the permit application for reconsidering the permit, so that it can be evaluated, whether further permit conditions are necessary for executing the energy savings possibilities of the energy analysis ".

Examples from **Sweden** include requirements on
- use of energy per produced unit
- design of equipment to reach certain energy consumption per produced unit.

4.5.2 Differences in energy efficiency requirements between sectors

The answers to the questionnaire were that generally there are no legal differences in energy efficiency requirements between sectors in Austria, Cyprus, Denmark, Finland, Germany, Latvia, Netherlands, Spain, Sweden, Poland and United Kingdom. However, in practice there are of course differences due to the fact that different sectors have different process equipment and different possibilities to take measures. Measures in different sectors may be different. The Netherlands has mentioned that in practice differences can arise from the existence of non active policy of trade associations to establish industry specific measures. In Sweden requirements are set individually. In Cyprus depending on the industrial sector, a provision is proposed which obliges the operator to use specific equipment – i.e. permits for the installations for the manufacture of ceramic products include a condition that requires the use of Tunnel Ovens.

4.6 Best available techniques

4.6.1 Development of BREFs concerning energy efficiency aspects

The integrated pollution prevention and control reference document on best available techniques for energy efficiency (ENE BREF) [3] was published in February 2009.

This document was specifically mandated by a special request from the Commission Communication on the implementation of the European Climate Change Programme (COM(2001)580 final) ECCP concerning energy efficiency in industrial installations. The need for the development of this document was a central item in the Finish report.

In September 2009 the European Commission published a Summary on Energy Efficiency issues in the BREF Series. The aim of this study was to summarise and gather the available information on energy efficiency for the industrial sectors covered by the IPPC Directive in systematic and structured way.

At the moment the revision of sector specific BREFs is being carried out with i.a. the objective to address more in detail the energy efficiency issue.

4.6.2 Use of EU BREFs in the permit procedures

4.6.2.1 The experiences with the use of the EU BREFs in the permitting process

Many countries have indicated that the common practice in general is to use BREFs in the permitting procedure (Austria, Czech Republic, Denmark, Finland, Romania, Greece, Cyprus, Sweden, Norway and UK) however some of the countries apply national "obligations". In Germany generally relevant limit values and other requirements are laid down in ordinances, technical instructions and other technical guidance papers or guidelines. They are based on the best available technique and shall protect against any harmful effects on the environment and prevent the emergence of any such effects. Information of BREF documents are taken into account. Permit writers can refer to the BREF documents, but it is not allowed that the requirements in the permit fall behind German law.

Some countries produce tailor made national reference documents for their purposes. Such approach is used in United Kingdom where sector guidance notes were developed which include sections on energy efficiency. At the moment all of these documents are under revision. One of the option considered by UK is to reflect the BREFs into a specific format against which their field staff will carry out specific energy efficiency audits. Also in Finland national sector specific guidance documents have been produced as well as tailor made national ENE BREF. In Czech Republic a specialist group has been established to support regional authorities in evaluation of BAT.

4.6.2.2 The horizontal BREF on energy efficiency techniques

The horizontal BREF on energy efficiency techniques has been developed recently (February 2009). This could be one reason why the use of the document has not yet been explored intensively in the MS. The main comment of the countries during the survey concerned the complexity of the horizontal BREF. One solution could be to incorporate the energy efficiency issues into the sector specific BREFs. Another approach is used in Finland and United Kingdom where horizontal BREF has been harmonised with national sector specific guidance.

4.6.2.3 The relevant data in BREFs used as benchmarks for energy efficiency

Many countries (Austria, Bulgaria, Czech Republic, Denmark, UK, Norway, Poland, Greece, Finland, Cyprus, Romania, Sweden) use any available and relevant data in BREFs as benchmarks for energy efficiency. Benchmarks have been mentioned and used in the permits, when these exist in BREFs and are relevant for certain activity. In Finland this approach is used for instance for the LCP sector, in Austria for the cement, iron and steel sector and in Romania in the cement production sector and in the sector of chemical installations producing basic inorganic chemicals such as ammonia.

For establishing a benchmark system United Kingdom is reviewing the BREF benchmarks now as well as other benchmarks such as EU ETS benchmarks. UK has also guidelines on GHG

Conversion factors for carbon reporting published by the Government (based on fuel usage, activity data, conversion factors).

In the Netherlands, Latvia, Spain and Sweden the BREF data is not used as benchmarks for energy efficiency.

4.6.3 Other sources for evaluation of BAT for energy efficiency

4.6.3.1 Other sources used for evaluation of BAT for energy efficiency

Many countries use also other sources to evaluate energy efficiency that are summarised in Table 4.3.

Table 4.3. Other sources to determine energy efficiency

Country	Yes	No	Source
Austria	√		energy consumption data from comparable operators in the sector
Bulgaria	√		Technical specifications of the equipment
Cyprus	√		Technical specifications of the equipment
Czech Republic	√		National official sources: 1) Catalogue of measures to reduce energy efficiency, 2) Energy intensity of production of selected products
Denmark	√		Using webpages
Finland	√		Unofficial benchmarking with other installations on same sector
Germany	√		Environmental Ministries or agencies of the federal states or their agencies have published guidelines on efficient energy use, e.g. Bavarian State Agency for the Environment has 10 general guidance papers (energy efficient use of compressed air, lighting systems, etc.), 15 branch specific guidance documents with examples (paper industry, paint shop, porcelain industry, plastics processing, glass industry …)
Greece	√		National legislation concerning in particular heating boilers, water discharges
Latvia		√	
The Netherlands	√		All BAT documents are included in the Dutch bylaw 'appointed BAT documents'. Standard lists of measures per sector are used for proven energy efficient measures. Specific measures are usually coming from additional energy efficiency studies by sector organisations. Additional energy efficiency policy can be found at provincial level, which has to be implemented by environmental protection agencies.
Norway	√		A web-based benchmarking system has been built up allowing all members to extract information about their own energy performance in relation to other plants within the same industry branch. Every year industry network members feed data into the system in an easy way via the internet. A precondition for getting economic support to energy analyses was to take an active part in the benchmarking project. There is an increasing interest amongst industry in benchmarking the energy

			performance to define the "best industry practices" and various cost-effective ways of improving performance.
Poland		√	
Romania		√	
Spain	√		Researches, reports from prestigious sources, for example, from USEPA or EEA or scientific articles
Sweden	√		One important source when evaluation what represents BAT for the industrial sector in question can be energy consumption data from other operators in the sector. Sometimes there are also data available in research programmes
United Kingdom	√		Reviewing of position by analysis of published literature: few technical developments in the science and practice of energy efficiency are found.

4.6.3.2 National sector-wise evaluation of BAT concerning energy efficiency

Some countries (Austria, Czech Republic, Latvia, Denmark, the Netherlands, UK) reported about national sector-wise evaluation of IPPC industries concerning energy efficiency in form of research studies, guidelines and other information.

Table 4.4. National sector-wise evaluation of energy efficiency

	Yes	No	Notes
Austria	√		The Federal Environment Agency published two studies on energy efficiency in selected industrial sectors.
Bulgaria		√	
Cyprus		√	
Czech Republic	√		Two studies on energy efficiency in industries: 1) Confrontation technological level of Czech Republic and European coking plants. 2003; 2) The issues of energy efficiency and the integrated permits of food industry and farming sector. 2007
Denmark	√		Guidelines from The Energy Agency
Finland		√	
Germany		√	
Greece	√		
Latvia	√		Study for Emission Trading Scheme in Latvia, 2004
The Netherlands	√		Sector-wise evaluation on an ad hoc basis.
Norway	√		A study of possible energy efficiency potentials in the food industry in 2007.
Poland	√		
Romania			No information available
Spain		√	
Sweden		√	
United Kingdom	√		Reviewing of this information and recently is updated reporting requirements through resource efficiency programme.

5. REPORTING AND SUPERVISION

5.1 Monitoring and reporting systems of energy use and efficiency, parameters, frequency

Monitoring and reporting systems of energy use and energy efficiency

A precondition for consistent monitoring and reporting are specific and enforceable permit conditions relating to energy efficiency. In most of the countries energy efficiency issues are addressed as part of the environmental inspections if they are relevant and if there are specific permit conditions.

Many countries (Spain, Sweden, Latvia, Cyprus, Finland, Poland, Romania, the Netherlands) have monitoring and reporting systems of energy use and efficiency in place, e.g. for large combustion plants as well as waste incineration plants. Depending on the permit conditions, annual reports contain information on energy use, monitoring and energy efficiency investments. Monitoring and reporting of CO2 emissions is also carried out according to E-PRTR and ETS if the companies are above the threshold.

In some countries detailed records (fuel and electricity consumption) are required for other types of energy intensive installations. More detailed information is provided by Romania that requires for cement production with a production capacity over 500 tons per day: on-line monitoring of the flue gas emissions from clinker kiln; monthly reporting of the results, continuous measurements and daily internal evaluation of the energy specific consumption and annual report regarding energy efficiency (confidential data), as a part of the annual environmental report (see www.arpmbc.ro).

In some countries (Bulgaria, Czech Republic) the permit contains relevant monitoring and reporting conditions and operators continuously record energy savings and report annually to the Regional Authority.

Other countries use specific energy efficiency reporting systems:

- In Finland voluntary energy saving schemes have separate reporting systems. However, results of these reporting systems can be used by competent environmental authorities as well.
- In United Kingdom there are a number of different energy efficiency schemes which have their own reporting requirements e.g. for trading schemes and government incentives designed to stimulate energy efficiency.

Parameters monitored

Many countries determine energy use and energy efficiency parameters that have to be monitored:

Table 4.5. Monitoring Parameters

Country	Parameters
Austria	quantities of thermal and electrical energy produced and measurement of CO_2 emissions
Finland	energy and fuel use, energy production, investments
Norway	kWh/t produced
the Netherlands	energy consumption and CO_2 emissions
Romania	flue gas parameters (CO, CO_2, O_2, temperature, gas-flow etc) – as a relevant indicator for the combustion efficiency; specific

	consumption of thermal energy; electricity specific consumption; total consumption of thermal energy or electricity, etc;
Spain	pollutant emissions to the air and fuel consumption
Greece	temperature, flow rates, etc.
Cyprus	Type of fuels/fuel and electricity consumption
Sweden	Energy consumption

Monitoring frequency

Only some countries reported about the frequency of monitoring:

- UK presents that monitoring is carried out by continuous monitors and other surrogate techniques and is available for inspection.
- Romania answers that it depends on the specific requirements of the installation: on-line monitoring of certain parameters; daily, monthly, quarterly, yearly measurements.
- In Sweden the operator monitors the consumption of energy continuously. Moreover, there is an obligatory legal request for operator self-monitoring that also covers energy issues.

Receiver of report

Many countries (Austria Bulgaria Germany Denmark, Finland, Norway, the Netherlands, Sweden, Spain, Poland, Greece, Cyprus, Latvia, Romania) submit yearly/monthly reports to the enforcement, licensing or supervising authority and/or ministry.

Table 4.6: Receiver of reports

Country	Authority	Frequency
Austria	Mostly district authority	Case specific
Bulgaria	Enforcement authority	annually
Czech Rep.	Regional authority	annually
Germany	Permitting authority	annually, 4 years
Denmark	Ministry of Environment/Municipality	at least annually
Finland	Supervising authority	annually
Norway	Pollution Control Authorities	annually
The Netherlands		annually
Romania	Regional Environmental Protection Agencies	different
Sweden	Competent authority	annually
Spain	Ministry of Industry	annually

Operators in Romania forward reports to the Regional Environmental Protection Agencies (the IPPC permitting authorities) and to the local (county) structures (commissariats) of the National Environmental Guard (the control authority in the field of environmental protection). According to the specific content of each report type, the reporting frequency is different (as exemplified above): monthly, quarterly, yearly.

5.2 Inspection or audit systems and follow-up

5.2.1 Follow-up required by the authorities

Inspections in all EU countries could be divided into three groups: routine or non-routine inspections and third – only if conditions are violated (reactive).

In the United Kingdom regular inspections are carried out, in Sweden Cyprus and Norway - as appropriate. In Czech Republic, Romania and Bulgaria the follow up is required too. In Spain follow up is required, but in case of large combustion installations, energy efficiency is followed up by Spanish government while regional governments inspect the compliance with the "autorización ambiental integrada" (integrated environmental) permit conditions. In Finland missing information in annual reports has to be supplied.

5.2.2 Energy efficiency in inspection or audit systems

In this context inspections are carried out by the competent inspection authorities. Some companies use internal audits to audit themselves. They can use external audits as well. They are performed by independent external organisations. They are used to determine whether or not the company complies with ISO standard or EMAS. Audits must be objective, impartial and independent. The audit process must be systematic and documented (see ISO 9000).

In most of the countries energy efficiency issues are addressed as part of the environmental inspections if they are relevant and if there are specific permit conditions relating to energy efficiency. Different attitude to inspection and energy audit systems in connection with environmental requirements is observed in EU member states. Only some countries have specific requirements for energy audits (Romania, Greece and Spain). In Greece there is a newly estabished Energy Inspection authority which will focus on energy efficiency issues.

In Denmark, Finland and UK energy audits are prepared due to requirements of other schemes (e.g energy efficiency agreements). In Denmark individual companies within specified branches can make voluntary energy saving agreements with the Energy Agency. The agreement will include an energy management. In connection with the agreement there will be an intern audit by the operator. Inspection will be made by the competent authority. In Finland Motiva Oy has developed sector-specific guidelines for energy efficiency audits.

In Romania it is stipulated in the IPPC permit that a company under the provisions of IPPC Directive must perform an audit for energy efficiency. The audit frequency differs according to the "energy specificity" of the installations: yearly, each two/ three years, but an internal evaluation of energy efficiency has to be yearly performed and the results of it have to be included in the Annual Environmental Report. The National Environmental Guard, through its central, regional and local structures, carries out regular inspections in the IPPC installations.

6. OTHER INSTRUMENTS FOR ENERGY EFFICIENCY

There are other schemes placed in the Member States to reach energy efficiency in the industrial sectors. Most of the obligations have been set in United Kingdom where under all the schemes described below all installations are covered, except for domestic homes that are covered through building standards. Some of the countries have voluntary energy saving schemes (Finland, Denmark, Sweden and the Netherlands), CO_2 taxes (Latvia, Norway, Poland, Sweden, Finland and Denmark), climate-protection-agreements (Germany) and other instruments for participants of emission trading scheme and others.

6.1. Voluntary energy saving agreements in Member States

The Netherlands

It is widely accepted that for the evaluation of energy efficiency developments in the manufacturing industry, the use of physical indicators of activity, either stand-alone or in combination with monetary indicators, contributes to a better understanding of energy efficiency developments. In the Netherlands, physical indicators of activity have also been used intensively for energy efficiency monitoring within the framework of the two generations of Long Term Agreements (LTA-1 and LTA-2) and the Covenant Benchmarking energy efficiency. These agreements have been the main governmental policies to promote energy efficiency in the industrial sector in the Netherlands since the 1990s, supported by various other policy instruments summarised in Table 1 [11].

Table 6.1. Policy instruments in the Netherlands for industrial energy efficiency in the period 1995 - 2003

Instrument	Period
Covenants	
LTA-1	1989-2000
LTA-2	2001-2012
LTA-3 (non-ETS enterprises) and LEE (ETS enterprises)	2001-2020
Benchmarking covenant	1999-2012
Environmental Action Plan	1991-2000
Regulations	
Energy in the environmental permit	1993-present
Fiscal instruments	
Energy investment tax cut (EIA)	1997–present
Variable tax deduction (VAMIL)	1991–present
Regulating energy tax (REB)	1996–present
Subsidies	
Tenders industrial energy savings (TIEB)	1989–1999
Subsidy scheme for energy conservation techniques (BSET)	1993–1996
CO_2 reduction plan	1997–2002

The first generation of LTAs on energy efficiency (LTA-1) were voluntary agreements contracted in the period 1992–1996 between the Dutch government and particular sectors of industry. The LTA-1 aimed to increase the energy efficiency of a sector by 20% between 1989 and 2000. The objective was reached already in 1999 [13]. In 1999, the energy-intensive plants consuming more than 0.5 PJ per year signed the Covenant Benchmarking energy efficiency. In this covenant, running until 2012, they committed themselves to be among the world leaders in energy efficiency as soon as possible, but not later than 2012, resulting in required energy efficiency improvements

that vary per sector and depend on e.g. the current distance to the world top and the expected development of the world top over time.

Part of the less energy-intensive industries (companies with a yearly primary energy consumption below 0.5 PJ) signed the second generation of LTAs (LTA-2), also running until 2012. The LTA-2 does not focus on energy efficiency only, but also on other energy topics such as sustainable product development and renewable energy. Companies participating in the LTA-2 are obliged to set up an energy efficiency plan, which for a period of 4 years describes the goals with respect to energy efficiency improvements. For the first period (2001–2004), the goals for the 16 participating industrial sectors varied between 2.4% and 46% total efficiency improvement (0.8–14.3% per year), including improvements due to the use of renewable energy and sustainable product development.

LTA3 is the third version of this very successful instrument. The LTA-1 focused primarily on process efficiency. The second generation added energy savings outside of the immediate production processes, that is to say throughout the entire product chain. LTA3 presents an expansion, intensification and broadening of the LTA2 agreement. While LTA2 ran until 2012, the conversion to LTA3 implied an extension of the term until 2020. The aim of LTA3 is an average total efficiency improvement of 2 percent up to and including 2020: a very ambitious target. As a result, energy savings demand even more attention than before. In order to keep up this pace in the long run, preliminary studies and road maps were introduced into LTA3. These studies involve the formulation of a strategic outlook in which the sectors show which (non-) technological aspects are important to be able to meet the working hypothesis of a 50 percent improvement in energy efficiency in 2030 compared to 2005. After signing LTA3, companies started formulating energy efficiency plans.

The monitoring methodologies of the LTA-1, LTA-2 and LTA-3 and the Covenant Benchmarking are very strict and are based on confidential production and energy use data of the participating companies [14]. For the industrial sector, mainly physical production data are used. In the LTA-1 monitoring reports, improvement in the energy efficiency indicator determined by top-down indicators is explained by bottom-up overviews of implemented energy efficiency improvement measures. LTA-1 was reviewed by different studies from which the study conducted in 2002 [12] assessed the monitoring methodologies and also the quantitative results of the LTA-1 until 1996. They concluded that the monitoring methodologies of the LTA-1 were insufficiently transparent and recommended independent supervision and verification of the LTA monitoring results.

Study results [11] show that since the middle of the 1990s, significant energy efficiency improvements have been made in the industrial sectors studied. The efficiency improvements vary widely from sector to sector, from year to year and also between the various types of energy use distinguished (electricity, fuels/heat and non-energy use).

Finland

Finland has a long history from yearly 1990s in using voluntary energy saving agreements. Experiences from previous schemes have been used when setting up the newest Energy Efficiency Scheme which is targeted for years 2008-2016.

The Energy Efficiency Agreements play a key role in the implementation of the EU energy efficiency related legislation, especially the EU Energy Services Directive (2006/32/EC) and the EU climate action and renewable energy package.

The Energy Efficiency Agreements cover the major part of the energy use and production in Finland; industry, municipals, transport and buildings. All these sectors have their own agreements including all horizontal elements like auditing and reporting as well as sector specific features.

Companies which sign the Agreement are committed to do several things. They must commit in continuous improvement of the energy efficiency. This requires constant control of one's energy usage, as well as systematic monitoring and consideration energy efficiency in practices, procurements, uptake and maintenance. Everything is founded on the commitment by the management. Energy intensive industries have to implement Energy Efficiency System which is the way to do everything in a systematic way. An essential issue in the system is that all companies have to do an energy audit. Only companies doing this may get some subsidies from the state to do some energy efficiency investments.

A company joining the agreement scheme has to submit an annual report on the previous year's energy use and any related efficiency measures. The information is collected in a joint Internet-based monitoring system. The monitoring system provides information for the Ministry of Employment and the Economy, the industry associations, and organizations participating in the Agreements. Information is not provided to the environmental permit or supervision authorities because they are not partners in the Energy Efficiency Scheme.

Denmark

The Danish scheme on voluntary agreements on energy efficiency in industry was launched in 1996 as part of the Green Tax Package [15]. The main objective of the Package was to reduce the CO_2 and SO_2 emissions from trade and industry. The Package comprised three policy instruments:

- Green taxes
- Subsidies
- Voluntary agreements (VAs).

The VA scheme mainly targets companies with relatively high energy use. The CO_2 tax and the VAs are differentiated between three energy applications:

- heavy process,
- light process and
- space heating.

All companies with heavy processes are eligible to enter a VA. Heavy processes include e.g. greenhouse heating and the production of foodstuffs, sugar, paper, cement and glass. Companies with light processes can enter a VA if the company’s tax on energy use exceeds 4% of the company’s value added.

The VAs contain a number of key elements which form the basis for the energy efficiency activities:

- the energy management system;
- the energy audit/energy flow screening;
- the special investigations;
- the energy saving projects (investments).

The initiatives to improve energy efficiency and reducing energy consumption have been modified in the beginning of 2010 due to law changes. The approach is anyway in principle the same. It is concluded that: Over a number of years, the production industries in Denmark have managed to stabilise their energy consumption and maintain considerable growth at the same time. The reason is that saving energy makes sense – also from a financial point of view. There are still considerable opportunities for companies to enhance their energy efficiency on a profitable basis. Danish industry itself estimates that Danish companies could, on average, and to their financial advantage, reduce their bills by approximately 15 per cent if they used energy more efficiently.

Sweden

Sweden has taxes, charges and voluntary systems which are not alternative provisions, but parallel.

On 1 January 2005, the Programme for Improving Energy Efficiency Act , PFE, came into force. The programme is intended to increase energy efficiency and create opportunities for tax exemption. On 1 July 2004, the tax on industrial process-related electricity was raised from SEK 0 to SEK 0.005 per kWh .The tax rise represents the adoption of the EU's Energy Tax Directive.

The Directive gives energy-intensive companies in manufacturing industry, which are subject to the tax, the opportunity of being granted tax exemption on their electricity consumption if they take action to improve their energy efficiency. The government has, therefore, adopted a programme of improving energy efficiency in energy-intensive companies (PFE), with the carrot of reduced taxation. Participation in the programme is voluntary, and is open to energy-intensive manufacturing companies which meet certain criteria.

The aim of the programme is partly to increase the efficiency of energy use among companies which consume large amounts of energy, i.e. energy-intensive companies. One measure to improve efficiency is to introduce an energy management system (EMS), the energy equivalent of an environmental management system.

The programme period for participating companies is five years. During the first two years of the programme period, the company must introduce and obtain certification for a standardized energy management system. An energy audit and analysis are used to generate a list of measures to improve energy efficiency, which the company then implements during the remaining three years of the programme. Since PFE focuses on electricity-efficiency, the priority is to list measures to improve the efficiency of electricity use.

Germany

In November 2000 the Federal Government reached a Climate-protection agreement with German industry . German industry has declared its willingness to reduce the specific greenhouse-gas emissions by 35 % by 2012. Associations of 19 industrial branches have signed the agreement (representing 80 % of energy consumption in the German producing industry). For monitoring the fulfilment of this agreement, the Federal Government has reached consensus with German industry regarding a systematic, transparent monitoring system. Regulations of the Ecological Tax Reform of 1999 were combined with the agreements. Manufacturing sector companies are granted so-called "net-burden compensation" ("Spitzenausgleich"). The European commission has approved the current net-burden compensation until 2012, if German industry meets the targets it

committed to in the climate-protection agreement of 9 November 2000. The German Federal Government plans that from 2013 on the net-burden compensation shall only be granted if certain targets are achieved and Energy Management Systems acc. to EN 16001 are established. [At the moment there are discussions that the "net-burden-compensation" may be totally abandoned due the economic crisis.]

The evaluation carried out in 2008 by Rheinisch Westfälisches Institut für Wirtschaftsförderung (RWI) showed that German industry had already met the target.

Norway

An industrial energy efficiency network ("Bransjenettverket") was established already in 1989 as an initiative of the Ministry of Petroleum and Energy (MPE) to stimulate efficiency measures. It started to play a more important role for identifying and realizing the industrial energy saving potential in the mid-90s. Network members can obtain grants to analyse the potential for energy savings and benchmark their performance against other companies. Approximately 900 companies are members and about 600 of mainly small and medium size enterprises (SMEs) have since 1996 got information and financial support for lowering their energy consumption by a variety of measures. The outcome of all these efforts has now been evaluated ex-post and the cost-efficiency can be estimated [16].

6.1.1. Effect of voluntary agreements concerning energy efficiency

A quantitative evaluation of the effect of voluntary agreements on energy efficiency can only be made if targets are well defined and the instruments include defined rules for monitoring and reporting. In some countries this was / is the case (see the Netherlands, Germany and Sweden). Sometimes the results are treated as confidential data. This causes problems concerning statistics. Another point of criticism is that voluntary agreements are often made with industrial associations and not with individual companies. In this case the fulfilment of targets is evaluated sector wise and not in relation to the individual site. So it is not guaranteed that all companies of a sector successfully have carried out measures. However the sector may have reached the target, because enough companies were very ambitious. Consequently it is not possible to conclude that companies generally fulfil the requirement of efficient use of energy on the basis of the results of voluntary agreements.

6.2. Environmental Management Systems

On global, EU and national level there are different environmental management systems in place that are established by companies or organisations on a voluntary bases. Concerning energy efficiency the most important systems in Europe are EN 16001, ISO 14001 and EMAS. Their influence and importance will be discussed in this chapter.

The future ISO 50001 will establish a global framework for industrial plants, commercial facilities or entire organizations to manage energy. Targeting broad applicability across national economic sectors, the standard could influence up to 60 % of the world's energy use. ISO 50001 will probably be adopted within a year and in the summer of 2011 at the earliest.

6.2.1 EN 16001 Energy management systems

The EU standard EN 16001 that came into force in June 2009 specifies requirements for an energy management system to enable an organisation to develop and implement a policy and objectives

which take into account legal requirements and information about significant energy aspects. It is intended to apply it to all types and sizes of organisations irrespective of any geographical, cultural and social conditions.

EN 16001 can be used independently or integrated with any other management system. The structure of this standard is similar to the structure of ISO 14001. It is based on methodology known as Plan-Do- Check- Act (PDCA).

The implementation of an energy management system specified by this standard is intended to result in improved energy efficiency. Therefore, it is based on the premise that the organisation will periodically review and evaluate its energy management system to identify opportunities for improvement and their implementation. The rate, extent and timescale of this continual improvement process are determined by the organization in the light of economic and other circumstances. Consequent implementation of the energy management system is intended to result in improvements in energy performance.

EN 16001 requires the organization to:

- Establish an appropriate energy policy;
- Identify the energy aspects arising from the organization's activities;
- Identify applicable legal requirements and other requirements to which the organization subscribes;
- Identify priorities and set appropriate energy objectives and targets;
- Establish a relevant structure and programmes to implement the policy and achieve objectives and meet targets;
- Facilitate planning, control, monitoring, preventive and corrective actions, auditing and review activities to ensure both that the policy is complied with and that the energy management system remains appropriate.

As the standard EN 16001 is a very young one its effect on energy efficiency and energy use in companies could not yet be evaluated in this project. It remained unclear whether it is attractive for companies. Being a European standard EN 16001 may be not very attractive for companies with worldwide activities. They would rather prefer an ISO 14001 management system.

6.2.2 ISO 14001 versus EN 16001

The International Organization for Standardization published the environmental management standard ISO 14001 in 1996 which has been acknowledged world wide and can be used by all kinds of organisations. The Finish report identified that concerning energy efficiency the co-ordination of activities related to ISO 14001 standard and the permit and inspection aspects might lead to simplification of procedures and reduction of workload. A precondition for that was that certifiers pay more attention to energy efficiency issues. The doubtful legal status of voluntary systems was seen as a main problem. The situation has not changed since 2002.

Many companies are certified according to ISO 14001. Energy management is one criteria of the complex environmental management system of the 14001 standard, which does not prescribe any methods or measures. The ISO/PC 242 committee has analysed the requirements of EN 16001 in comparison to ISO 14001. It is shown that if companies have established a 14001 environmental management system basically they fulfil already many aspects of EN 16001. But especially they have to

- add the improvement of energy use and efficiency to their environmental policy
- define energy management as an important item
- define the boundaries of the energy management system
- define the targets for improvement in energy efficiency
- identify the most energy intensive parts and the possibilities for improvements
- determine measures and monitoring procedures.

The brochure "DIN EN 16001: Energy Management Systems in Practice – A Guide for Companies and Organisations" (www.umweltdaten.de/publikationen/fpdf/4013.pdf) contains a comparison table with details in Annex B.

6.2.3 EMAS and EN 16001

EMAS (Eco-Management and Audit Scheme) is a voluntary environmental management system (EMS), under which companies and other organizations evaluate, manage and continuously improve their environmental performance. EMAS has been operative since 1995. The latest revision (EMAS III) came into effect on 11 January 2010. Currently, more than 4,400 organisations and approximately 7,600 sites are EMAS-registered.

The core elements of EMAS are performance, credibility and transparency. By carrying out annual updates of environmental policy targets and actions to implement and evaluate them, registered organisations continually improve their environmental performance and provide evidence that they comply with all environmental legislation that is applicable to them. Third-party verification from independent auditors significantly adds credibility to registered organisations by guaranteeing the value of both the actions taken and the disclosed environmental information. Transparency is generated by the environmental statement, which an organization is required to provide as part of EMAS registration. The communication tool makes available to the public information on the environmental impact and performance of the organization.

The requirements of ISO 14001 are part of EMAS and EMAS covers a wider range than ISO 14001. Thus for companies with an EMAS certificate it is even easier to fulfil the EN 16001 requirements. In Germany it will be possible for operators of EMAS sites to obtain the EN 16001 certificate with their EMAS validation if energy efficiency is a core item in their improvement program.

6.2.4 Effect of environmental management systems on energy efficiency

ISO 14001 and EN 16001 are voluntary environmental management systems. Consequently companies are not obliged to publish the data of improvements due to the establishment of a management system. Operators of EMAS sites publish their environmental statement. But as measures and requirements for monitoring and reporting are not standardised it is not possible to estimate the quantitative effect of these systems on energy efficiency.

6.3 Energy Taxes, Grants and Subsidies

6.3.1 General considerations

Taxes

Most of the Member States participating in this project have energy taxes (except Latvia and Poland). However, in those countries where the taxes are used, they are not necessarily created with environmental purposes in mind.

According to IPCC Fourth Assessment Report: Climate Change 2007 [5] tax reductions are frequently used to stimulate energy savings in industry. Some examples of energy efficiency tax policy are following:

- In the **Netherlands**, the Energy Investment Deduction (Energie Investeringsaftrek, EIA) stimulates investments in low-energy capital equipment and renewable energy by means of tax deductions (deduction of the fiscal profit of 55% of the investment).
- In **France,** investments in energy efficiency are stimulated through lease credits. In addition to financing equipment, these credits can also finance associated costs such as construction, land and transport.
- **Romania** has a programme where imported energy-efficient technologies are exempt from customs taxes and the share of company income directed for energy efficiency investments is exempt from income tax.

There is limited experience with taxing industrial GHG emissions. France instituted an eco-tax on a range of activities, including N_2O. It provides a supplementary incentive for emissions reductions.

Germany has an eco-tax on the consumption of electricity, gasoline, fuel oil and natural gas. Revenues are recycled to subsidize the public pension system. The tax rate for electricity consumed by industrial consumers is € 0.012/kWh. Very large consumers are exempt to maintain their competitiveness. The impact of this eco-tax on CO_2 emissions is still under discussion.

In **Sweden** the PFE program is intended to increase energy efficiency and create opportunities for tax exemption. On 1 July 2004, the tax on industrial process-related electricity was raised from 0 to 0.005 SEK/kWh. The tax rise represents the adoption of EU's Energy Tax Directive. This directive gives energy-intensive companies in manufacturing industry, which are subject to the tax, the opportunity of being granted tax exemption on their electricity consumption if they take action to improve their energy efficiency. The government has, therefore, adopted PFE, with the carrot of reduced taxation. Participation in the program is voluntary, and open to energy-intensive manufacturing companies that meet certain criteria.

There are different ways how **UK** deals with energy efficiency. First of all they have industry that is focused under IPPC and there is specific application in national policy and these companies are introduced with that.

Three alternative energy tax systems are created in UK

- First is in connection with IPPC installations and they are subjects in emission trading scheme (ETS);

- if installations are not contained by ETS then they are covered by climate change agreement (CCA);
- if energy consumers are not under CCA then they are under Carbon Reduction Commitment (CRC).

The Climate Change Levy (charge) in UK is a tax on the use of energy in industry, commerce and the public sector and additional support for energy efficiency schemes and renewable sources of energy. But the Government recognises the need for special consideration to be given to the position of energy intensive industries given their energy usage, the requirements of the Integrated Pollution Prevention and Control regime and their exposure to international competition. Consequently, the Government has provided an 80% discount from the levy for those sectors that agree challenging targets for improving their energy efficiency or reducing carbon emissions. The UK Climate Change Levy applies to industry only and is levied on all non-household use of coal (0.15 UK pence/kWh or 0.003 US$/kWh), gas (0.15 UK pence/kWh), electricity (0.43 UK pence/kWh or 0.0085 US$/kWh) and non-transport LPG (0.07 UK pence/kWh or 0.0014 US$/kWh). Industry includes agriculture and the public sector. Fuels used for electricity generation or non-energy uses, waste-derived fuels, renewable energy, including quality CHP, which uses specified fuels and meets minimum efficiency standards, are exempt from the tax. The UK Government also provided an 80% discount from the levy for those energy-intensive sectors that agreed to challenging targets for improving their energy efficiency. Climate change agreements have now been concluded with almost all eligible sectors.

CRC is a mandatory emissions trading scheme aimed at reducing UK carbon dioxide emissions and improve energy efficiency. It will affect up to 5,000 organisations, primarily large businesses and public sector organisations including government departments, universities, retailers, banks, water companies, hotel chains and local authorities. Those organisations using at least 6,000 MWh/year settled on the half-hourly market, representing an annual electricity bill of around £1 million, will have to participate in a mandatory 'cap and trade' scheme. Each year this will require them to monitor and report their energy use and surrender sufficient allowances to cover their carbon dioxide (CO_2) emissions.

Subsidies

Subsidies are used to stimulate investment in energy-saving measures by reducing investment cost. Subsidies to the industrial sector include: grants, favourable loans and fiscal incentives, such as reduced taxes on energy-efficient equipments, accelerated depreciation, tax credits and tax deductions.

Many developed and developing countries have financial schemes to promote industrial energy savings. A World Energy Council (WEC) survey in 2004 showed that 28 countries, most in Europe, provide grants or subsidies for industrial energy efficiency projects. Subsides can be fixed amounts, a percentage of the investment (with a ceiling), or be proportional to the amount of energy saved.

Subsidies for industry may lead to energy savings and corresponding GHG emission reductions and can create a larger market for energy efficient technologies. Whether the benefits to society outweigh the cost of these programmes, or whether other instruments would have been more cost-effective, has to be evaluated on a case-by-case basis. A drawback to subsidies is that they are often used by investors who would have made the investment without the incentive. Possible approaches for improving their cost-effectiveness include restricting schemes to specific target

groups and/or techniques (selected list of equipment, only innovative technologies, etc.), or using a direct criterion of cost-effectiveness.

Investors particularly during after the economical crisis in different EU countries tend to have a weak capital basis. Development and finance institutions therefore often play a critical role in implementing energy efficiency and emission mitigation policies. Their role often goes beyond the provision of project finance and may directly influence technology choice and the direction of innovation.

6.3.2 Effect of energy tax systems and subsidies on energy efficiency

The previous chapter described how Member States use tax systems and subsidies as incentives for companies and organisations to reach national targets. Some of them have made evaluation of the results and published them. It is acknowledged that tax and subsidy systems may be very effective and successful. But there is no EU wide systematic and quantitative evaluation available that could have been used for this IMPEL project.

6.4 Influence of Emission Trading Scheme on energy efficiency

6.4.1 General considerations

EU ETS is the world's first international company-level 'cap-and trade' system of allowances for emitting carbon dioxide (CO_2) and other greenhouse gases. The first period of ETS (2005-2007) was a so-called "learning phase" for checking up the implementation of the Kyoto protocol in 2008-2012. The core sectors included in the ETS are:

- Energy installations with rated thermal input above 20 MW,
- Mineral oil refineries,
- Coke ovens,
- Industries producing and processing ferrous metals,
- Mineral industries (including cement, lime, glass and ceramic production with different assigned capacities), and
- Pulp and paper industries.

In 2012 the scheme will be joined by aviation sector but from 2013 as well capture other energy intensive industrial sectors, transport and geological storage of CO_2 will be included.

2003/87/EC does not include any provisions on energy efficiency for installations. Although there are no implications from EU, the scheme itself has a great impact on energy efficiency in installations, because the reduction of CO_2 emissions can be mainly reached by implementation of different measures like:

- fuel switch (replacing fuel with a higher emission factor by fuel with a lower emission factor);
- improving the energy efficiency of boiler and/or other installations at the company;
- improving the energy efficiency of the processes at the company;
- improving the arrangement of the heating network to reduce heat loss;
- improving consumers' energy efficiency.

As the results of the "learning phase" showed, more stringent emission caps had to be set for all Member States. This was done by European Commission already for the second phase (2008-

2012) and had a good impact on the EU emission allowances (EUA) price (see figure 6.1) as higher prices of allowances lead to greater incentives for energy efficiency at the installation level.

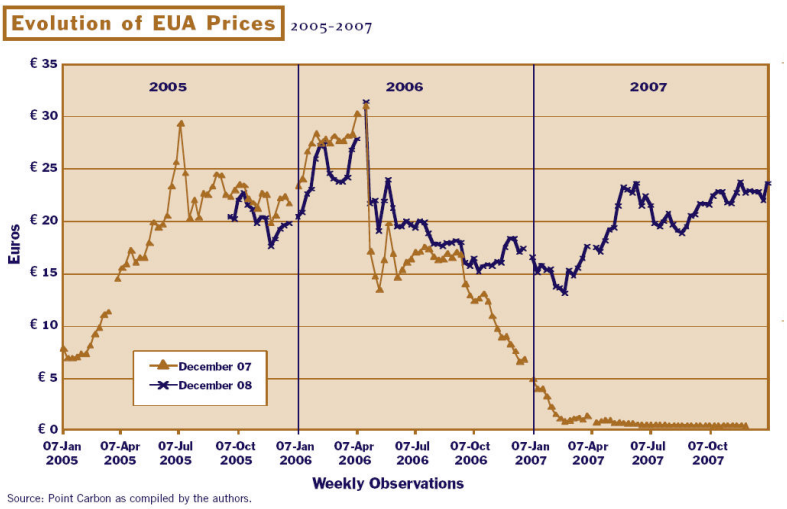

Figure 6.1. Evolution of EUA Prices [6]

European Commission has worked out more severe rules for the third ETS phase (2013-2020).

6.4.2 Consideration concerning quantitative effects of ETS on energy efficiency

Targets concerning the reduction of CO2 emissions are normally combined with measures of improvement in energy efficiency. Up to now there is no systematic evaluation of the quantitative effects of the measures available that could have been used for this project.

7 CONCLUSIONS

7.1 General conclusions

1. Energy efficiency is one of the key topics on the European level. It is one of the main approaches to reduce CO_2 emissions and increase the competitiveness. The potential to improve energy efficiency in industrial sectors is high and there are many tools available to increase it. One tool to improve energy efficiency in industry is to better utilize the requirement to use BAT to reach energy efficiency in the IPPC permit procedure.

2. The European Commission has published different sector specific guidance documents and horizontal guidelines on energy efficiency to improve the conditions for issuing the IPPC permits (BREF documents). Some of the countries have adopted them directly, others like United Kingdom and Finland have developed national specific guidelines for applicants to assist in the process. With the new IED Directive the BAT conclusions in the BREF documents will become more binding for all Member States.

3. The first evaluation of the energy efficiency in the environmental permits was performed 8 years ago. Since that only minor changes have occurred in the consideration of energy efficiency issues in permitting and supervising procedures. In Member States that recently joined to European Union energy efficiency has not been at the countries' political level among the main priorities.

7.2 Main challenges

The results of this evaluation of the current situation in Member States indicated 7 main challenges. These challenges should be addressed in the nearest future to increase the quality of the IPPC permits and to increase energy efficiency:

a. Legal background – In the current IPPC directive it is not explicitly stipulated how energy efficiency is defined or should be addressed. However it is quite clear that BAT shall be used not only for emissions and waste prevention and minimisation but also for energy efficiency. The situation will be slightly improved in the future IE directive but not clearly enough. The requirements have been implemented in different ways in Member States. As a special case, realisation of combined heat and power is not always possible because of local reasons (e.g. whether the use of surplus heat is possible). Some (existing) industrial sites cannot fulfil this goal; however the application cannot be rejected on the basis of suboptimal site conditions; requirements for land-use planning (e.g. local, regional energy concepts) could be an option.
b. Sector specific BREFs have until now not been concrete and precise enough regarding energy efficiency - although the horizontal BREF on energy efficiency techniques includes all major techniques to implement energy efficiency. However, to date this document has not been utilized much. The horizontal BREF on energy efficiency has been used mainly as a check list. It would be more user-friendly to incorporate the energy efficiency issues in the sector specific BREFs. The Guidance document on collection of data for the BREF work, IEF 20/4, emphasizes the need to improve the collection of data on energy aiming at BAT conclusion given e.g. as GJ/tonne of product.
c. Lack of expertise in technical energy efficiency in authorities and companies. – Many authorities do not have the technical expertise to check the energy efficiency in detail.

This means that operators must be very clear and comprehensive in their discussions with authorities and in their applications for permits.

d. Lacking or only occasional cooperation between energy and environmental authorities or organisations which have specific knowledge in energy efficiency;
e. Permit revision – In many Member States there is no general approach to handle the item of energy efficiency in the permit revision. The individual legal background in the countries sometimes makes it impossible to integrate energy efficiency in the procedure. The individual legal background in the countries sometimes makes it difficult to consider energy efficiency in the procedure. It remained unclear whether in case of alterations of installations the overall efficiency will be assessed or only the efficiency of the changed part.
f. System boundaries and benchmarking - Defining the "system" and the resulting benchmark is a challenge. There is lot of information related to that in the ENE BREF. However: Due to site specific solutions it might at least for some installations be burdensome to compare the performance with available benchmarks. Concerning the system boundary the legal definition of an IPPC installation is rather narrow and does not extend to third parties
g. Unclear influence of environmental management systems, voluntary agreements, tax- and more profoundly, the overlap with the EU Emission Trading Scheme on energy efficiency - It is often assumed that the effects of measures carried out under these systems produce improvements in the energy efficiency performance of sites to such a degree so that it might not be necessary to deal with the item of energy efficiency in IPPC permitting and inspection. It remained open whether these systems are effective enough to fulfil the requirements of the IPPC directive concerning energy efficiency.

7.3 Good practice

Many of the items of the report of the IMPEL project "Energy Efficiency in Environmental Permits" (finalised in December 2002) were examined again in 2010. The identified measures which could lead to a satisfying, consistent and transparent consideration of energy efficiency issues in permitting procedures were supplemented by updated information and other good practices were added. Besides, a key source for good practice, (i.e. more precisely BAT), is the BREF Energy Efficiency where many of the elements below are described as general BAT.

1. Guidance

Good practice identified by the project is the existence of horizontal and sector specific guidance on energy efficiency issues. National guidance is available in Finland and in United Kingdom where a revision of the guidance is under development. Although the horizontal BREF on energy efficiency was considered hard to use this document provides a good check list.

2. Beforehand discussions and application forms

As indicated already in the Finnish report, good practice would be that application forms with specific requirements concerning information on energy efficiency should be available. In Finland such application form is available (see Annex of the Finnish report). However this good practice has not been taken into account in other Member States. The template has to be updated.

3. Energy efficiency in permit conditions

According to Article 9 (1) of the IPPC Directive the permit has to include all measures necessary for compliance with the requirements of the Directive which inter alia is that energy is used efficiently by applying BAT. Workshop discussions showed that the participating countries have different systems for compliance monitoring in place. Some countries check the performance of installations by way of voluntary agreements between certain institutions and operator, frequent site visits and improvement programmes while other systems are based mainly on the permit and its conditions. Countries of the latter could therefore benefit from clear permit conditions regarding energy efficiency which can be monitored and enforced. This need was also expressed during the workshop.

The answers to the questionnaire made clear that at least in some countries more or less specific permit conditions regarding energy efficiency are a common practice. Examples for such permit conditions which could be regarded as a set of general minimum requirements for permit conditions are: monitoring of fuel and energy consumption, performance of recurring energy audits including submission of the evaluation to the competent authority, or alternatively establishment of an energy efficiency management system, obligation to draw up action plans/improvement programmes. They represent examples on the way towards finding BAT based measures for reaching energy efficiency.

4. Monitoring and supervision

Responses to the questionnaire and workshop discussions confirmed the approach expressed already in the Finnish report, namely, that adequate self monitoring is essential. Concrete permit conditions or agreements make it easier for authorities to check compliance.

Performance of energy audits and implementation of energy efficiency management systems is considered as part of BAT. Some countries (e.g. UK, Norway) require the implementation of such a system.

5. Co-operation

Information on energy efficiency is available from numerous sources and organisations. The problem is how the competent authorities can use this knowledge efficiently. Approaches to overcome this obstacle exist in some countries by way of involving energy agencies or other authorities in the permitting procedures depending on national structures.

6. Voluntary measures and incentives

Environmental management systems normally include the development of a company policy for energy efficiency. The EN 16001 provides useful guidance in this field. Some countries (e.g. some federal states in Germany) pay subsidies for initial energy efficiency checks. Others like UK, Finland, Denmark, Sweden use tax systems to encourage companies to improve energy efficiency on their sites.

7. Training

Generally the knowledge of environmental authorities in the field of energy efficiency seems not to have basically improved since 2002. It is good practice to provide good working material and training for environmental authorities. The project showed that this has still to be improved.

7.4 Proposals for further IMPEL work

During the project the following proposals for further work of IMPEL were identified

- Development of a template for documents and data required regarding energy efficiency in the permit application
- Workshop on assessment of the application documents regarding energy efficiency (for new and existing installations) and development of permit conditions based on BREFs and other sources using a sector specific approach (e.g. food sector, metal processing sector, paper sector, chemical sector, waste treatment plants).
- Training course for dealing with energy efficiency in permitting and inspection.
- Integrating the discussion on energy efficiency into other sector specific IMPEL-projects, e.g. pig farming.
- Explore the overlap between EU ETS and IPPC which may negate the requirement to deal with energy efficiency under IPPC.

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Annex I

IMPEL-Project

Energy Efficiency in Permitting and Inspection

Compilation of answers to the questionnaire

Organisation

	national	regional	other	permitting	inspection	
Austria	X					1)
Bulgaria	X			X		
Cyprus	X			X	X	
Reg. Office Centr. Bohemia		X		X		
Czech Env Inspectorate	X				X	
Denmark	X			X	X	
Finland		X		X		
Berlin (DE)		X		X	X	
Hessen (DE)		X		X	X	
Kiel (DE)		X		X	X	
Bezreg Köln (DE)		X		X	X	
Greece	X				X	
Latvia	X			X	X	
The Nether-lands InfoMil	X			-	-	3)
The Nether-lands DCMR						
Norway	X			X	X	
Poland		X			X	
Romania		X			X	
Spain		X		X	X	
Sweden	X					2)
United Kingdom	X			X	X	

1) The Federal Ministry of Agriculture, Forestry, Environment and Water Management is not responsible for permitting and inspections but is involved in policy issues, legislative background and guidance issues.

2) *Key tasks for the Swedish EPA are to present proposals for environmental policy and legislation to the Swedish Government and ensure that environmental policy decisions are implemented.*
Moreover, we i.a. participate in individual permitting procedures when important environmental and principal issues are discussed.
Permits are issued either by the five environmental courts (for larger installations) and by 21 regional authorities (for medium sized installations) We have a guiding role what concerns supervision/inspections.

3) Inforamtion on permitting and inspection

Working field

	Permit-ting	Inspec-tion	IPPC-installations	Energy intensive non-IPPC	SME	
Austria	See note 1)	See note 1)	See note 1)	See note 1)	See note 1)	
Bulgaria	X		Most of the industrial activities on Bulgarian territory. The number of IPPC	Even though we don't have a specific defi-	Yes, if they are in the scope of the	

			installations currently is about 380 (it slightly changes over time)	nition of the term “energy intensive” our directorate deals with activities in the scope of EIA directive, SEVEZO directive, Environmental liability	above mentioned legislation or subjects of the chemicals’ legislation which is also implemented through our directorate	
Cyprus	X	X	1.1, 2.5 (a), 2.6, 3.1, 3.5, 5.1, 5.2, 5.4, 6.4(a), 6.5, 6.6	no	no	
Reg. Office Centr. Bohemia	X		Energy industries (1.1, 1.2), production and processing of metals (2.5.b), chemical industry (4.1, 4.2, 4.4, 4.5), waste management (5.1), other activities (6.4 b)	--	3 to 250 employees	
Czech Env Inspectorate		X	2601 IPPC installations	--	medium and large	
Denmark	X	X	All IPPC	--	only IPPC	
Finland	X		1.1, 2.1, 2.6, 4.1, 4.2, 5.2, 5.4, 6.1	Small combustion plants	Small com-bustion plants, SME in mentioned IPPC categories	
Berlin	X	X	all that are at the same time installations under the German immission control act (BImSchG) (apart from power plants)	Yes, apart from power plants all non-IPPC inst. that need a permit acc. to the German immission control act (BimSchG)	?	
Hessen	X	X	whole Annex I	yes	yes	
Kiel	See note 2)	See note 2)	Chemical industry	yes	yes	
Bezreg Köln	X		Large combustion plants 1.1, waste incineration plants 5.1, 5.2 Chemical plants 4.1, 4.2, 4.3, 4.4	?	Biogas plants	
Greece		X	Hellenic Environmental Inspectorate has competency for any installation / activity / work that is subject to environmental legislation (need for environmental permit)	yes	yes	
Latvia	X		1.1. LCPs with thermal input > 50 MW 2.3. Inst. for processing of ferrous metals: 2.4. Ferrous metal foundries with production capacity > 20 t per day 2.5. Inst. b) for smelting, incl. alloyage, of non-ferrous metals, incl. recovered products, (refining, foundry casting, etc.) with melting capacity > 4 t per day for Pb and Cd or 20 t per day for all other metals. 2.6. Inst. for surface treatment of metals and	Yes, non IPPC combustion plants, metals processing plants	Environmental permitting system in Latvia comprises all enterprises that have any polluting	

			plastic materials using an electrolytic or chemical process where the volume of the treatment vats exceeds 30 m3. 3.1. Inst. for the production of cement clinker in rotary kilns with a production capacity > 500 t per day or lime in rotary kilns with production capacity > 50 t per day or in other furnaces with a production capacity > 50 t per day. 3.5. Inst. for manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain, with a production capacity > 75 t per day, and/or with a kiln capacity > 4 m3 and with a setting density per kiln > 300 kg/m3. 4.1. (b;)Chemical installations for the production of basic organic chemicals 4.5. Inst. using a chemical or biological process for the production of basic pharmaceutical products. 5.1. Inst. for the disposal or recovery of hazardous waste as defined in the list ref. to in Article 1(4) of Dir. 91/689/EEC, as defined in Annexes II A and II B (operations R1, R5, R6, R8 and R9) to Directive 2006/12/EC and in Council Directive 75/439/EEC of 16 June 1975 on the disposal of waste oils [2], with a capacity > 10 t per day. 5.2. Ins. for incineration of municipal waste (household waste and similar commercial, industrial and institutional wastes) with a capacity > 3 t per hour. 5.4. Landfills receiving more than 10 tonnes per day or with a total capacity exceeding 25000 tonnes, excluding landfills of inert waste. 6.6. Installations for the intensive rearing of poultry or pigs		activity, including SME
The Nether-lands InfoMil					
The Nether-lands DCMR					
Norway	X		Energy industries 1 Production and processing of metals 2 Mineral industry 3 Chemical industry 4 Waste management 5 Other activities Other activities 6 pulp and paper 6.1 textiles incl. dying of fibres 6.2 Tanning of hides and skins 6.3 Slaughterhouses 6.4 a production of food products from animal and vegetable raw materials 6.4 b treatment and processing of milk 6.4 c Disposal and recycling of animal carcases and animal waste 6.5 Intensive rearing of poultry and pigs 6.6 Surface treatment of substances, objects or products using organic solvent 6.7		
Poland		X	1; 2.4; 2.6; 3.4; 3.5; 3.6; 6.1; 6.9	Yes – similar to list	Yes, see list

Romania		X	*1.1. Combustion installations with a rated thermal input exceeding 50 MW.* *3.1. Installations for the production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day;* *4.1. (b, h, i, j) Chemical installations for the production of basic organic chemicals: alkydic resins, polymers synthetic fibres, synthetic rubbers (polyurethans), dyes and pigments;* *4.2. (a, b) Chemical installations for the production of basic inorganic chemicals: ammonia, nitric acid;* *4.3. Chemical installations for the production of phosphorous-, nitrogen- or potassium-based fertilisers (ammonium nitrate, Ca-ammonium nitrate, urea)* *6.1. (b) Industrial plants for the production of paper and board with a production capacity exceeding 20 tonnes per day;* *6.2. Plants for the pre-treatment or dyeing of fibres or textiles where the treatment capacity exceeds 10 tonnes per day;*	- *Installation for surface treatment of metals using electrolytic process (where the volume of treatment vats is less than 30 m^3)* *- Industrial plant for the production of metallic tanks and containers*	*Yes, in the fields of:* *- Food products from animal raw materials (other than milk)* *- Flexo-printing, using VOC-s* *Processing of herbs for nutritional supplements and drugs production*
Spain	X	X	All Annex I IPPC Directive, but 6.6	Yes, for instance, combustion installations under 50 MW in the energy sector	Yes, any activity that needs a pollutant emmissions permit due to our national law: Ley 34/2007
Sweden	X		Pulp and Paper, 6.1 in Annex I of IPPC	no	no
United Kingdom	X	X	all	yes	If Annex I activities e.g. chemicals

1) The Federal Ministry of Agriculture, Forestry, Environment and Water Management is not responsible for permitting and inspections but is involved in policy issues, legislative background and guidance issues.
2) The Ministry of Agriculture, Environment and Rural Areas is not directly working in the firld of permitting and inspections but is responsible for giving guidance and advice. It supervises the work of the subsequent authorities.

1. Legal Background
1.1 Implementation of the IPPC Directive
1.1.1 How have the provisions on energy efficiency of the IPPC directive been implemented in your legislation (Articles: 3(1d), 6(1), 9(1) and 9(3)? (If nothing has changed since the final report 2002 please note: ***see 2002***)

Article 3 (1d)

	Act/Directive	Please specify the wordings of the provision
Austria	Sectoral laws (Section 77a of the Trade and Industry Act, Section 43 (3) 2 of the Waste Management Act, Section 121 of the Mining Code, Sec. 5 (3) 2 of the Clean Air Act for Steam Boilers)	The respective texts stick very closely to the Directive's wording.
Bulgaria	Environment protection act; Ordinance on the conditions and the order for the issuance of IPPC permits	All requirements of the IPPC directive are transposed and their implementation is ensured by one and the same legal acts and guidance documents – Environment protection act, Ordinance on the conditions and the order for the issuance of IPPC permits, guidance on – scope of the application, scope of the permit, procedure to issue a permit. Wording is following the wording of the directive and is compatible with the national legal background.
Cyprus	-Integrated Pollution Pre-vention and Control Laws of 2003 to 2008, Article 6.1 (e). - Water Pollu-tion Control Laws of 2002 to 2009, Article 20.2(d).	For the effective enforcement of the above Laws, competent Minister defines the appropriate conditions within the permit, so as energy and natural resources be used efficiently.
Reg. Office Centr. Bohemia	Act 76/2002	The Authority provides in binding conditions of operation steps for the economic use of raw materials and energy
Czech Env Inspectorate	Act 76/2002 paragraph 13 article 4(f)	Decision about requisition-"The Authority set up about binding conditions f) Provisions for using energy and commodities efficiently"
Denmark	See 2002	See 2002
Finland	See 2002	See 2002
Berlin	§ 5 (1) Nr. 4 BImSchG	§ 5(1) Nr. 4 BImSchG: Installations subject to licensing shall be established and operated in such a way that, in order to ensure a high level of protection for the environment as a whole energy is used sparingly and efficiently The draft Climate Protection Act of Berlin does not only focus on big companies, but on ecological and energy efficient renovation of buildings in general.
Hessen	---	----
Kiel	§ 5 par. 1 Nr. 4	See Bezreg Köln

	BImSchG; § 4a, 4d .. of 9. BImSchV; …§ 7 of 13 . BImSchV (Large Combustion Plants) § 8 of 17. BImSchV (Waste Incineratiom)	
Bezreg Köln	§ 5 Abs. 1 Nr. 4 BImSchG; § 4a 9. BImSchV; …§ 7 13 . BImSchV § 8 17. BImSchV (Waste Incineratiom)	Article 5 Obligations of Operators of Installations subject to licensing Installations subject to licensing shall be established and operated in such a way that, in order to ensure a high level of protection for the environment as a whole 4. economical and efficient energy use is ensured To fulfil the obligation to take precautions pursuant to the first sentence Nr 2 above, installations subject to licensing that are covered by the Greenhouse Gas Emissions Trading Act shall comply with the requirements laid down in section 5 and section 6 subsection (1) of the Greenhouse Gas Emissions Trading Act. For such installations, requirements on the limitation of greenhouse gas emissions shall be admissible only where they serve the purpose of ensuring compliance with section 5 subsection (1) no. 1 by preventing any harmful effects on the environment from arising in the sphere of influence of the installation in question. For such installations, the objective of compliance with the obligation to ensure efficient energy use must not lead to requirements related to carbon dioxide emissions based on combustion or other processes in the installation that go beyond the requirements laid down in the Greenhouse Gas Emissions Trading Act. **§ 4d ninth BImSchV** **Data on Energy Efficiency** The documents must contain information about planned measures for economical and efficient energy use, especially information about possibilities for achieving high energy efficiency and high rate of utilisation, for minimisation of energy loss and use of generated energy **Article 7 thirteenth BImSchV (LCP)** **Combined heat and power generation** When a plant is constructed or substantially changed the operator has to implement requirements for combined heat and power generation unless this is technically impossible or disproportional. This has to be verified to the competent authority. **Article 8 Seventeenth BImSchV (Waste Incineration)** **Heat recovery** Unless transferred to third parties, the heat generated by the incineration or co-incineration process shall be used in the operater's facilities to the extent this is technically feasible and can be reasonably expected given the type and location of the plant. If the heat generated is not transferred to third parties or not used in the operator's facilities and is sufficient to generate an electric terminal output of more than 0,5 megawatts, such heat shall be used for electricity generation.
Greece		
Latvia	Law on	"to prevent or, if it is impossible, reduce the utilisation of non-

	pollution. IPPC is fully implemented in Latvia	renewable natural resources and energy when performing polluting activities"
The Nether-lands InfoMil	Wet Milieubeheer art. 8.12b	
The Nether-lands DCMR		
Norway	Pollution Control Act, section 16, 1st paragraph	**§ 16 Conditions laid down in a permit** Further conditions may be laid down in a permit issued in accordance with this Act or regulations pursuant thereto, to prevent pollution from resulting in damage or nuisance, and to promote efficient use of energy used in or generated by an installation.
Poland	Polish Environmental Act (PEA) Art. 166.1	
Romania	*Governmental Ordinance no. 152/ 2005, approved by the Law no. 84/2006, concerning Integrated Pollution Prevention and Control, art.3 (1 – d)*	*"The Competent Authority takes all the measures in order that, during the operation of the installation, the operator follows the basic general principles, so that ….. (d) the energy is efficiently used".*
Spain	Ley 16/2002, de 1 de julio, de prevención y control integrados de la contaminación Real Decreto 509/2007, de 20 de abril, por el que se aprueba el Reglamento para el desarrollo y ejecución de la Ley 16/2002, de 1 de julio, de prevención y control integrados de la contaminación.	Ley 16/2002, 4.1.c: Se utilice la energía, el agua, las materias primas y otros recursos de manera eficiente.
Sweden	*By the Environmental Code of 1999, below "the Code"*	*In essence, BAT shall be used to conserve energy as long as it cannot be deemed unreasonable. See below the wording in sections 3, 5 and 7 in chapter 2 of the Code.* ***Section 3.*** *Persons who pursue an activity or take a measure, or intend to do so, shall implement protective measures, comply with restrictions and take any other precautions that are necessary in order to prevent, hinder or combat damage or detriment to human health or the environment as a result of the activity or measure. For the same reason, the best possible technology shall be used in connection with professional activities.*

		Such precautions shall be taken as soon as there is cause to assume that an activity or measure may cause damage or detriment to human health or the environment. ***Section 5*** *Persons who pursue an activity or take a measure shall conserve raw materials and energy and reuse and recycle them wherever possible. Preference shall be given to renewable energy sources.* ***Section 7*** *The rules of consideration laid down in sections 2 to 6 shall be applicable where compliance cannot be deemed unreasonable. Particular importance shall be attached in this connection to the benefits of protective measures and other precautions in relation to their cost. The cost-benefit relationship shall also be taken into account in assessments relating to total defence activities or where a total defence measure is necessary. A decision reached in accordance with the first paragraph must not entail infringement of an environmental quality standard referred to in chapter 5.*
United Kingdom		We deal with the IPPC Directive through referential drafting. Our national legislation which requires regulation of IPPC activities is the Environmental Permitting Regulations. Schedule 7 of the EPR requires that we comply with all relevant articles of the Directive. This includes energy efficiency. For example: **5.**—(1) The regulator must exercise its relevant functions so as to ensure compliance with the following provisions of the IPPC Directive— (a) Article 3, ignoring the words "provide that the competent authorities" contained in the first sentence of Article 3(1);

Article 6 (1) as far as b) and h) are concerned (i.e. energy used or generated and measures planned to use energy efficiently)

		Please specify the wordings of the provision
Austria	Trade and Industry Act (Article 353a), Waste Management Act (Section 39 (3), other sectoral laws	Article 6 (1) of the IPPC Directive was implemented more or less word by word e.g. in the Trade and Industry Act (Article 353a), the Waste Management Act (Section 39 (3)) and the other sectoral laws.
Bulgaria		All requirements of the IPPC directive are transposed and their implementation is ensured by one and the same legal acts and guidance documents – Environment protection act, Ordinance on the conditions and the order for the issuance of IPPC permits, guidance on – scope of the application, scope of the permit, procedure to issue a permit. Wording is following the wording of the directive and is compatible with the national legal background.
Cyprus	Water Pollution Control Laws of 2002 to 2009, Article 9.1(b and h).	In order to be issued a Waste Discharge Permit to surface waters, ground or underground, an application must be submitted to the competent Minister, including the following information: – the raw and auxiliary materials, other substances and the energy used in or generated by the installation - further measures under the Water Pollution Control Laws, planned to comply with general principles of the basic obligations of the facility operator.

Reg. Office Centr. Bohemia	Decree 554/2002 of Act 76/2002	Chapter 7 “Describe commodites and supplies and other commodites and energy, which are used in installation/will use and are product/will product”
Czech Env Inspectorate	Decree 554/2002 of Act 76/2002	Chapter 7 “Describe commodites and supplies and othercommodites and energy, which are used in installation/will use and are product/will product”
Denmark	See 2002	See 2002
Finland	See 2002	See 2002
Berlin		In the application documents the operator has to describe the planned measures for economical and efficient energy use concerning the project. Otherwise the application is incomplete and will be rejected.
Hessen	--	---
Kiel	Ordinance on permit procedure (9. BImSchV) § 4 a Information about the installation and its operation	(1) For the decision acc. to article 20 or 21 the application documents must contain information about … 4. the energy generated and used in the installation
Bezreg Köln	Ordinance on permit procedure (9. BimSchV) § 4 a) Information about the installation and its operation	(1) For the decision acc. to article 20 or 21 the application documents must contain information about … 4. the energy generated and used in the installation its helpful to understand the whole process and to check the relevant obligation to minimize energy consumption
Greece		
Latvia	Law on pollution	Rules of Cabinet of Ministers on procedure how to apply for and issue environmental permit for A, B and C category polluting activities
The Nether-lands InfoMil	Inrichtingen en vergunningenbesluit (IVB) Art. 5.1	
The Nether-lands DCMR	---	
Norway	Pollution regulations, chapter 36 The proces-sing of applications pursuant to the Pollution Control Act	**§ 36-2. Content of an application for a permit** An application in accordance with sections 11 and 29 of the Pollution Control Act shall include: 1. name and address of the applicant 2. a clear description of the property or properties where the activity takes place, 3. a description of the status of the property in relation to any site plans of zoning plans, 4. a description of the installation, the nature and scope of activities, and the technology chosen 5. a list of raw and auxiliary materials 6. a description of the power sources for, power consumption of and power generated by the activity 7. a description of all emissions to air, water and land that may be caused by the activity and of the effects these emissions may have, 8. an environmental impact assessmentof the site where the activity is located 9. a list of interests that can be presumed to be affected by the activity, including a list of parties to be notified in accordance with sections 36-4 and 36-5. 10.a description of measures to limit waste generation, including opportunities for recovery and other handling of waste, 11. a description of techniques for preventing or limiting pollution and the harmful effects of pollution, 13. measures planned to monitor emissions into the environment, 14. reference to administrative decisions or statements by public

		bodies that have reviewed the case 15. a summary of the impact assessment, where concluded, including a list of the key options that have been assessed by the applicant, The applicant shall describe each point to the extent relevant to each activity. When applying for an amendment to a permit, it is sufficient for the application to contain information on the points that have been amended in relation to the actual conditions that applied when the existing permit was issued. The application shall iclude a summary of details referent to above. The competent authority may issue supplementary provisions regarding the form and content of the application and, if necessary for the processing of the case, demand supplementary information in addition to that listed in points 1 to 15 above.
Poland	PEA Art. 188.3/4	
Romania	A. *Governmental Ordinance no. 152/ 2005, approved by the Law no. 84/2006, concerning Integrated Pollution Prevention and Control, art.5 (1 – b,h), completed by* B. *Ministerial Order (MEF) no.36/ 2004, concerning the approval of the General Technical Guidance for the issuing procedure of the Environmental Integrated Permit (EIP) – especially the following chapters/ articles:* *9.6. The process variables monitoring* *10.2. Operational aspects* *10.7. The main activities* ***15.** Energy – mainly:* 15.2. *Specific energy consumption* *15.4. Measures for energy efficiency – identification and set-up* *15.5. Description of the proposed measures for the energetical efficiency improvement – including 15.5.1. – Techniques for energy efficiency*	A. *"The application for IEP shall include the following data and information: … the description of the raw and auxiliary materials, other substances, the type of the energy used in or generated by the installation; …. the description of the measures planned in order to comply with the general principles"* B.*(*see the followings*)* *9.6. The process variables monitoring – "Some of the process variables can have a potential environmental impact; those variables shall be identified and appropriately monitorized…. e.g. the energy consumption on the installation and on the particular consumption points, according to the energetic plan".* *10.2. Operational aspects – "In the application for IEP, the owner of the activity/ the operator shall describe the practical way for complying with the demands, regarding each of the following aspects of the activities: …. the utilisation of the energy"* *10.7. The main activities – "The operator shall present a process description for all the activities and for the depollution and control equipments, so that the competent authority for the environmental protection can understand the process in detail, in order to evaluate the options proposed by the operator and to analyse the improvement possibilities. ….. In order to sustain these elements, the following information shall be considered, according to the type of the installation/ activity: …. the information regarding the materials and energy balances. ….. The owner of the activity/ the operator shall corroborate this information with the BAT-s demands and to motivate every option and every deviation from the norms presented in this Technical Guidance".* *15. Energy* (briefly) *"Techniques of technological management are necessary to be included, in order to decrease the energy consumption at the source and at the consumers, by the improvement of the efficiency energy conversion per product unit". (*Several examples regarding the decrease of the energy consumption are given*).* *15.2. Specific energy consumption – "The operator shall define and calculate the specific energy consumption of the activity(ies), based on the primary energy consumption for products or inputs and he shall compare the actual specific consumption with the limit-values for its sector, identified in the sector's guidance (where available). This information will be yearly reported to the competent authorities for the environmental protection."* *15.4. Measures for energy efficiency – identification and set-up – "The operator shall present a plan for energy efficiency" (*The main content of such a plan is mentioned*).* *15.5. Description of the proposed measures for the energy efficiency improvement – 15.5.1. – "Techniques for energy efficiency:* ▪ *Heat recovery from different processes steps* ▪ *Minimisation of the energy used for drying processes, by using high efficiency dehydration techniques* ▪ *Water consumption diminishing and utilisation of the water in closed cycles* ▪ *Appropriate insulating* ▪ *The appropriate location of the installation, so that the pumping distances are reduced to the minimum* ▪ *The optimizing of the electronic control of the engines* ▪ *The utilization of the used cooling water (having high*

		temperature) for heat recovery purposes ▪ *The utilization of the belt-conveyers instead of pneumatic ones (but, with big attention paid to the potential higher fugitive emissions)* *Continuous processes instead of batch ones"*
Spain	Ley 16/2002, de 1 de julio, de prevención y control integrados de la contaminación	Ley 16/2002, 12.1. a: ....Recursos naturales, materias primas y auxiliares, sustancias, agua y energía empleadas o generadas en la instalación....Las demás medidas propuestas para cumplir los principios a los que se refiere el artículo 4 de la Ley...
Sweden	*Chapter 22 of the Code*	***Section 1*** *An application in an application case shall be made in writing. It shall contain:* *1. any information, drawings and technical descriptions that are* *necessary for an assessment of the nature and scope of the activity or measure;* *.* *3. any information that is necessary for an assessment of compliance with the general rules of consideration laid down in* *chapter 2;*
United Kingdom		See explanation above

Article 9 (1)

		Please specify the wordings of the provision
Austria	Section 77a (1) Trade and Industry Act, Section 121 (1) Mining Code, Section 5 (3), 16 (1) Clean Air Act for Steam Boilers Section 43 (3) b (6) Waste Management Act	Section 77a (1) of the Trade and Industry Act, Section 121 (1) of the Mining Code, Sections 5 (3) and 16 (1) of the Clean Air Act for Steam Boilers and Section 43 (3) b (6) of the Waste Management Act provide that inter alia the efficient use of energy is a prerequisite for the permit.
Bulgaria		See above explanation
Cyprus	Integrated Pollution Prevention and Control Laws of 2003 to 2008, Article 6(3) and 6(4).	Article 6(3): Where an environmental quality standard requires stricter conditions than those achievable by the use of the best available techniques, all necessary additional measures for compliance with relevant quality standard are included in the permit. Article 6(4): The competent authority ensures that the permit includes all measures necessary for compliance with the requirements of granting permits, in order to achieve a high level of protection for the environment as a whole by means of protection of the air, water and land.
Reg. Office Centr. Bohemia	Act 76/2002	The Authority used best available techniques for formulation the binding conditions of operation, taking into account the technical characteristics of equipment, its location and local environmental conditions, but without requiring that operator had use of any specific technique or technology
Czech Env Inspectorate	Act 76/2002 Paragraph 14	Method of set up binding conditions plant – set up emission limits (pollutant mentioned in appendix No. 2, for set up binding conditions plant especially emission limits the authority getting on BAT (in term of appendix No.3 of Act 76/2002 (in term of appendix No.4 of IPPC

		directive))
Denmark	See 2002	See 2002
Finland	See 2002	See 2002
Berlin		The application documents must contain a description of planned measures for economical and efficient energy use of the installation, otherwise the application is incomplete and will be rejected.
Hessen	--	---
Kiel	See above	The permit writer must understand the whole process and check the relevant obligations to minimize energy consumption.
Bezreg Köln	See above	
Greece		
Latvia	Law on pollution	Law on pollution Rules of Cabinet of Ministers on procedure how to apply for and issue environmental permit for A, B and C category polluting activities
The Nether-lands InfoMil	In the act "Wet milieubeheer" under chapter 8 (article 8.11)	In an environmental permission that's granted to a company, is the applying of BAT (as for the use of energy efficient techniques) taken into account by the government (local authority or the provincal authority).
The Nether-lands DCMR	---	
Norway	--	See comments concerning Article 3 (1d)
Poland	PEA Art 202	
Romania	A. *Governmental Ordinance no. 152/ 2005, approved by the Law no. 84/2006, concerning Integrated Pollution Prevention and Control, art.9 (1) completed by* B. *Ministerial Order (MEF) no.36/ 2004, concerning the approval of the General Technical Guidance for the issuing procedure of the Integrated Environmental Permit (IEP) – Chapter 4.*	A. *"IEP is issued by the competent authority, according to the conditions in art.3 and 18, in order to secure a high level of protection for the environment, as a whole, in compliance with the regulations regarding the air, water and soil quality." (*The provisions in the art. 9 (2) – 9 (5), describe more detailed the above idea*).* B*. The Chapter 4 of the General Technical Guidance is referring to "The Responsibilities of the Competent Authority for the Environmental Protection" during the whole permitting procedure. The content of each procedure step is described, in the spirit of the provision* A. (see above) *A scheme of the permitting procedure main steps is given in the sub-chapter 4.1.*
Spain	Ley 16/2002, de 1 de julio, de prevención y control integrados de la contaminación	Ley 16/2002, 11.1.b: La finalidad de la autorización ambiental integrada es: a) Establecer todas aquellas condiciones que garanticen el cumplimiento del objeto de esta Ley por parte de las instalaciones sometidas a la misma, a través de un procedimiento que asegure la coordinación de las distintas Administraciones públicas que deben intervenir en la concesión de dicha autorización para agilizar trámites y reducir las cargas administrativas de los particulares. b) Disponer de un sistema de prevención y control de la contaminación, que integre en un solo acto de intervención administrativa todas las autorizaciones ambientales existentes en

		materia de producción y gestión de residuos, incluidas las de incineración de residuos municipales y peligrosos y, en su caso, las de vertido de residuos; de vertidos a las aguas continentales, incluidos los vertidos al sistema integral de saneamiento, y de vertidos desde tierra al mar, así como las determinaciones de carácter ambiental en materia de contaminación atmosférica, incluidas las referentes a los compuestos orgánicos volátiles.
Sweden	*the Code*	*Chapter 22:* ***Section 25*** *A judgment granting a permit for an activity shall, where appropriate, include provisions concerning:* *1. the period of validity of the permit;* *2. the purpose, situation, scope, safety and technical design of the activity;* *3. supervision, inspections and checks;* *4. liability for compensation or for implementing preventive measures and the manner of payment;* *5. the obligation to pay charges or fees;* *6. any conditions that are necessary to prevent or limit any harmful impact or other detriment;* *7. any necessary conditions concerning the handling of chemical products in connection with the activity, where such handling may be detrimental to the external environment;* *8. any necessary conditions concerning waste disposal and recycling and reuse where handling, recycling or reuse may be detrimental to the external environment;* *9. any necessary measures relating to the management of land, water and other natural resources;* *10. any necessary measures relating to after-treatment and the furnishing of securities;* *11. any necessary measures to prevent major chemical accidents and limit the consequences of the accidents for human health and the environment,* *12. the period during which claims relating to unforeseen damage may be submitted;* *13. any loss of water or other assets that holders of permits referred to in chapter 31, sections 22 and 23 must accept without compensation; and* *14. litigation costs.* *If the permit relates to works for water operations, the judgment shall specify the time within which these works shall be completed. The maximum period shall be ten years. The time limit for commencement of the environmentally hazardous activities shall be stated.* *The environmental court may leave it to the discretion of the supervisory authority to lay down conditions of minor importance.*
United Kingdom		See explanation above

Article 9 (3)

		Please specify the wordings of the provision
Austria	Section 23 (2) Clean Air Act for Steam Boilers	(we think the question rather concerns subparagraph 4) Answer relating to subparagraph 3: Section 23 (2) of the Clean Air Act for Steam Boilers Answer relating to subparagraph 4: Austria did not make use of the possibility not to impose requirements relating to energy efficiency.
Bulgaria		See above explanation
Cyprus	This provision is not imple-	

	mented in our legislation	
Reg. Office Centr. Bohemia	Act 76/2002	Emission limits for substances, vibration, noise, heat or other forms of non-ionizing radiation relate to place where they are emitted from the installation
Czech Env Inspectorate	Act 76/2002 Paragraph 14 Article 2	"Method of set up binding conditions plant" – set up emission limits (pollutant mentioned in appendix No. 2 (Act 76/2002))
Denmark	See 2002	See 2002
Finland	no	no
Berlin	---	---
Hessen	---	---
Kiel	§ 5 par. 1 Nr. 4 BImSchG	To fulfil the obligation to take precautions pursuant to the first sentence Nr 2 above, installations subject to licensing that are covered by the Greenhouse Gas Emissions Trading Act shall comply with the requirements laid down in section 5 and section 6 subsection (1) of the Greenhouse Gas Emissions Trading Act. For such installations, requirements on the limitation of greenhouse gas emissions shall be admissible only where they serve the purpose of ensuring compliance with section 5 subsection (1) no. 1 by preventing any harmful effects on the environment from arising in the sphere of influence of the installation in question. For such installations, the objective of compliance with the obligation to ensure efficient energy use must not lead to requirements related to carbon dioxide emissions based on combustion or other processes in the installation that go beyond the requirements laid down in the Greenhouse Gas Emissions Trading Act.
Bezreg Köln	--	---
Greece		
Latvia	Law on pollution	Law on pollution Rules of Cabinet of Ministers on procedure how to apply for and issue environmental permit for A, B and C category polluting activities
The Nether-lands InfoMil	In the act "Wet milieubeheer") under chapter 16.1.	Companies who participates in the emission trading scheme (ETS) have no permissions in there enviromental permit. ETS companies participate in the long-term agreement on energie-efficiency for ETS enterprises.
The Nether-lands DCMR	---	
Norway	Pollution regulations - § 36-8. Basic principles in the processing of permits	**IV. Conditions for permits for the activities listed in Appendix I** § 36-8 Basic principles in the processing of permits When processing applications for permits and when determining the conditions attached to them, cf. section 36-9, the competent authority shall base its decision on the following principles: 1. All the appropriate preventive measures are taken against pollution, in particular through application of the best available techniques, cf. Appendix II to this chapter, 2. No significant pollution is caused. 3. the dicharge of prioritizes chemicals that are hazardous to health and the environment shall be reduced or eliminated completely in so far as this is technically and economically possible. 4. The production of waste shall be avoided as far as possible. If waste is produced, it shall be recovered and, where that is not technically and economically possible, it shall be disposed in such a way that avoids or reduces any impact on the environment. 5. Energy is used efficiently. 6. The necessary measures are taken to prevent accidents and limit their consequences. 7. the necessary measures are taken upon definitive cessation of

		activities to avoid any pollution, risk and return the site of operation to a satisfactory state. 8. Information on the emission status of the activity and the environmental impact of the emissions shall be made available to the public.
Poland	PEA Art. 202	
Romania	*Governmental Ordinance no. 152/ 2005, approved by the Law no. 84/2006, concerning Integrated Pollution Prevention and Control, art.9 (6)*	*"For the installations in which the activities included in the Annex 1, point.6.6 take place, the emissions limit-values mentioned in the art. 9 (3) – 9 (5) shall take into account the practical aspects, characteristic for this category of installations."* (Annex 1, point.6.6 in G.O. no.152 /2005 includes installations for the intensive rearing of poultry or pigs, with a capacity exceeding: 40 000 places for poultry, 2 000 places for production pigs (over 30 kg), or 750 places for sows).
Spain	Ley 16/2002, de 1 de julio, de prevención y control integrados de la contaminación	Ley 16/2002, 22.2: En el caso de instalaciones sujetas a la Ley 1/2005, de 9 de marzo, por la que se regula el régimen del comercio de derechos de emisión de gases de efecto invernadero, la autorización no incluirá valores límite para las emisiones directas de aquellos gases especificados en el anexo I de dicha Ley, a menos que sea necesario para garantizar que no se provoque ninguna contaminación local significativa. Lo previsto en el párrafo anterior no se aplicará a las instalaciones excluidas temporalmente del régimen de comercio de derechos de emisión de gases de efecto invernadero, de conformidad con lo previsto en la disposición transitoria cuarta de la citada Ley.
Sweden	*The Code, chapter 16 section 2 and chapter 22 section 25*	*The provisions are in essence a translation of the provision in the IPPC-directive*
United Kingdom		Article 9(3) of the IPPCD (2008) includes the allowance for Member States to choose not to impose requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site that are listed in annex 1 of the ETS directive (This does not affect MWI or HWI which are excluded from ETS). The UK have not taken up this option, specifically requiring us to ignore the relevant paragraphs in the directive in the EPR Regs (Schedule 7 paragraph 5(2) (a) EPR 2010).

1.1.2 Do you have alternative obligations to requirements in permitting (e.g. CO_2-taxes, obligations to implement certain management systems)?

	Yes/no	Please describe the alternatives
Austria	yes	For projects requiring an Environmental Impact Assessment (EIA) the application must include a climate and energy concept (see in detail answer to 3.2.1.a). Note: Section 17(2) of the EIA Act states that emissions of polluting substances shall be controlled in accordance with the state of the art. CO_2 is considered to be a polluting substance in the sense of this wording, therefore measures to reduce this emissions are required (e.g. energy efficiency measures).
Bulgaria	yes	As part of the permit conditions the operators are required to implement the basic aspects of an environmental management system
Cyprus	yes	All IPPC permits include an additional provision of implementing Environmental Management System without the obligation to be

		certified by EMAS or ISO 14000 as well as Risk Management System. However, this provision is a part of the permit. It is not an alternative obligation.
Reg. Office Centr. Bohemia	no	---
Czech Env Inspectorate	no	---
Denmark	yes	Individual companies within specified branches can make voluntary energy saving agreements with the Energy Agency. Denmark has CO2-taxes but not as part of the permit and they are not alternatives.
Finland	yes	Voluntary energy saving schemes, which contain compulsory reporting obligations
Berlin	?	UBA
Hessen	yes	Emission Trading Regulations according to the EU Directive for specific plants. Environmental management systems with recquirements due to energy efficiency are voluntary.
Kiel	yes	Apart from participation in European Emission Trading Scheme there is an ecological tax system. It is independant. There is no relation to the permit procedure but it influences improvements in energy efficiency in a positive way.. On 9 November 2000, the Federal Government made a climate-protection agreement with German industry. German industry has declared its willingness to reduce the specific greenhouse-gas emissions by 35 % by 2012. For monitoring the fulfillment of this agreement, the Federal Government has reached consensus with German industry regarding a systematic, transparent monitoring system. Regulations of the Ecological Tax Reform of 1999 were combined with the agreements. Manufacturing sector companies are granted so-called “net-burden compensation” (“Spitzenausgleich”). The European commission has approved the current net-burden compensation until 2012, if German industry meets the targets it committed to in the climate-protection agreement of 9 November 2000. The German Federal Government plans that from 2013 on the net-burden compensation shall be granted if certain targets are achieved and Energy Management Systems acc. to EN 16001 are established. [At the moment there are discussions that the “net-burden-compensation” may be totally abandoned due the economic crisis.] On top of that: The Act on the Preservation, Modernisation and Development of Combined Heat and Power Generation (CHP Act, KWKG) of 2002 has the following aims: - supporting the operation of (old and new) existing installations - modernisation of existing installations (requirements for operators) - subsidies for small and very small installations. Agreement between the Federal Government and German industry, calling for reduction of CO2 emissions and for promotion of combined heat and power (CHP) generation, and complementing the climate-protection agreement of 9 November 2000: the associations agree to reduce CO2 emissions via construction and modernisation of CHP installations, by a total of 20 – 30 million tonnes of CO2 by the year 2010 in comparison to the relevant level of the base year 1998.
Bezreg Köln	yes	Act on the Auctioning of Emission Allowances (TEHG)
Greece	yes	1. Substitution of liquid fuels by natural gas in the Attica region’s industrial installations 2. Obligatory application of Environmental management system (EMS) to medium and high impact industrial installations

		3. In order to obtain an operational permit, new established industrial units are obliged to submit, to the Ministry of Environment, Energy and Climate Change, an energy study that has to be approved. The study includes a detailed energy balance and calculations of the average special energy consumption (per raw material or product unit).
Latvia	yes	Emission Trading Regulations according to the EU Directive for specific plants
The Nether-lands InfoMil	no	---
The Nether-lands DCMR	?	---
Norway	yes	A condition in the permit for installations are normally: **Energy efficiency** The Company shall maintain a system for the continuous assessment of measures which can be implemented to attain the best possible energy efficient production in its plants **CO2-taxes** Tax on mineral oil products since 1991.
Poland	yes	CO_2 taxes
Romania	yes	*Governmental Ordinance no. 152/ 2005, approved by the Law no. 84/2006, concerning Integrated Pollution Prevention and Control, art. 10 (1): "For the installations in which the activities under the regulations regarding the trade of greenhouse gases certificates take place, the EIP **does not** establish emission limit-values for the direct emissions of these gases, except the case when a significant local pollution has to be avoided" and* *G.O. no.152 /2005, art. 10 (2): "In the situations mentioned in art. 10 (1), EIP-s **don't** include the requirements concerning the efficient utilisation of energy for the combustion installations or any other units emitting CO_2, on site."*
Spain	yes	Greenhouse gases permit and trading allowances scheme for installations inside the Directive 2003/87/CE
Sweden	no	*We have some taxes, charges and voluntary systems. However, they are not alternative provisions, but parallel.*
United Kingdom	yes	Energy intensive users which are not subject to the EU ETS are caught by our Climate Change Agreements. All businesses are subject to a climate change levy – a tax. However energy intensive users can claim 80% of this tax back if they enter into a climate change agreement. Energy efficiency targets are prescribed for the sector and the companies that operate within that sector. If they meet the target they receive the rebate. If they do not then they risk loosing the rebate. Targets are reviewed and set annually. We also have the Carbon Reduction Commitment Energy Efficiency Scheme. All organisations which are not caught by EU ETS, or CCA are subject to this UK trading scheme. This includes public organisations including the Environment Agency and small businesses. Revenue generated is recycled back in to the scheme so that the best performers get the maximum rebate and the worst performers nothing. As with the EU ETS, they have to surrender enough allowances to cover their emissions. Around 20,000 organisations will be covered. A British Standard on Energy Efficiency was also published in 2009. We are looking to incentivise uptake of this through our permit charging scheme.

1.2 Definition of efficient energy use

1.2.1 Is there a reference to or a specific definition of efficient use of energy in your legislation?

	Yes/no	Please note the act/directive/decree Please quote or describe the definition
Austria	no	---
Bulgaria	no	---
Cyprus	no	---
Reg. Office Centr. Bohemia	yes	Act 406/2000 Chapter IV Paragraph 6 Article 1-5, 10
Czech Env Inspectorate	yes	Act 406/2000 Chapter IV Paragraph 6 Article 1-5, 10 Some provisions for increase use energy efficiently
Denmark	no	---
Finland	no	---
Berlin	No	---
Hessen	no	---
Kiel	No/yes?	Reference to BREF "Energy Efficiency". There is no official legal definition, but several organisations like Wuppertal Institute for Climate, the Environment and Energy have published their definitions. See W. Irrek, S. Thomas "Defining Energy Efficiency". Wuppertal Institute is an independent institute partly financed by the "Ministry for Innovation, Science, Research and Technology of Northrhine Westfalia. Wuppertal Institute: In the context of **energy conversion** energy efficiency resp. efficiency of conversion can be defined by efficiency factors resp. utilisation ratios of the conversion (input/output of the conversion), as for instance the ratio of generated end-use energy in proportion to secondary energy used (e.g. efficiency factor of a power plant, a heating system, a cooling device or of a refinery. According to the **macro-economic perspective** energy efficiency is either denoted as energy intensity (primary energy consumption per unit of product) or (reciprocal) as energy productivity (real GDP per primary energy input). Energy intensity parameters can be measured on the aggregated level as ratio to certain physical parameters.
Bezreg Köln	yes	Article 8 seventeenth BImSchV (waste incineration) Heat Recovery
Greece	---	---
Latvia	no	---
The Nether-lands InfoMil	yes	In the act "Wet milieubeheer" art. 1.1 lid 2 b In the act "Wet milieubeheer" is mentioned that the protection of the environment also means an efficiënt use of energy.
The Nether-lands DCMR	?	
Norway	no	---
Poland	yes	Directive 2006/32/WE
Romania	yes	*Governmental Ordinance no. 22/ 2008 regarding the energetic efficiency and the promotion of the utilization, at the final consumers, of the renewable energy resources – art.2-k and o.* *k. "Energetic efficiency – the ratio between the value of the performing result obtained – consisting in services, goods or the resulted energy – and the value of the energy utilized for this purpose"* *o. "The improvement of the energetic efficiency – the increase of the energetic efficiency at the final consumers, as a result of the technological, economical and/ or attitudinal changes"*
Spain	no	---

Sweden	no	*However, from the Government white paper accompanying the proposal for Chapter 2, section 5 in the Code the following could be quoted:* *The principle of conservation means that that all activities shall be conducted and all measures be taken in such a way that raw material and energy is used as effectively as possible and consumption is minimised.*
United Kingdom	no	No because of referential drafting. However, we do require annual reporting and benchmark sectors in order to identify the most efficient operators. We examine what they do in order to revisit BAT. Not in our legislation but in our permit. Taken from our permit operators are currently required to: 1.2 Energy efficiency 1.2.1 For the following activities referenced in schedule 1, table S1.1 (A1 to A4 etc.) The operator shall: (a) take appropriate measures to ensure that energy is used efficiently in the activities; (b) review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities; and (c) take any further appropriate measures identified by a review. The operator is also required to report their energy usage on an annual basis.

1.2.2 Does your country provide any guidance on defining efficient use of energy?

	yes/no	Please describe the alternatives
Austria	yes	Currently, a guidance on the climate and energy concept within the Environmental Impact Statement (Environmental Impact Assessment - EIA procedure) is being elaborated (finalisation envisaged for June 2010). This guidance will provide information for developers and authorities on the necessary energy related data and on the state of the art referring to energy efficiency for certain sectors (IPPC installations but also other project types like e.g., urban development projects).Concerning state of the art the guidance will make use of the available data in the BREFs. Within the Austrian klima:aktiv campaign various guiding material has been issued (on topics such as ventilations systems, pumps, motor-driven systems). The focus of these guidelines is on SMEs. For EMAS projects: The Austrian Chamber of commerce also offers guidance on energy efficiency (e.g. energy efficiency checklist for companies). The Austrian Federal Environment Agency has published some studies on energy efficient technologies in certain industrial sectors. Apart from the mentioned Austrian guiding materials the BREFs also offer specific guidance.
Bulgaria	yes	As a part of the BAT, guidance on the scope of the IPPC application
Cyprus	yes	The Ministry of Industry, Commerce and Tourism (Energy Service) provides information related to the utilisation of renewable sources of energy, measures undertaken for energy efficiency, as well as to innovated energy efficient technologies. This information has been published and is available at the Ministry's web side but does not form an official guidance for industry.
Reg. Office Centr. Bohemia	yes	e.g. Decree 150/2001 of Act 406/2000

Czech Env Inspectorate	no	---
Denmark	yes	Sector energy analysis and some horizontal guidelines (e.g. on ventilation, heating, compressors and electric light) from the Danish Energy Agency.
Finland	yes	Best Available Techniques (BAT) - Energy efficiency in industry, SY 51/2008 (In Finnish) See: http://www.ymparisto.fi/download.asp?contentid=96740&lan=fi Abstract in English on page 88.
Berlin	no	---
Hessen	no	---
Kiel	yes	The Federal Ministry for the Environment has not issued national guidance, only a brochure with advice on energy efficiency in industry and crafts. Environmental Ministries of the federal states or their agencies have published guidelines on efficient energy use. They can be found on the individual homepages, e.g. Bavarian State Agency for the Environment: has 10 general guidance papers (energy efficient use of compressed air, lighting systems, etc.), 15 branch specific guidances with examples (paper industry, paint shop, porcelain industry, plastics processing, glass industry …) and commerce, crafts and services (butcheries, bakeries ..). The website of the German Energy Agency (dena) provides an overview. Guidelines of VDI – Verein Deutscher Ingenieure (Association of German Enigineers) .eg. VDI 4602 ”Energy Management”, VDI 3807 “Characteristic values of energy and water consumption in buildings”, VDI 3922 “Energy consulting for industry and business”, VDI 4661 “Energetic characteristics – definitions – terms - methodology” etc. are a source of information from a non-governmental organisation. The VDI-guidelines are often taken into account for the determination of BAT.
Bezreg Köln	no	---
Greece	---	---
Latvia	yes	Only as a part of the BAT, in the case of IPPC installations Low on energy efficiency of buildings (gives some hints what should be considered during construction)
The Nether-lands InfoMil	yes	In the guidance “handreiking Wegen naar preventie bij de bedrijven” subscribed as a BAT-document, has the following definition: “Energy saving is the use of energy as efficient as possible. The use of sustainable energy to replace the use of energy produced bij fossile fuel is not mentioned as energy saving”.
The Nether-lands DCMR	No?	---
Norway	no	---
Poland	no	---
Romania	yes	*Governmental Ordinance no. 22/ 2008 regarding the energetic efficiency and the promotion of the utilization, at the final consumers, of the renewable energy resources – Annex no.1 – The orientative list including eligible measures for the improvement of the energetic efficiency* (The list is not exhaustive, it includes relevant eligible measures, structured according to the main sectors of activity – industrial, residential and tertiary sectors, transports sector – and also trans-sectorial and horizontal measures)
Spain	yes	The following definition is given by the Instituto para la Diversificación y Ahorro de la Energía (IDAE): energy efficiency is the group of programs and strategies in order to reduce the energy used by some devices or systems without affect to the quality of the service. http://www.idae.es/index.php/mod.glosario/mem.listado/relmenu.139/letra.E IDEA depends on the Spanish government and publishes reports and researches about energy efficiency in some sectors of the industry. http://www.idae.es/index.php/mod.publicaciones/mem.listadoDestacadas/relmenu.73
Sweden	no	Would be interesting seeing examples from other MS. However, it might not be trivial defining what efficient use of energy means.
United Kingdom	yes	• Horizontal Guidance Note, IPPC H2, Integrated Pollution Prevention and Control (IPPC), Energy Efficiency. • How to comply with your environmental permit. Getting the basics right. • Sector specific guidance notes.

		Guidance covers the basic standards and measures that apply to all other activities 1 subject to the Environmental Permitting Regulations (EPR). For some activities there are additional technical guidance notes.

1.3.1 Implementation in practice

1.3.1 How is the obligation to use energy efficiently applied in practice? (Please give a general overview)

	Please give a general overview
Austria	In most IPPC and EIA cases the developer designs the installation in such a way that the obligation to use energy efficiently is fulfilled and therefore, no specific conditions have to be prescribed (the project description will be an integrated part of the permit). Waste incineration plants and large combustion plants: The question of heat recovery is always an issue (e.g. use of a steam turbine, use for district heating). Sometimes, if heat recovery is not or only to a minor extent possible the authorities demanded a concept about future possibilities and economic studies relating to energy efficiency. For more details see answers to section 3.
Bulgaria	The permits contain conditions on the how much energy is allowed to be used per unit production (or other appropriate unit), how much fuel is allowed to be used per unit production (or other appropriate unit), operation and maintenance of the major energy consuming equipment and generating equipment
Cyprus	Each permit includes specific requirements regarding measures that must be taken by facility operator for efficient use of energy. Most commonly, measures refer to the following: – monitoring and maintenance of equipment on regular basis – prevention of energy losses (i.e. by using insulating materials, alarm systems, etc) – application of systems and techniques (i.e. for lighting, air conditioning, pumping, etc) of lower energy consumption detailed record keeping (including fuels and electricity consumption).
Reg. Office Centr. Bohemia	Obligation is to meet best available technology.
Czech Env Inspectorate	The conditions are defined in integrated permit (using BAT)
Denmark	Before issuing a permit the authority shall consider and decide that energy is used as efficient as possible (Statutory Order no. 1757 22. December 2006)
Finland	Energy efficiency is addressed in case by case basis in the environmental permit process. Based on evaluation permit conditions on energy efficiency can be issued to industrial activities, as well as requirements to monitor energy use and report on the energy efficiency improvements. This can be also achieved by joining on the voluntary energy saving schemes.
Berlin	---
Hessen	Within the permitting procedure it must be ensured that there is a concept for the efficient use of energy. There are special requirements for plants which are under the emission trading system.
Kiel	The permit writer has to check the information about planned measures for economical and efficient energy use, especially information about possibilities for achieving high energy efficiency and high rate of utilisation, for minimisation of energy loss and use of generated energy in the application documents.
Bezreg Köln	as mentioned before we have to check if there are information concerning the relevant legislations
Greece	The practical application of efficient use of energy is specified into the environmental permits

Latvia	The conditions are defined in integrated permit (using BAT), but in general every operator has to maintain the installation in the way that impact on the environment should be minimal.
The Nether-lands InfoMil	---
The Nether-lands DCMR	- via multi-annual negotiated agreements-partn3, or - comparable alternative. Existing companies require energy study and implementation of economic viable best available techniques / new companies are assessed on application of BAT. BAT application depending on the total energy use. Group 1: Elektricity use <50.000 kWh or gas < 25.000 Nm3: no conditions, other measures **Group 2**: Electricity use: 50.000 - 200.000 kWh **and/or** gas: 25.000 - 75.000 Nm3 Companies within this group are required to implement all energy-efficiency measures with return on investments of maximum 5 years. The competent authority can not require an energy study. **Group 3:** Electricity use: > 200.000 kWh **or** gas: > 75.000 Nm3 Companies within this group are required to implment all known energy-efficiency measures with return of investments of maximum 5 years. The competent authority can require an energy study, when it the company is expected that it has not implemented all economic viable measures. Emission trade-companies do not have to comply with this requirement, but they can participate volutarily, as it is a part of the the multi-annual energy covenant.
Norway	The Company shall yearly submit a report to the authorities on its total emissions to air and water, noise in the surroundings, waste quantities and energy consumption. We have in some cases carried out inspections to follow up the energy consumption of an installation, and how they work systematically to reduce energy consumption.
Poland	It is usually monitored by the installation owner only
Romania	- During the permitting procedure for the IPPC installations, the efficient use of the energy is evaluated by the permitting authorities, based on the informations that the applicant has to submit (see also the answer 3.2.1.-a) and in connection with the EIA conclusions, when case. The comparison with BREFs (where available) is made. - For the *existing* IPPC installations which don't comply with specific requirements, an Actions Plan is set-up (as part of the Environmental Integrated Permit), strictly in the framework of the "Transition Period" approved for each installation (see also the answers 3.2.4 incl. example 2 and 3.4.1 incl.example 2). The accomplishment of the Actions Plan is checked by the National Environmental Guard and the National Environmental Protection Agency, through their local/ regional structures -The new IPPC installations must comply by the beginning - All IPPC operators must submit to the authorities above the Annual Environmental Report, including information about energy use and efficiency. Regarding the existing installations (see below): *- The sectors with specific large consumption of energy (e.g. cement industry and, partly, pulp and paper industry) have a higher degree of awareness regarding the efficient use of energy – firstly because of the high price of energy that significantly affects the production costs, but also due to the legal requirements concerning energy efficiency.* *- Some other sectors, especially the ones still using old technologies (e.g. metallurgy, part of the chemical industry) were less aware of this problem, but they became more and more interested in modernization – also due to the high price of energy, but obliged by the legal requirements too.*
Spain	We evaluate, in the applications for the permit, the use of the best available techniques (BAT) including criteria about energy efficiency. Then if the project suggests a technique that is not a BAT we ask for the BAT to achieve the environmental benefits of the BAT. For instance, in Extremadura we have several tomato juice concentrate installations and their permits evaluations have considered

	the number of effects of the evaporators or the recovery of the water condensate or the isolation of pipes in order to increase the energy efficiency. Another example is the evaluation of production of ceramic bricks installations. We have assessed the efficient use in the drier of hot gases from the furnace.
Sweden	*The applicant* - *has to describe processes and consumption and production of different types of energy carriers like fuels, heat and electricity* - *shall describe measures which can be taken to reduce consumption and increase production of different types of energy carriers , including BAT for the sector, as appropriate.* *When it is difficult to find data on what represents BAT, the applicant can be asked to describe the consequences of reducing heat and electricity consumption respectively by certain percentages, e.g. 5, 10 and 20 %.* - *shall state investment cost, expected technical lifetime, annual operating costs, and benefits of possible measures. Benefits include both reduced costs for energy and reduced emissions following from the measures* *What represents BAT for the industrial sector in question can be found by studying other operators in the sector and sometimes, but not often, in the relevant sector BREF.* *The annual investment costs are to be calculated from expected technical life time of the measure and often at an interest rate of 6 %.* *The sum of the annual investment and operation costs are compared with the annual reduction in costs for energy and the monetised value of the annual reduction of emissions like NOx and SO_2.* *In this way calculated costs and benefits are compared. If the measure is then found not to be unreasonable, it shall be taken. The burden of proof whether or not a measure shall be deemed unreasonable rests with the applicant.*
United Kingdom	All installations under the scope of IPPC shall meet a set of basic energy requirements for energy efficiency. These include: provision of information on energy consumed or generated by the activities within the permit and the associated direct and indirect carbon dioxide emissions • energy management provisions • a description of the proposed measures for the improvement of energy efficiency in operating and maintenance procedures, control of excessive heating and cooling losses and building services • provision of an energy efficiency plan that identifies energy efficiency techniques that are applicable to the operation of the activities. All installations under the scope of IPPC must also meet additional energy efficiency requirements either: • through participation in a Climate Change Agreement or Direct Participant Agreement in the Emissions Trading Scheme or Carbon Reduction Commitment or • through compliance with further permit-specific requirements as determined with the regulator. We will not enforce any part of a Climate Change Agreement or Direct Participant Agreement of the Emissions Trading Scheme or Carbon Reduction Commitment. We are actively reviewing this and we are likely to start specific energy efficiency audits against the 29 measures set out in the BREF

1.3.2 Are there differences in energy efficiency requirements between the existing and new IPPC installations? Please give examples.

	Yes/no	Please specify and give examples
Austria	no	Basically, no legal differences. The requirements in permits for existing installations that have been substantially changed and new installations will be the same. However, in the consideration of energy efficiency in a certain case the technical and economic feasibility will be taken into account.
Bulgaria		This is decided case by case through the BAT implementation for each installation and site
Cyprus	no	There are no legal differences. As regards the existing installations, for permitting purposes, the given infrastructure has to be considered.
Reg. Office Centr. Bohemia	---	See 3.2.4
Czech Env Inspectorate	---	Undefined
Denmark	yes	New installations must comply with BAT. Existing installations have according to Danish law a legal protection for 8 years from the date of the first permit. After this period the principle of proportionality applies.
Finland	No	No legal difference. In practice energy efficiency is addressed mainly for IPPC-installations and in specific non-IPPC sectors, such as small VOC-plants
Berlin	yes	In case of existing operating installations the given infrastructure of the installation has to be taken into account. Principle of appropriateness of means.
Hessen	no	---
Kiel	yes	When considering energy efficiency measures for existing installations the given situation (individual infrastructure, technical feasibility etc.) has to be taken into account. Measures must be technically feasible and it must be obvious that they can be reasonably expected given the type and location of the plant. The authority can set an individual time frame for the implementation of a new technique. For new installations requirements are higher. They have to fulfil the requirements right from the start.
Bezreg Köln	no	---
Greece	yes	According to the requirements of the specific BREF documents
Latvia	no	---
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	yes	e-efficiency measures in existing installations are not always possible due to (a combination of) deprication costs, building space in the installation, limitations from investment choices in the past. In a new installation energy efficiency BAT can be introduced with much higher financial efficiency.
Norway	yes	New energy installations would be considered for their overall energy efficiency and greater ambitions for utilizing excess energy. In Norway this might be quite challenging as installations often are situated in sparsely populated areas.
Poland	no	
Romania	yes	*The existing installations that have obtained so-called "transition period", listed in the Annex no. 5 of the Governmental Ordinance no. 152/ 2005, approved by the Law no. 84/2006, have different dead-lines to comply with the energy efficiency requirements; the ultimate dead-line is 31.12.2015.*

Spain	yes	Lots of BATs are applicable only in new installations because of the need of great modifications of the installations or equipments. So, it depends on the level of modification needed and the applicability given in the BREF document.
Sweden	no	*Not typically. However, in some cases there are of course better possibilities to be energy efficient in a new installation. What is reasonable for a new installation can be deemed unreasonable for an existing.*
United Kingdom	no	We expect energy efficiency measures to be incorporated in the design stage. Existing installations will be subject to an improvement programme. We are actively looking at CHP in order to increase uptake.

1.3.3 Are there differences in energy efficiency requirements between sectors? Please give examples.

	Yes/no	Please specify and give examples
Austria	no	No not in the legal provisions. However, it is assumed that the authority will examine very energy intensive installations more closely than others. Note: The Austrian Waste Management Act is currently being amended. In the consultation document a new provision is proposed which obliges the operators of a waste incineration or co-incineration plants with energy recovery to ensure a "high degree of energy efficiency".
Bulgaria		The criteria are the same
Cyprus	no	There are no legal differences. However, some differences exist due to the differences of technologies/equipment between sectors. Depending on the industrial sector, a provision is proposed which obliged the operator to use specific equipment. i.e. Permits about the installations for the manufacture of ceramic products include a condition that requires the use of Tunnel Ovens.
Reg. Office Centr. Bohemia	yes	This is determined by the BAT.
Czech Env Inspectorate	---	undefined
Denmark	---	In principle no.
Finland	no	---
Berlin	no	---
Hessen	no	---
Kiel	yes	Basically not. But as the industrial branches are so different it is necessary to determine sector specific requirements. This is the reason why there are so many sector specific guidances.
Bezreg Köln	no	---
Greece	yes	LCPs, metallurgical sector
Latvia	no	---
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	no	Energy efficiency requirements depend on energy use, not on the sector (see 1.3.1). In praktice, differences are seen due to differences in pro-active approach of sector organisations, developing sector specific measures (new techniques, innovation studyies). The energy efficient covenant works with standard measure options per sector. Companies in sectors that do not participate in the voluntary covenant are confronted with a comparable approach. .

Norway	yes	see 1.3.2
Poland	no	There were some differences in the past.
Romania	both	*In principle, there are no fundamental differences.* *The differences reffer only to the technological particularities of different sectors. When requirements in the IPPC permit can be formulated based mainly on sectorial BREFs, these ones are priorily used.*
Spain	no	---
Sweden	no	*Requirements are set individually and different sectors(and different installations within sectors) have different process equipment and different possibilities to take measures.*
United Kingdom	no	The principles are the same. The technology may differ depending on the sector. This is reflected in our sector guidance notes which also deal with energy efficiency.

1.3.4 Can the environmental permit authority deviate (in any direction) from the provisions on energy efficiency? Please give examples

	Yes/no	Please specify and give examples
Austria	no	---
Bulgaria		The CA can add but it is not allowed to skip the minimum requirements described above
Cyprus	no	It is not possible to deviate from the Law.
Reg. Office Centr. Bohemia	no	---
Czech Env Inspectorate	no	---
Denmark	-	There is no provisions on energy efficiency. Only guidelines from The Danish Energy Agency
Finland	yes	Energy efficiency is assessed on case basis during the environmental permit process. There is no legal framework in place how to deviate from this process. In practice participation in a voluntary energy saving scheme has been evaluated to be sufficient to meet the legal requirements for energy efficiency and related reporting and monitoring.
Berlin	yes	If the authority has knowledge about a very energy efficient technology for a special application and the operator can prove that the realisation lacks proportionality the authority shall refrain from such orders or obligations in a permit.
Hessen	no	---
Kiel	yes	There are only a few clear provisions concerning energy efficiency in German legislation up to now (see Art.7 of 13. BImSchV and Art. 8 of 17. BImSchV). For waste incinerators the requirements concerning heat recovery are given in Article 8 ordinance concerning waste incineration (see question 1.1.1) and there are expressions like technically feasible and reasonably expected. If there is a clear provision the permit authorities can deviate from the provisions only in one direction: they can ask the operator to meet higher requirements than in the legislation. They can do so if it is necessary and the operator agrees. They cannot stay behind the legal requirements. Another possibility to deviate is if it is evident, that the state of technology / BAT has developed considerably to a higher level than the provisions prescribe.
Bezreg Köln	no	---
Greece		

Latvia	no	Energy efficiency is assessed on case basis during the environmental permit process. There is no legal framework in place to set conditions out of requirements of legislation.
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	yes	Yes, we can allow a motivated deviation. We also allow deviation when a company participates in emission trade or has a known too low energy use.
Norway	yes	Whether conditions regarding energy efficiency are included in the permit is left to the permit writer's expert assessment. SMBs with minor energy use might have less stringent conditions on energy efficiency.
Poland		Provision level is not specified in the permits.
Romania	no	---
Spain	no	---
Sweden	no	*We have no generally expressed provisions.* *Provisions in the IPPC-directive and the Code state that requirements on energy efficiency are to be set individually and based on BAT*
United Kingdom	no	We do not set limits with regard to CO2 for EU ETS participants as this will impact on their ability to trade under the scheme. We also do not set energy specific measures on sites subject to CCAs although we are now looking at this. We exercise flexibility depending on site specific circumstances but any deviation is usually reflected in a specific improvement programme.

2. The Authorities and organisations

2.1 Competent authorities and organisations

2.1.1 Which ministry/authority is competent for giving guidance on energy efficiency in environmental permits

Austria	Federal Ministry of Economy, Family and Youth (Trade and Industry Act, Mining Code, Clean Air Act for Steam Boilers); Federal Ministry of Agriculture and Forestry, Environment and Water Management (Waste Management Act, Water Act).
Bulgaria	Ministry of environment and water
Cyprus	Department of Environment Ministry of Agriculture, Natural Resources and Environment Department of Labour Inspection, Ministry of Labour and Social Insurance
Reg. Office Centr. Bohemia	Ministry of the Environment of the Czech Republic, Ministry of Industry and Trade of the Czech Republic, Regional Authority
Czech Env Inspectorate	Ministry of Environment, Regional Authority
Denmark	The Danish Energy Agency is giving guidance in general – but not in connection with permits (a part of The Ministry of Climate and Energy)
Finland	Ministry of the Environment, Finnish Environment Institute (SYKE)
Berlin	Competent authority for licensing acc. to the German Immission Control Act
Hessen	Guidance can be given by the German Environmental and Energy Ministries. In Hessian additionally the regional authorities are able to give guidance.
Kiel	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. If the Ministry does not give guidance the Länder (federal states) can give guidance.
Bezreg Köln	---
Greece	Ministry for Environment, Energy and Climate Change
Latvia	Ministry of Environment
The Nether-lands InfoMil	---
The Nether-	---

lands DCMR	
Norway	The Climate and Pollution Agency
Poland	Ministry of Economy (still working on the final version)
Romania	*The Environmental Integrated Permits (EIP-s) are issued by the Regional Environmental Protection Agencies, subordinated to the Ministry of Environment and Forests. The guidance on energy efficiency included in environmental permits is based on BAT-s, BREF-s and on the orientative list including eligible measures for the improvement of the energetic efficiency (GO no.22/ 2008)* *But, according to the same GO no.22/ 2008, chapter V, "The Romanian Agency for Energy Preservation (RAEP or "ARCE") is the speciality body of the public administration, at the central level, which participates to the elaboration of the energy efficiency policy. At the national level, ARCE is the responsible institution for the implementation and monitoring of the energy efficiency policy and it is subordinated to the Ministry of Economy".*
Spain	In the IPPC permit the competent is the regional authority but it is under the provisions given by European and Spanish rules. Nevertheless there is an energy and industry administration that is competent in granting energy production permits.
Sweden	The Swedish EPA
United Kingdom	Guidance is produced by the Environment Agency for England and Wales in collaboration with the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment and Heritage Service (EHS). Publication follows consultation with industry, government departments and non-governmental organisations. The Environment Agency also produces guidance on behalf of the Local Authorities

2.1.2 Which authorities are competent for issuing permits including energy efficiency

	Please give a general overview
Austria	• In most cases: district authority, appeals: independent administrative tribunal • For waste management installations: provincial governor, appeals: Independent administrative tribunal For EIA: provincial government, appeals: environmental senate
Bulgaria	Ministry of environment and water
Cyprus	Department of Environment Ministry of Agriculture, Natural Resources and Environment (Waste Discharge Permit) Department of Labour Inspection, Ministry of Labour and Social Insurance (Air Emission Permit)
Reg. Office Centr. Bohemia	Ministry of the Environment of the Czech Republic, Regional Authority
Czech Env Inspectorate	Ministry of Environment, Regional Authority
Denmark	municipalities and Ministry of Environment.
Finland	Regional State Administrative Agencies and municipal environmental authorities
Berlin	Competent authority for licensing acc. to the German Immission Control Act
Hessen	In Hessian these permits are issued by the regional authorities (Regierungspräsidien).
Kiel	The competent authorities in the federal states, e.g. in Schleswig-Holstein the State Agency for Agriculture, the Environment and Rural Areas, in Niedersachsen the Staatliche Gewerbeaufsichtsaämter (State Authorities for Work Safety and Environmental Protection), NRW: generally the 5 District Governments, Saxony district governments and municipalities – depending on kind and size of the installation
Bezreg Köln	generally the 5 District Governments in NRW are competent authorites for that issue
Greece	Ministerial, regional and prefectural environmental authorities are competent for the environmental permitting of installations / activities according to their size / type /

	environmental impact.
Latvia	State Environmental Service
The Nether-lands InfoMil	Local authorities and provincial authorities
The Nether-lands DCMR	---
Norway	The Climate and Pollution Agency and the County Governors
Poland	Municipal authorities (voievodship and local)
Romania	*The competent authority for issuing Environmental Integrated Permits, including the energy efficiency aspects related to the installations subject of IPPC permitting procedure, is the Ministry of Environment and Forests, through the National and Regional Environmental Protection Agencies.*
Spain	Environmental authorities and energy and industry administration, too.
Sweden	The Environmental courts and the Environmental licensing delegations at the County administrative boards
United Kingdom	The Environment Agency for England and Wales, the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment and Heritage Service (EHS). In addition, in England and Wales, for less complex Annex 1 processes as identified in our national legislation, the Local Authorities.

2.1.3 Which authorities/organisations are responsible for monitoring compliance with energy efficiency conditions?

	Please give a general overview
Austria	• In most cases: district authority • For waste management installations: provincial governor
Bulgaria	The Regional inspectorates on environment and water
Cyprus	Department of Environment Ministry of Agriculture, Natural Resources and Environment Department of Labour Inspection, Ministry of Labour and Social Insurance
Reg. Office Centr. Bohemia	Ministry of the Environment of the Czech Republic, Regional Authority, The Czech Environmental Inspectorate
Czech Env Inspectorate	Czech Environmental Inspectorate (Take control of conditions of integrated permit)
Denmark	The Danish Energy Agency when an agreement is made. In other cases it is the environmental authorities (municipalities and Ministry of Environment)
Finland	Centres for Economic Development, Transport and the Environment and municipal environmental authorities
Berlin	Competent authority for licensing acc. to the German Immission Control Act
Hessen	See above
Kiel	See 2.1.2
Bezreg Köln	generally the 5 District Governments in NRW are competent authorites for that issue
Greece	Environmental inspections authorities on ministerial, regional and prefectural level.
Latvia	State Environmental Service
The Nether-lands InfoMil	NL Agency is responsible for the implementation of LTA3 and LEE (see answer on question 4.1)
The Nether-lands DCMR	---
Norway	The Climate and Pollution Agency and the County Governors
Poland	Municipal authorities (voievodship and local) – should be
Romania	- *Specifically (concerning the specific provisions included in EIP-s): The Regional Agencies for the Environmental Protection, in cooperation with local structures of the National Environmental Guard.* - *For the general aspects (e.g.energy consumption in different economic sectors): ARCE - according to GO no.22/2008, chapter V, art.13 (b, h, o)*

Spain	Each authority takes care of their permit provisions and our IPPC permits have been granted considering energy efficiency.
Sweden	The competent regional or local authorities
United Kingdom	The Environment Agency for England and Wales, the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment and Heritage Service (EHS). In addition, in England and Wales, for less complex Annex 1 processes as identified in our national legislation, the Local Authorities.

2.1.4 Which authorities/organisations are competent to enforce energy use and efficiency?

	Please give a general overview
Austria	• Enforcement: district authorities, for waste management installations: Provincial governor • Inspections: district authorities together with provincial government
Bulgaria	The Regional inspectorates on environment and water
Cyprus	• Energy Service, Ministry of Commerce, Industry and Tourism
Reg. Office Centr. Bohemia	Ministry of the Environment of the Czech Republic, Regional Authority
Czech Env Inspectorate	Ministry of Environment, Regional Authority
Denmark	The Ministry of Environment, municipalities
Finland	Centres for Economic Development, Transport and the Environment and municipal environmental authorities
Berlin	Competent authority for licensing acc. to the German Immission Control Act
Hessen	See above, but it has to be mentioned that the German regulation in this field (§ 5 Abs. 1 Nr. 4 BImSchG) are not specified in an enforceable way.
Kiel	See 2.1.2
Bezreg Köln	if there are special questions we contact our Environmental Agency LANUV in Essen
Greece	Ministry for Environment, Energy and Climate Change
Latvia	Ministry of Environment, Ministry of Economics, State Environmental Service
The Nether-lands InfoMil	---
The Nether-lands IDCMR	---
Norway	The Climate and Pollution Agency and the County Governors
Poland	Municipal authorities (voievodship and local) – should be
Romania	*- Specifically (concerning the energy efficiency specific provisions included in EIP-s): the National Environmental Guard, through its central, regional and local structures - according to the Governmental Decision no.112/2009, art.14(1-b)* *- For some general aspects: ARCE - according to GO no.22/ 2008, chapter VII, art.26*
Spain	We only enforce energy use and efficiency in IPPC permits considering every installation independently and the energy and industry administration is the actual competent authority to enforce energy use and efficiency in general.
Sweden	*Depends on what is understood by "enforce". Is "enforce" means seeing to it that conditions, when broken, are adhered to as soon as possible then the answer would be "the competent authorities for monitoring compliance with permit conditions".*
United Kingdom	The Environment Agency for England and Wales, the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment and Heritage Service (EHS). In addition, in England and Wales, for less complex Annex 1 processes as identified in our national legislation, the Local Authorities.

2.2 Co-operation between authorities/organisations

2.2.1 Which organisations/authorities are involved in energy efficiency issues in your country (in the permitting procedure, on guidance or consulting issues)?

	Please give a general overview
Austria	Federal Ministry for Economy, Family and Youth, Federal Ministry of Agriculture and Forestry, Environment and Water Management On guidance: Federal Environment Agency Ltd., Austrian Energy Agency
Bulgaria	Ministry of environment and water, The Regional inspectorates on environment and water and the Executive agency on environment
Cyprus	Department of Environment Ministry of Agriculture, Natural Resources and Environment Department of Labour Inspection, Ministry of Labour and Social Insurance
Reg. Office Centr. Bohemia	Ministry of the Environment of the Czech Republic, Ministry of Industry and Trade of the Czech Republic, Regional Authority, The Czech Environmental Inspectorate, The Ministry of Agriculture, CENIA, Czech Environmental Information Agency
Czech Env Inspectorate	Ministry of Environment, Regional Authority, Czech Informational Environmental Agency, Czech Environmental Inspectorate
Denmark	Municipalities, Ministry of Environment, Energy Agency. But in general there is no co-operation.
Finland	Ministry of Environment, Ministry of Economy and Employment, Regional State Administrative Agencies, Centres for Economic Development, Transport and the Environment, municipal authorities, Motiva Oy (Energy information centre), energy utilities and numerous private consultancies and research institutions.
Berlin	Competent authority for licensing and alternative authority for land use planning (in Berlin different departments)
Hessen	See above
Kiel	See 2.1.2 the permit authorities, in Saxony the State Agency for the Environment, Agriculture and Geology makes an evaluation of the energy efficiency of the installations, writes a statement and proposes obligations for the permit
Bezreg Köln	Environmental Agency LANUV in Essen
Greece	Permitting authorities at three levels (ministerial, regional and prefectural) as well as in an advisory role the Centre for Renewable Energy Sources
Latvia	Ministry of Environment, Ministry of Economics; State Environmental Service
The Nether-lands InfoMil	
The Nether-lands DCMR	---
Norway	The Climate and Pollution Agency and the County Governors
Poland	Ministry of Economy; Ministry of Environmental Protection; The Polish National Energy Conservation Energy; Research Institutes; Ecological Organisations
Romania	*- The Ministry of Environment and Forests, through the National Environmental Protection Agency and the Regional EPAs (concerning the permitting procedure, specific guidance and consulting issues, BATs and BREFs, including "ENE" BREF adopted in February 2009)* *-The Ministry of Economy, through ARCE, the Ministry of Constructions and – additionally – the Ministry of Administration and Internal Affairs (concerning consulting aspects and general guidance, as Methodological Norms regarding the Energy Performance of the Buildings, Methodological Norms regarding the Efficient Utilization of Energy).*
Spain	*See previous answers*
Sweden	*The Swedish EPA, the Swedish Energy Authority, Regional authorities,and local authorities.*
United Kingdom	In addition to the Environment Agency, Government has set up a number of organisations which provide advice to industry but has no regulatory remit. This includes The Carbon Trust and Energy Savings Trust. Government is also trying to stimulate energy efficiency through financial incentives which are administered by other bodies – CCA by DECC, Renewable Heat Incentives – by Ofgem.

3. ENERGY EFFICIENCY IN THE PERMIT PROCEDURE

3.1 Guidance for the applicant

3.1.1 Is there any national guidance provided to the applicant in order to evaluate energy efficiency of the operation/activity?

	Yes/no	If yes, what kind of guidance
Austria	no	Strictly speaking, there is no national guidance. However, see answer to 1.2.2.
Bulgaria	yes	The guidance documents are described above
Cyprus	no	See answer 1.2.2
Reg. Office Centr. Bohemia	yes	There is national guidance for the application of integrated permit. Decree 554/2002 of act 76/2002.
Czech Env Inspectorate	yes	Decree 554/2002 of act 76/2002
Denmark	yes	Yes, but the guidance is intended to be used in connection with an agreement with the Energy Agency .
Finland	yes	Best Available Techniques (BAT) - Energy efficiency in industry (In Finnish) See: http://www.ymparisto.fi/download.asp?contentid=96740&lan=fi Abstract in English on page 88. and Specific form on energy efficiency to be attached to an application: http://www.ymparisto.fi/download.asp?contentid=2300&lan=fi (also available in English, see 2002 report annex III)
Berlin	---	---
Hessen	no	---
Kiel	yes	See 1.2.2
Bezreg Köln	no	---
Greece	yes	Common ministerial Decree applied on textile sector
Latvia	no	---
The Nether-lands InfoMil		InfoMil provides information on energy efficiency on her website and by Helpdesk.
The Nether-lands DCMR	yes	Applicable BAT documents including BREF's, bylaw 'enery in environmental permits'. A list of measures has been compiled for all sectors participating in the energy covenant.
Norway		NS- EN16001 Standard on energy management systems
Poland	no	
Romania	yes	*BAT and BREFs, according to the specific "IPPC activity/ installation", completed – since February 2009 – with ENE BREF.*
Spain	no	---
Sweden	yes	*Depends on what is meant by national guidance. Swedish EPA has informed on its home-page on how to evaluate whether or not a measure to increase energy efficiency is reasonable to take.*
United Kingdom	yes	Operator has access to the same guidance that the regulator uses. Refer to answer 1.1.2. But we are reviewing our approach. It is likely that we will now draw on the BREF note on energy efficiency

3.1.2 What is the official status of the guidance?

	binding/ non-binding	Please specify
Austria	non-binding	---
Bulgaria	binding	Must be followed
Cyprus	non-binding	
Reg. Office Centr. Bohemia	Binding	This decree is binding on the application for integrated permit.
Czech Env Inspectorate	binding	Binding guidance Decree 554/2002 of act 76/2002
Denmark	non-binding	We have no general binding requirement of energy efficiency
Finland	non-binding	
Berlin	---	---
Hessen	---	---
Kiel	Non-binding	---
Bezreg Köln	---	---
Greece	binding	Common ministerial Decree applied on textile sector
Latvia	---	---
The Nether-lands InfoMil	---	---
The Nether-lands DCMR		The Ministrial regulation BAT documents require considerations in the environmental permit. List of measures has been linked to the voluntary energy covenant-3
Norway	non-binding	---
Poland	non-binding	
Romania	binding	*When specific provisions from BREF-s are included in EIP, these provisions become binding ones.*
Spain	non-binding	---
Sweden	no	
United Kingdom	non-binding	This guidance is non binding.

3.1.3 Is a negotiation between the applicant and the competent authority possible?

	Yes/no	Please specify and give examples
Austria	no	A trade-off between certain issues would not be possible. During the preliminary contacts between applicant and authority advice on the project will be given and the authority will also communicate early whether it sees any definite compliance problems. In practice, if any difficulties are encountered, improvements of the project can occur during the permitting procedure. However in any case, the concrete application will be taken into consideration.
Bulgaria	yes	There are complicated installations and sites, they require more attention to figure what energy is consumed/generated and where exactly.

Cyprus	no	A negotiation is not possible as the authority is obliged to apply the legislation. However, during the contact between the applicant and the authority, a discussion will take place and some advice will be provided.
Reg. Office Centr. Bohemia	yes	Part of an integrated permit`s management is negotiation between the applicant, the regional authority, the public concerned and others relevant authorities. E.g.: There is a possibility for longer time for the reconstruction of installation unless the operator has to use more efficient installation then is required by legislation.
Czech Env Inspectorate	yes	Oral proceedings about integrated permit from among regional authority, operator and Czech environment inspection on regional authority
Denmark	yes	During the permit process there will be often be negotiations and even also before and while the installation is writing an application.
Finland	yes	Typically in all environmental permit processes a competent authority arranges a negotiation or/and inspection on the site with applicant
Berlin	---	---
Hessen	yes	The competent authorities and the applicants usually discuss the energy efficiency concept in advance of the permission.
Kiel	yes	The permit authorities are obliged to give advice to the applicants. They often discuss the planned installations and measures before the applications are submitted. They inform about legal requirements and documents that have to be part of the application.
Bezreg Köln	yes	---
Greece	---	---
Latvia	yes	Typically in all environmental permit processes a competent authority arranges a negotiation or/and inspection on the site with applicant in order to improve quality of permit and to set appropriate conditions.
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	yes	Negotiation is possible on implementation planning, integrated assessment with other environmental aspects, taking into account the Cross media BREF and economics BREF.
Norway	yes	Negotiation is possible taking into account the environmental protection, cross media effects, costs and advantages, and the technical characteristics of the installation.
Poland		Should be pointed in the final law act.
Romania	yes/in a specific case	*Only in the situation when the negotiated items are subject of the so-called "Action Plans", which include compliance measures to be taken during the "transition period", for the installations which have obtained such one.* *The subjects of negotiation can be: the concrete content of the measures to be taken, in order to comply with IPPC requirements; the dead-lines for the measures established, but strictly in the limits of the transition period approved for the respective installation.* As example, see below the answer 3.2.4. – b)-2 (energy efficiency measures included in the Actions Plan. The specific content of the measures and the dead-lines have been established as the result of negotiations between the competent authority, Regional EPA Bacau and the applicant, *AGRANA ROMANIA S.A. Buzău – branch office ROMAN*).
Spain	yes	Just before the permit granting there is a discussion period between applicant and environmental authority to give him the opportunity to complaint
Sweden	no	*The legislation itself is of course not negotiable. The applicant shall present what is possible to do and his/her view on whether or not a measure is BAT for the sector and whether or not such a measure is reasonable to take at the installation I question.. The competent authority decides if a measure is reasonable to take.*
United	yes	For new installations, we expect BAT from the outset. Negotiations

Kingdom		do take place, on for example CHP. For existing installations, negotiations do take place to bring the installation up to BAT standards. This is reflected in an improvement programme with prescribed dates for completion.

3.2 Application documents

3.2.1 What kind of information concerning energy use is the operator required to include in the application?

Austria	IPPC installations: Sec. 353a of the Trade and Industry Act requires (for IPPC installations) data on substances and energy used or produced in the installation and information on measures foreseen for efficient energy use. Installations for which an environmental impact assessment (EIA) procedure has to be carried out: The application must include a climate and energy concept which contains the following information: energy consumption, broken down by plants, machinery and devices as well as by energy sources, available energy indicators, description of energy flows, energy efficiency measures; description of the climate-relevant greenhouse gases arising from the project and measures to reduce them with a view to climate protection; certificate of an authorised consulting engineer or technical consulting office stating that the measures included in the climate and energy concept comply with the state of the art (state of technology - BAT).
	b) example 1: extension of an integrated work for the initial melting of cast-iron and steel in Linz (EIA procedure): increase of production capacity to 6 million tonnes steel/year For an EIA project the operator had to submit to the authority an application for development consent that contains the documentation required under administrative law for the approval of the project and the Environmental Impact Statement. The competent authority demanded comprehensive application documents relating to energy demand and efficiency and an „energy and waste-heat study“of the site which evaluated the potentials for energy-saving and use of waste-heat.
	c) example 2:
Bulgaria	---
Cyprus	a) General overview: The operator must specify in the application, the amount of energy used in or generated by the installation, including information regarding the following: – type of energy used (i.e. fuel or electricity consumption or other) – Energy production – type of process which require use of energy, – Efficiency coefficient (%) – Discription of how to obtain energy efficiency (technologies/equipment)
	b) example 1: Power Stations: The application must include information on how heat recovery is achieved i.e. description of boilers e.t.c.
	b) example 2: Cement Industry: The application must include information regarding the use of heat generated in combustion
Reg. Office Centr. Bohemia	a) General overview: The operator have to compare parameters of installation with BAT including an explanation of deviations.
	b) example 1: Energy industries: The operator is required to include energy efficiency in application when installing new boiler.
	b) example 2:

	Waste incineration plant: heat is used to produce steam. The operator is required to include energy efficiency in application.
Czech Env Inspectorate	a) General overview: The operator must in application about integrated permit evaluate energy efficiency
Denmark	a) General overview: Only as mentioned in directive 2001/80 23. October 2001 (“big incinerators”) and directive 2000/76 4.December 2000 (Incineration of waste)
Finland	a) General overview: Information on energy use, fuel use, energy produced, potential energy efficiency analysis which have been conducted, participation on voluntary energy saving scheme, energy efficiency investments and improvements both planned and executed. See form: http://www.ymparisto.fi/download.asp?contentid=2300&lan=fi
	b) Specific for waste incineration: information on how heat generated in combustion is utilised.
Berlin	a) General overview: documentation of substances used, their heating value and produced quantity of steam in the annual report
	b) example 1: waste incinerator
Hessen	Depends on individual case.
Kiel	a) General Overview Article 4 d of ordinance concerning the permit procedure (9. BimSchV): The documents must contain information about planned measures for economical and efficient energy use, especially information about possibilities for achieving high energy efficiency and high rate of utilisation, for minimisation of energy loss and use of generated energy. Applicants have to add their investigations concerning possibilities for CHP. The documents for the Environmental Impact Assessment must contain chapters on efficient energy use and climate protection. b) example 1: 2009/2010 permit procedures for Large Combustion Plants in Schleswig-Holstein: information about quantity and kind of fuel, electrical efficiency and thermal efficiency, energy efficiency calculation, concept for achieving high energy efficiency, investigations concerning possibilities for CHP. As they were close to an industrial area they had to plan some kind of “ready for CHP”. The documents for the Environmental Impact Assessment contained chapters on efficient energy use and climate protection. b) example 2: permit procedure 2008 in Schleswig-Holstein for a new large combustion plant using high-caloric waste material to produce steam for chemical industry. The installation was planned for the use of high caloric waste material separated from municipal household waste: The application had to contain the information required by article 4 d 9. BImSchV and 17. BimSchV. An external expert had to check the application whether it was in line with the BREF Waste Incineration including the requirements concerning energy efficiency. The documents for the Environmental Impact Assessment contained chapters on efficient energy use and climate protection.
Bezreg Köln	a) General overview: because of the high fuel and energy cost, the operator try to reduce energy consumption so Energy efficiency it normal his own interest Normally there is in the application form just gerenal informations; concering the detailed obligation in german legistation(13 o.17.BImSchV), there are more information necessary and the authority check that issue
Greece	a) General overview: Fuel type(s) and consumption, general energy flow chart of the installation, heat and energy outflow mean(s) and magnitude b) example 1: Energy efficiency limit in the case of Large Combustion Plants (gas turbines) – temperature limit for the discharged cooling water b) example 2: Re-use of heat and energy in the production process for energy intensive installation (e.g. recovery of energy in the pre-heating processes in metallurgical / ceramic /….. installations). Requirements for minimization of heat / energy losses
Latvia	a) General overview:

	a description of the energy sources, energy consumption, energy flows, capacity of installation, power/energy generated by the activity, recovered energy, planned improvements etc.
The Nether-lands InfoMil	---
The Nether-lands DCMR	a) General overview: Maximum energy use, overview of all energy relevant installations, overview of energy efficiency measures at present, in the past and planned. b) example 1: see example for conditions for e-efficiency [1)]
Norway	a) General overview: a description of the power sources for the activity, expected power consumption and if relevant power generated by the activity
Poland	a) General overview: Annual energy use in total and per product
Romania	a) General overview: *According to the provisions in the Ministerial Order (MEF) no.36/ 2004, the main types of information required to be included in the application file are:* *- The balances of materials and* energy *- Operational aspects – the description of the practical way for complying with the "IPPC" demands, regarding all the relevant aspects of the activities (including the* energy utilisation*).* *- The main activities – A relevant and easily understandable process description, for all the activities and for the depollution and control equipments, having mainly in view the following elements:* ▪ *The installations included in the application* ▪ *Methods and measures for prevention and diminution of the* energy losses *and of the emissions* ▪ *Special situations: start-up/ shut-down, emergency shut-down, incidental losses, inappropriate operation.* *- In order to sustain the elements above, the following information shall be considered, according to the type of the installation/ activity:* o *flow charts (for each technological process);* o *P&I diagrams (with a special attention payed to the processes including hasardous substaces);* o *detailed plans and data for those activities/ installations environmentally relevant (e.g. depollution installation, incinerators, waste disposals, landfills);* o *details of any chemical reaction and chemical kinetics balance or energy balance;* o *the conception/ structure of the control system and how the environment monitoring information is incorporated in it;* o *relevant information regarding the materials and* energy balances; o *the endowment with vent valves, exhaust valves and safety valves;* o *brief overview of the actual operating conditions and maintenance methods;* o *the description of the protection methods/ systems during the abnormal operation conditions (start-up, shut-down, temporary closure of the installations)* *The activity owner/ the operator shall corroborate these information with the BAT-s demands and to motivate every option and every deviation from the norms presented in the technical guidance.* Energy *- Techniques of technological management have to be included, in order to decrease the energy consumption at the source and at the consumers, by the improvement of the efficiency energy conversion per product unit (The information can be presented as tables and, if case, completed with Sankey diagrams).* *- Specific energy consumption has to be defined and calculated, based on the primary energy consumption for products or inputs and a comparison has to be made between the actual specific consumption and the limit-values for each sector, identified in the sector's guidance, where available. (Afterwards, these information will be yearly reported to the competent authorities for the environmental protection).* *- Measures for energy efficiency: a plan for energy efficiency has to be set-up, in order to:*

	○ *identify all representative techniques in the installation* ○ *identify the implementation status of these techniques* ○ *prioritize the applicable techniques,* ○ *identify any technique leading to a different environmental impact* ○ *show the evaluation methodology* ○ *establish and motivate the methods to be used* *- Operational and maintenance procedures: the application has to prove that the operational and control procedures are optimized and that the system' management and maintenance are appropriate, in the field of:* ▪ *air conditioning, cooling systems, freezing processes (e.g. temperature control, maintenance against leakages, sealings)* ▪ *engines and actuations operation* ▪ *compressed gases systems (operational procedures maintenance against leakages)* ▪ *steam distribution systems (losses, insulations, obstruction)* ▪ *heating and hot water systems* ▪ *lubrication (to avoid frictional loss)* ▪ *any other important maintenance activity, related to the specific of the installations.* *- Description of the proposed measures for the energy efficiency improvement; techniques for energy efficiency, as:* ▪ *Heat recovery from different processes steps* ▪ *Minimisation of the energy used for drying processes, by using high efficiency dehydration techniques* ▪ *Water consumption diminishing, utilisation of the water closed cycles* ▪ *Appropriate insulating* ▪ *The appropriate location of the installation, so that the pumping distances are reduced to the minimum* ▪ *The optimizing of the electronic control of the engines* ▪ *The utilization of the used cooling water (high temperature) for heat recovery purposes* ▪ *If appropriate, the utilization of the belt-conveyers instead of pneumatic ones* *If possible, continuous processes instead of batch ones*
	b) example 1: *The application for Environmental Integrated Permit forwarded by the company ARCELORMITTAL TUBULAR PRODUCTS ROMAN SA, having as result EIP no.16/ 29.12.2005 – first revision: 12.11.2007, issued by the Regional EPA Bacau for the IPPC installations of the applicant – activity 2.3.- a: Installations for the processing of ferrous metals/ Hot-rolling mills with a capacity exceeding 20 tones of crude steel per hour.* *Part of the information in the application is included in EIP no.16/2005 (available on the site www.arpmbc.ro). E.g. Chapter 7.2. – The efficient utilization of energy / 7.2.1. – Thermal energy / 2. - Equipments for thermal energy recovery. This part includes the description of 6 recovery boilers operating in the IPPC installations.*
	b) example 2: *The application for Environmental Integrated Permit forwarded by the company ARCELORMITTAL TUBULAR PRODUCTS ROMAN SA, having as result EIP no.16/ 29.12.2005 – first revision: 12.11.2007, issued by the Regional EPA Bacau for the IPPC installations of the applicant – activity 2.3.- a: Installations for the processing of ferrous metals/ Hot-rolling mills with a capacity exceeding 20 tones of crude steel per hour.* *The Annexes no. 16, 17 and 18 of the application file contain SANKEY diagrams for natural gas, compressed air and technological steam.*
Spain	a) General overview: Resources of energy used: fuels or electricity. Points of the operation where the energy is used. Technique related to any point of energy consumption. Recovery of waste energy. Assessment of the BAT implemented in the installation, including energy efficiency as criterion.
	b) example 1: In Extremadura we have several tomato juice concentrate installations and their permits evaluations have considered the number of effects of the evaporators or the recovery of the water condensate or the isolation of water vapour pipes in order to

	increase the energy efficiency. In addition, the kind of fuel used has been assessed and the use of natural gas instead of fuel oil has been promoted.
Sweden	a) General overview: *See 1.3 above*. *Addition for combustion/incineration plants:* *Description on how energy outputs fits in the energy system, for instance district heating, in order to see that energy losses will be minimised.*
	b) example 1: *Combustion/incineration. Data on heat efficiency, electricity efficiency. Steam /temperature data.*
United Kingdom	a) General overview: Within the application template, operators are required to: • Describe the basic measures for improving how energy-efficient your activities are Document reference of this description • Provide a breakdown of any changes to the energy your activities use and create • Describe the specific measures you use for improving your energy efficiency. Document reference of this description

1) The Netherlands: DCMR

1. **Example: Obligations in the permit**
2. **Example: Energy monitoring in the energy permit**

ad 1.

1 Energy Efficiency

1.1 Within a period of three month after the permit has entered into force the operator is obliged to decide and take the initiative to join the voluntary energy saving covenant concluded between the government and industry as well as the multi annual agreement concerning energy efficiency.
If the permit holder does not participate in the energy saving covenant he has to give notice to the competent authority in written form. In the case that the permit holder does not participate, the requirements of regulation 7.2 are valid.

1.2 If the regulation has entered into force (see under 7.1. of the regulation) the requirement is that within 18 month after the permit has entered into force the permit holder has to provide a comprehensive energy assessment, in which the technical feasibility of the measures improving the energy efficiency is presented. This assessment has to be submitted to the competent authority for evaluation. Economic measures are those with a pay back period of max. 5 years. The assessment has to include the following items:

a) description of the process, the installations and buildings (possibly the factory sections)
b) description of the energy balance/budget, this means a survey of the energy balance of the whole object with the allocation of at least 90 % of the whole energy consumption to individual installations and sub-processes.
c) a survey of all predominantly energy saving measures, which are feasible as well as realistic and the other energy saving measures. Concerning the possible but not used energy saving measures the cause or reason for not using it has to be reported.
d) Regarding the planned technique the following things have submitted:
   - rate of annual energy saving
   - costs of the additional investment
   - the expected economic life-time
   - the annual saving of energy costs based on the energy tariffs valid at the point of time of the assessment
   - an estimation of possibly other costs and income related to the energy saving
   - the payback time based on the additional investment costs and the income
   - a survey of the possible organisational and management as well as maintenance measures concerning the buildings that lead to energy saving

1.3 Within a period of two month after submission of the assessment mentioned in regulation 7.2 the competent authority should evaluate the plan. If the authority concludes that insufficient efforts were made to identify technically and economically feasible measures additional investigations can be required.

Ad 2

Eneregy

Energy consumption (primary energy)		Whole establishment including CHP
Electricity		2008
Purchased electricity (including electricity from renewables)	MWh	0
Electricity from renewables produced on site (except biofuels)	MWh	0
Consumption of electricity from renewables from participation/cooperation	MWh	0
Delivering of electricity to third parties	MWh	0
Feeding into the general power grid	MWh	0
Net consumption of energy		

Natural gas		2008		
	unit	For energy production	For process energy	As raw material
Purchased natural gas	Nm³	32 300		
Natural gas passed through	Nm³			
Net consumption of natural gas	Nm³	32 300	0	0
Emissions to the air related to the consumption				

Other fuels		2008		
kind	unit	Tonnes/year		
		For energy production	For process energy	As raw material

Heat	2008	
Purchased heat (including heat from renewables	TJ	0
Heat from renewables produced on site (except biofuels)		
Consumption of heat from renewables from participation/cooperation		
Delivering of heat (including heat from renewables)		
Net consumption of heat		

CHP on site			Whole establishment
	unit	Energie (GJ)	2008
Input			
Fuel consumption of CHP			
Natural gas	Nm³ ae	0,0316	0
Output			
Electricity production by CHP	MWh		0
Rate of consumption on site	MWh		0
Rate delivered to third parties	MWh		0
Rate fed into the general power grid	MWh		0
Heat production through CHP	TJ		0
Rate of own consumption	TJ		0
Rate of not used heat	TJ		0
Rate delivered to third parties	TJ		0
Rate of not used heat	TJ		0
Savings			
Energy saving (primary) through CHP	TJ		0
Inclusion of savings			

CHP unit is	not part of the establishment /installations
Who is the owner of the CHP unit	other company , Eurogen/Enecal

Explanatory statement (energy)

New explanations

Result of evaluation

Existing CHP

Advices (energy)
No expert statements available.

Energy: not a company with long term agreement (LTA 2) and no benchmark company
The module is not used because you are subject to an additional charge for LTA 1 or the following energy agreements:

Statement of ground (no long term energy agreement LTA-2)
Not available

Result of evaluation (no long term energy agreement LTA-2)
Not available

Advices (no long term energy agreement LTA-2)
Not available

3.2.2 What kind of additional monitoring information is required?

Austria	Application for an IPPC permit has to include emission monitoring measures according to section 353a Trade and Industry Act. Depending on the type of project: monitoring obligations according to the sectoral laws Application for an EIA permit: The Environmental Impact Statement has to include: information on follow-up measures as well as any measures to secure evidence and ensure concomitant control
	see answer to a), no further information available
Bulgaria	---
Cyprus	a) General overview: Emission monitoring measures including a description of technologies which are implemented in order to reduce emissions, as well as all the possible environmental impacts arising from such technologies are required in the application.
	b) example 1: Power Stations: The implementation of FGD Unit for SOx absorption (Flue Gas Desulfurization by use of seawater) produce waste water with high concentrations of SO4.
	b) example 2: Cement Industry: the usage of bag filters for de-dusting purposes leads to the development of solid waste (dust).
Reg. Office Centr. Bohemia	a) General overview: The operator has to indicate the source and use energy and fuels. The operator has to describe the current and the planned measures (such as recovery, alternative energy, dual-energy, energy generated in making the incineration of waste, etc.)
	b) example 1: It is necessary to give a description of how to obtain energy, consumption of fuel or other combustible media, the use of energy produced, the efficiency of energy use in newly set up units to produce electricity or thermal energy or when existing installation has to change.
	b) example 2:
Czech Env Inspectorate	a) General overview: undefined
Denmark	a) General overview: Only as mentioned in directive 2001/80 23. October 2001 (“big incinerators”) and directive 2000/76 4.December 2000 (Incineration of waste)
Finland	a) There are no specific requirements on monitoring of energy efficiency in application documents for environmental permits. In general the monitoring of energy use is required for applicants. When ever operator is part of the voluntary energy savings scheme, same monitoring can be used for environmental permits
Berlin	---
Hessen	Depends on individual case.
Kiel	a) General overview: Depends on individual type of installation and sectoral laws. b) Example 1: large combustion plants – permits are not yet issued, planned: input material and characteristics, electricity produced Example 2: wate incineration plant for steam production – quantity, quality and characteristics of the high caloric waste material used in the installation, steam produced with its characteristics
Bezreg Köln	---
Greece	a) General overview: Temperature, flow rate b) example 1: Continuous measurements of flow rate and temperature
Latvia	No specific monitoring information is required in permit applications
The Nether-lands InfoMil	---
The Nether-lands DCMR	a) General overview: monitoring of energy data and implementation plan of energy efficiency measures
Norway	In the application: Data on expected energy consumption or data from monitoring.
Poland	none

<table>
<tr><td>Romania</td><td>a) General overview:
Taking into account the environmental impact of the energy utilization, the emissions in the atmosphere associated to the yearly energy consumption are required. If some installations have specific factors, it has to be mentioned.</td></tr>
<tr><td></td><td>b) example 1: The associated emissions of flue gas components has to be calculated and afterwards, the information shall be yearly reported, e.g. as a table:
<table>
<tr><td rowspan="2">Activities</td><td colspan="4">Yearly Emissions (kg)</td></tr>
<tr><td>CO_2</td><td>SO_2</td><td>NO_X</td><td>TPM</td></tr>
<tr><td>Sector 1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sector 2… etc</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Related technical sectors</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td></td><td>b) example 2:
- When case, the monitoring data regarding the energy consumption on the entire installation and on the particular consumption points, according to the energetic plan.</td></tr>
<tr><td>Spain</td><td>a) General overview:
The monitoring information related to the use of fossil fuels is needed to accomplish with the Directive 2003/87/CE, but registers of consumption of electricity and fuels is asked in the permits too. The installation must show his capability of registering his energy consumption and of determining his carbon dioxide emissions.</td></tr>
<tr><td></td><td>b) example 1:
The tomato juice concentrate installations must develop a system of registering and documenting their fuels consumptions, for example, by measuring devices in pipes or weighbridge, buying tickets, delivery notes,</td></tr>
<tr><td>Sweden</td><td>No specific monitoring information.</td></tr>
<tr><td>United Kingdom</td><td>
<table>
<tr><td>Electricity *</td><td>MWh</td></tr>
<tr><td>Natural Gas</td><td>MWh</td></tr>
<tr><td>Gas Oil</td><td>tonnes</td></tr>
<tr><td>Recovered Fuel Oil</td><td>tonnes</td></tr>
<tr><td></td><td></td></tr>
<tr><td>TOTAL</td><td>-</td></tr>
</table></td></tr>
</table>

3.2.3 Can information from the voluntary systems be used in the applications?

	Yes/no	
Austria	yes	a) General overview: Voluntary systems used in Austria: EMAS, Responsible Care (chemical industry)
		b) example 1: no information available, the company has no EMAS certificate
Bulgaria	yes	b) example 1: the sufficient characteristic of the information is it's credibility– for instance if the information is a measurement carried out by an accredited laboratory – it is considered credible
Cyprus	no	
Reg. Office Centr. Bohemia	no	a)General overview: b) Example 1: c) Example 2:
Czech Env Inspectorate		undefined
Denmark	yes	b) example 1: Energy saving with Energy Agency
Finland	yes	Voluntary energy savings scheme covers many industrial and service sectors

		a) Voluntary energy saving schemes are available for energy-intensive industry, energy production, food and drink industry, chemical industry, plastics industry, wood-processing industry, technology industry, commerce, Finnish Hotel and Restaurant Association FHR, energy services. There is also a general energy savings scheme for business and industry and schemes for municipal sector.
Berlin	---	---
Hessen	yes	Information from any voluntary system can be used by the applicant.
Kiel	yes	a) General overview: If operators have produced or produce relevant information by their voluntary systems they can use it in the applications. But it must comply with the requirements of the sector specific provisions. Possibilities: information from EMAS, ISO 14001, in future EN 16001, individual energy management systems or sector specific energy management systems b) example 1: chemical plant: the company has implemented an energy management system and can use data generated by it
Bezreg Köln	---	I don't know anythink about the voluntary system
Greece	yes	In case that under certain circumstances, voluntary systems are foreseen in the legislation a) General overview: (e.g. from which voluntary systems can information be used in this field …) Good practises: measures and techniques, measurements / monitoring requirements
Latvia	yes	If information from voluntary systems (environmental management or quality management systems) is relevant to requirements on fulfilment of application and it gives sufficient information on improvement of environmental performance or describes current situation in plant a) General overview: (e.g. from which voluntary systems can information be used in this field …) EMAS, ISO 14 001
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	yes	Economic measures agreed the energy covenant can be taken up as a condition in the permit.
Norway	yes	EMAS ISO 9001 ISO 14001 NS-EN 16001 Standard on energy management
Poland		Not specified yet
Romania	no	---
Spain	yes	a) General overview: (e.g. from which voluntary systems can information be used in this field …) The installation could use the information achieved due to a voluntary integrated environmental system in his permit application and also to accomplish with his permit provisions if the information comply the requirements of the permit too.
		b) example 1: we haven't had any case yet
Sweden	yes	*Information from "the Programme for Improving Energy Efficiency Act" , PFE, can be used as part of the information needed in an application as possible measures to improve energy efficiency are to be listed according to this programme.* *The PFE programme is intended to increase energy efficiency and create opportunities for tax exemption.*

		On 1 July 2004, the tax on industrial process-related electricity was raised from SEK 0 to SEK 0.005 per kWh. The tax rise represents the adoption of EU's Energy Tax Directive. *This directive gives energy-intensive companies in manufacturing industry, which are subject to the tax, the opportunity of being granted tax exemption on their electricity consumption if they take action to improve their energy efficiency. The government has, therefore, adopted PFE, with the carrot of reduced taxation. Participation in the programme is voluntary, and open to energy-intensive manufacturing companies which meet certain criteria.*
United Kingdom	yes	Operators are required to report on energy efficiency measures and back this up with monitoring information. They can also make demonstrations through use of voluntary management standards such as British Standard EN 16001 Standard for Energy Management Systems

3.2.4 Are there any differences between the requirements in the application documents for new and existing installations?

	Yes/no	
Austria	no	a) General overview: A new permit for an existing installation is only necessary when a substantial change is planned (e.g. an extension). Since the application documents will only deal with the parts of the installation which are changed the obligations to use energy efficiently will only apply to these parts and not necessarily to the whole plant (i.e. a reconsideration of the overall energy efficiency will not taken place). However, for the changed part the requirements would be the same as for a new part.
		b) example 1: Although it was an extension project the authority required comprehensive documents (e.g. total energy balance of the integrated steel work with inputs/outputs).
Bulgaria	yes	b) example 1: information in the application for new installations of course is based more or less on expectations and must be compliant to the EIA conclusions for instance
Cyprus	no	
Reg. Office Centr. Bohemia	yes	a) General overview: For new installations are set strictly operating conditions. The installations have to be used with higher energy efficiency. The conditions for existing installations can be less strictly then for new installations.
		b) Example 1
		b) Example 2
Czech Env Inspectorate	yes	a) General overview: Legislation and BAT in BREF documents for new installations are using stricter emission limits (higher energy efficiency), than existing installation (lower energy efficiency).
Denmark	no	---
Finland	no	---
Berlin	---	---
Hessen	no	---
Kiel	no	a) General overview: Application documents for existing installations have only to be submitted if substantial changes are planned. They only refer to the part(s) of the installation to be changed. The authority decides whether there should be requirements for the existing parts too.

		Concerning energy efficiency the requirements for the changed part(s) are the same as for new installations.
Bezreg Köln	no	---
Greece	no	---
Latvia	no	---
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	no	
Norway	yes	New LCPs would be considered for their overall energy efficiency (to a larger extent).
Poland	no	None according to the existing law regulations
Romania	yes/in a specific case	a) General overview: *The application for the existing installation under the "transition period" has to be completed by the "Actions Plan".* *This document includes all the actions and measures to be taken in order to comply with the IPPC requirements, in a clearly defined period of time, according to the transition period approved for the existing installation. When EIP is issued, the Actions Plan becomes part of it.*
		b) example 1: *The Actions Plan included in EIP no.16/ 29.12.2005 – first revision: 12.11.2007, issued by the Regional EPA Bacau for the IPPC installations of ARCELORMITTAL TUBULAR PRODUCTS ROMAN SA – activity 2.3. - a: Installations for the processing of ferrous metals/ Hot-rolling mills with a capacity exceeding 20 tones of crude steel per hour (available on the site www.arpmbc.ro).* *Measure no.9: "The endowment of the thermal power station with high efficiency boilers." Effects: the diminution of natural gas consumption; the emissions diminution; the modernization of the installation according to BAT prescriptions. Dead-line: December 2008; actual status: accomplished.*
		b) example 2: *The Actions Plan part of EIP no.8/ 23.03.2007, issued by the Regional EPA Bacau for the IPPC installations in S.C. AGRANA ROMANIA S.A. Buzău – branch office ROMAN – main activity 6.4.-b(2): Treatment and processing intended for the production of food products from vegetable raw materials with a finished product production capacity greater than 300 tones per day (average value on a quarterly basis); additionally activity 1.1: LCP – Combustion installations with a rated thermal input exceeding 50 MW. (EIP available on the site www.arpmbc.ro)* *The Actions Plan includes a separate chapter "Energy efficiency", with 3 measures (dead-lines between December 2007 and December 2009), as follows:* *- The diminution of primary energy consumptions – stage 2 – mounting of new agitators in crystallization sector* *- The diminution of primary energy consumptions – stage 3 – optimizing steam/condensate distribution system* *- Replacement of the oversized electric engines* *Measures' actual status: accomplished*
Spain	no	---
Sweden	no	a) General overview: *Both new and existing shall use BAT as long as it is not unreasonable. In both cases the application shall give the necessary data to decide on which measures are reasonable to take*
United Kingdom	no	The big difference is regard to CHP and CHP ready installations. This all depends on a viable outlet for the heat.

3.3 Permit consideration

3.3.1 How specific is the competent authority in terms of energy efficiency measures required/presribed in the permit (only for the concrete examples)?

Austria	Please specify for example 1: The following conditions were prescribed in the EIA permit: • to keep informed on technical developments in the iron and steel sector referring to energy efficiency • to carry out an energy monitoring (yearly basis, choice of fuel, use of specific benchmarks) for the important installations (sinter plant, blast furnace, hot rolling mill, power plant) • new assessment of the energy saving potentials on the basis of the energy monitoring (5 years after issuing the permit) • Insulation of the steam pipes
Bulgaria	Please specify for example 1: there are concrete numbers as limits and concrete equipment as names
Cyprus	example 1:A general condition is defined in the permit so as energy to be used efficiently. See answer 1.3.1 example 2: A general condition is defined in the permit so as energy to be used efficiently. See answer 1.3.1
Reg. Office Centr. Bohemia	Please specify for example 2: The operator is obliged to take measures to ensure the economical use of energy.
Czech Env Inspectorate	undefined
Denmark	---
Finland	Example 1: In first example permit no specific permit conditions were given, but under motivation for issuing the permit it is mentioned that: "Based on the information presented in the application, it was evaluated that the activity is operating on energy efficient manner." (Coal fired power plant Example 2: In second example permit no general motivation for energy efficiency was given for permit consideration, but operator got a permit condition stating that: "Energy efficiency of the brick works must be controlled continuously and it must be documented. The permit condition was motivated by: "Permit condition on energy efficiency is based on environmental protection degree 43 §, which states that when assigning permits conditions one must take into account the efficient use of energy. (Brick factory) Example 3: In third example permit no general motivation for energy efficiency was given for permit consideration, but operator got a permit condition stating that: "The company must submit an action plan to competent authority based on the energy audit, covering energy efficiency measures taken and planned, as a part of the application for reconsidering the permit." The permit condition was motivated by: "By operation on energy efficient manner it is possible to reduce the consumption of non-renewable fuels and environmental impacts of fuel production. Energy analysis conducted according to the energy saving scheme has been assigned to be attached to the permit application for reconsidering the permit, so that it can be evaluated, whether further permit conditions are necessary for executing the energy savings possibilities of the energy analysis. " (Steel mill)
Berlin	---
Hessen	Please specify for example 1: The competent authority issues the permission including all issues. There is no specific authority for energy efficiency.
Kiel	example 1: Large combustion plants: “CHP ready” measures. As the application will become part of the permit specific permit conditions are only necessary if the authority has to fix other or additional measures than described in the documents. example 2:

	Waste incineration plant: relevant BAT requirements
Bezreg Köln	---
Greece	---
Latvia	The operator shall maintain a system for the continuous improvements and assessment of taken measures in order to reach BAT and the best possible energy efficient use in its plant
The Nether-lands InfoMil	---
The Nether-lands DCMR	See example conditions
Norway	example 1: The Company shall maintain a system for the continuous assessment of measures which can be implemented to attain the best possible energy efficient production in its plants
Poland	Not specified yet
Romania	example 1: *The measure exemplified above was established as the result of the compliance evaluation for the installations subject of EIP (table 8.2 in EIP). The non-compliance aspects regarding the use of energy and, subsequently, the composition of the flue gas have been identified and measures for compliance have been established.* example 2: *The measures exemplified above were established as the result of the compliance evaluation for the installations subject of EIP (e.g. table 6.1.in EIP: The compliance evaluation for sugar production technologies, using white beet as raw material; the comparison with BREF – BAT – FDM provisions for sugar industry)*
Spain	example 1: We don't require any quantitative goal in energy efficiency or energy consumption, instead we ask for process integrated measures that are selected before the construction of the facility, as the examples already given.
Sweden	Example 1: We know of one permit with conditions on the specific use of energy: *"The consumption of energy may as annual mean not exceed 1,2 MWh of electricity respectively 6,3 GJ of heat per tonne of tissue produced"*
	Example 2: *We have some examples on conditions on how equipment must be designed, e.g. :* *The new recovery boiler shall be constructed for* *- a dry substance concentration in spent liquor of approximately. 80 % and* *- a steam pressure of 110 bars and a steam temperature of 515ºC*
United Kingdom	Operators are required to outline their measures for delivering energy efficiency. We audit against this plus additional BAT measures that we identify through the BREF note. We are currently reviewing our guidance to incorporate BREF

3.3.2 What are the specific energy saving systems that the authority takes into consideration when evaluating energy efficiency in your country? (systems see list in BREF "Energy Efficiency": combustion, steam, heat recovery, cogeneration, electrical power supplies, electric motor driven subsystems, pumping systems, heating, air conditioning and ventilation, lighting, drying and separation)

Austria	a) General overview: It appears that the focus of the authorities is on the process specific energy issues rather than on auxiliary systems and utilities such as mentioned above. Since efficient and clean combustion is also an issue of reduction of other emissions, authorities and developers will try to optimise larger combustion systems.

Bulgaria	a) General overview: all of the described above if it is relevant to the site and other if it is also relevant to the site. It is a case by case assessment
Cyprus	a) General overview: The authority takes into consideration all the energy saving systems mentioned above depending on the type of installation. b) example 1: Power Stations: More attention is given to combustion, heat recovery and cogeneration. b) example 2: Cement Industry: The recovery of heat generated in combustion is also very important to be taken into consideration.
Reg. Office Centr. Bohemia	a) General overview: It depends on type of installation.
Czech Env Inspectorate	---
Denmark	a) General overview: No specific in environmental permits. IPPC-installations usually make agreements with the Danish Energy Agency concerning EE.
Finland	a) General overview: All systems should be taken into consideration, there area no specific regulations on different systems.
Berlin	---
Hessen	a) General overview: Not specified.
Kiel	a) General overview: individual process, specific energy saving systems b) example 1: LCPs: choice of fuel, use of electricity, use of heat, process optimisation, use of waste energy, planned measures for energy saving, assessment of cogeneration of power and heat b) example 2: waste incineration plant for steam production quantity, quality and characteristics of the high caloric waste material used in the installation, use of heat, use of electricity, process optimisation, use of waste energy, planned measures for energy saving, assessment of cogeneration of power and heat
Bezreg Köln	---
Greece	b) example 1: Combustion, steam, heat recovery, heating systems
Latvia	a) General overview: not specified, depends on case
The Nether-lands InfoMil	---
The Nether-lands DCMR	a) General overview: all named systems are dealt with in the considerations when relevant for the company. The lists of standard and sector specific measures is used, as well as the relevant BAT-documents..
Norway	a) General overview: The most energy consuming parts of the installation. Hydroelectric power is the main source for electricity in Norway.
Poland	a) General overview: Not specified yet – there is only polish translation of “Energy Efficiency” BREF conspect
Romania	a) General overview: *All the categories mentioned above are considered, according to the specific of evaluated IPPC installation*.
	b) example 1: *EIP no.7/ 09.03.2007, issued by the Regional EPA Bacau for the IPPC installations in the company AMBRO SA Suceava - activities 6.1. – a, b: Industrial plants for production of pulp from timber or other fibrous materials and of paper and board, with a production capacity exceeding 20 tones per day; and also the connected activities: auxiliary boilers, waste water treatment plant (EIP available on the site www.arpmbc.ro).* *EIP excerpt: “Thermal energy is provided from company’s own production; it is*

	obtained as result of: concentrated black liquor combustion in the revivifier; wood waste combustion, completed with the natural gas combustion. *The power is partly taken from National Energetic System, based on the supplying contract. Another part of power is produced in the company's own equipment (BAT system of co-generation, using black liquor combustion and natural gas combustion)*. *In order to reduce SO_2 and CO_2 emissions from fossil fuels, BAT reccomandation, to utilize as fuel the wood waste produced in the company, is applied:* - *52,36% from thermal energy is produced from the black liquor and wood waste combustion;* - *36% from the total needed power is produced in the company's own equipment*." Remark: *at least two others IPPC installations with the same type of activities (6.1. – a, b) are considered as complying with ENE BREF reccomandations, by the utilization of co-generation equipments (as mentioned in their EIPs). But, because those companies are subject of greenhouse gases trade scheme, they are excepted from the yearly evaluations of energy efficiency, according to the provisions in GO no. 152/ 2005, approved by the Law no. 84/2006, IPPC, art. 10 (1, 2).*
	b) example 2: *EIP no. SB 3/ 15.07.2005, updated: 25.10.2007, issued by the Regional EPA Sibiu for the IPPC installations in the company Lafarge Cement Romania SA Bucuresti - branch office Hoghiz-Bv - activity 3.1: Installations for the production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day (EIP available on the site www.arpm7c.ro).* *The following energy saving systems implemented by the company are considered as complying with ENE BREF reccomandations:* *- Heat recovery from industrial hazardous waste (co-incineration)* *- The optimizing of the combustion/ technological processes (pre-heating of air/ fuel/ raw material, process automatic control at clinker kilns)*
Spain	a) General overview: We assess the energy efficiency of the techniques related with the main process and not the detailed consumption of every electric device in the installation.
	b) example 1: We ask for, at least, three effects in the evaporators of tomato juice concentrate installations but we don't assess the efficiency of the compressor that pumps the water vapour to the evaporator.
Sweden	a) General overview: *Everything that has an impact on energy conservation is taken into account. This includes items in the "list" but does not preclude other items.* *Combustion/incineration plants: The possibility to use the heat (and electricity) produced is studied and considered.*
United Kingdom	All of the above ie BREF 29 measures

3.3.3 Do you have any provisions and/or guidelines on how co-generation of heat and power has to be dealt with in the permit procedure?

	Yes/no	Please specify what kind of provisions and/or guidelines
Austria	yes	Section 5 (3) of the Clean Air Act for Steam Boilers states that a permit for a large combustion plant can only be issued if energy is used efficiently, inter alia by co-generation of heat and power or by use of waste gas of a gas turbine in a steam boiler, as far as economically and technically feasible. See also answer to 1.1.1. (proposal for an obligation of operators of a waste incineration or co-incineration plants with energy recovery to ensure a "high degree of energy efficiency").
Bulgaria	no	We have not found it necessary
Cyprus	no	see answer 1.2.2
Reg. Office	no	---

Centr. Bohemia		
Czech Env Inspectorate	yes	---
Denmark	no	Not with in the permit procedure. It will be dealt with in the planing process. The Danish Energy Agency and the municipalities are the competent authority concerning issues.
Finland	yes	Environmental Protection Degree (86/2000) 43 § subparagraph 4. CHP is common practice in Finland.
Berlin	no	---
Hessen	no	See 1.2
Kiel	yes	Art. 7 of 13. BImSchV (provisions for LCP): When a plant is constructed or substantially changed the operator has to implement requirements for combined heat and power generation unless this is technically impossible or disproportional. Operators have to submit an assessment on possibilities for CHP on the site, if possible they shall integrate the CHP installation into their application. Operators have to provide evidence of the feasability/non-feasability.
Bezreg Köln	no	---
Greece	yes	Environmental permits of co-generation (heat and power) installations provide the general terms / provisions for efficient use of energy
Latvia	no	---
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	no	
Norway	no	Not beyond conditions on overall energy efficiency for new LCPs. We have few LCPs based on fossil fuel in Norway.
Poland	no	
Romania	no*	* *The co-generation of heat and power is treated in the context of BREF-s for different sectors (e.g. BREF on the production of pulp and paper, where CHP is listed as BAT candidate in the cases of mechanical and chemi-mecanical pulping installations and recovered paper processing)*
Spain	no	
Sweden	no	
United Kingdom		We are reviewing this issue now. Key to the success of CHP is a viable outlet for the heat. Location and infrastructure is determined by our Planning Authority. We are working to ensure the location allows viable CHP. Our presumption is for CHP.

3.3.4 Could changes in energy efficiency affect an existing permit, i.e. is this an issue when the reconsidering and updating of the permit conditions is undertaken (Art. 13 of the IPPC Directive)?

	Yes/no	If yes, please specify
Austria	yes	This could be an issue, e.g. if the energy efficiency of an installation is drastically reduced (e.g. by losing an important heat user) or if substantial changes of the state of the art relating to energy efficiency occur. However, up to now this has never been the case.
Bulgaria	yes	As a part of the implemented BAT assessment.
Cyprus	yes	All installations are obliged to report on any changes arising on the process or the equipment (including energy efficiency improvements). i.e. If the amount of emissions is affected an updating of the permit conditions is required.

Reg. Office Centr. Bohemia	yes	The operator on the basis of an energy audit requests to amend the permit. After reconsideration of permit conditions by the competent authority the competent authorities shall amend the permit.
Czech Env Inspectorate	---	undefined
Denmark	yes	Energy is always a subject.
Finland	no	a) So far solely a change in energy efficiency has not led to situations, where permit would have been reconsidered or updated, but this evaluation is made case by case basis. Typically other issues, for example changes in emissions, would result to reconsideration of the permit. b) One example of the general practice is biomass (bark) dryer utilising waste heat which was built on the same site with paper machine and power plant utilising the dried biomass. The dryer had a major effect on the energy efficiency of the power plant, but no change on actual emissions to air and water, so the permit for the power plant was not reconsidered. (power plant and paper mill)
Berlin	yes	Subsequent order, if proportional
Hessen	yes	---
Kiel	yes	If the measures the operator intends to carry out for that purpose result in substantial changes at the existing installtion that will have impact to the environment, a new permit has to be issued.
Bezreg Köln	yes	because if the operators change facilities of existing installations, that caused normally a substantial change of the installation (Art. 12 IPPC directive) because the change of facilities will have an impact (noise, air etc,) to the environment
Greece	yes	In the procedure for the reconsideration of the environmental permit
Latvia	yes	An operator can apply for amendments to permit at any time during formal 7 years period for review. Permits can be changed to reflect improvements of energy efficiency where appropriate.
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	yes	Only when it is named as an requirement in the BREF-document..
Norway	yes	Conditions on efficient use of energy were implemented in permits from 2004 in connection with revising IPPC-permits.
Poland	no	---
Romania	yes	*Governmental Ordinance no. 152/ 2005, approved by the Law no. 84/2006, concerning Integrated Pollution Prevention and Control, chapter V –Reconsidering and updating of the EIP* and *chapter VI – Operational changes specify the cases when the permit conditions have to be revised and updated.*
Spain	yes	Changes in fuel to use that promote the acquisition of new burners, so more efficient combustion. Also modifications to update the installation would be considered as applications for new installations so we could require more efficient BATs, related to the main activity. However, Spanish permits haven't had to be reconsidered yet.
Sweden	yes	*Could be an issue when considering the need for updating a permit.*
United Kingdom	yes	An operator or the regulator can apply or vary the permit at any time with also a formal 4 year review. Permits can be changed to reflect advances is energy efficiency where appropriate.

3.4 Permit conditions

3.4.1 How is the requirement for energy efficiency incorporated into the permit?

Austria	a) General overview: Either as a binding specific permit condition or by declaring the project description an integrated part of the permit.
	b) example 1: Both of the above options have been used (see answer to 3.3.1).
Bulgaria	---
Cyprus	a) General overview: Each permit includes specific requirements regarding measures that must be taken by facility operator for efficient use of energy. Most commonly, measures refer to the following: – monitoring and maintenance of equipment on regular basis – prevention of energy losses (i.e. by using insulating materials, alarm systems, etc) – application of systems and techniques (i.e. for lighting, air conditioning, pumping, etc) of lower energy consumption – detailed record keeping (including fuels and electricity consumption) b) example 1: see answer 3.3.1 b) example 2: see answer 3.3.1
Reg. Office Centr. Bohemia	a) General overview: Results of energy audit are included in the conditions of operation. In the conditions is included monitoring of energy efficiency.
Czech Env Inspectorate	undefined
Denmark	a) General overview: In general no requirements because IPPC-installations usually make agreements with the Danish Energy Agency concerning EE.
Finland	a) General overview: Requirement for energy efficiency is an integrated part of the permit consideration. This leads in some cases to specific permit conditions. b) Reporting permit condition: "Realised measures that have improved the energy efficiency must be reported annually in annual report according to permit condition 64." (Oil refinery) c) More specific permit condition: "The plant should aim to operate as energy efficiently as possible. Operator must submit a written statement by 28.2.2008 about measures, which help to improve the energy efficiency of the plant. On evaluation energy efficiency, the possibilities for utilizing the waste heat from VOC afterburner and capacity and annual water consumption of the cooling system on the factory need to be taken into account. (Packaging factory)
Berlin	---
Hessen	a) General overview: A general description based on § 5 Abs. 1 Nr. 4 BImSchG is given within the permission.
Kiel	a) General overview: In Germany the application documents are part of the permit, this means that things described in the application are binding for the applicant. On top of that requirements concerning the individual case are integrated into the permit. b) example 1: power plants (permit not yet issued): binding permit condition: the application documents are part of the permit, "CHP ready" devices have to be installed and if possible the operator has to develop a full system. b) example 2: waste incineration plant for steam production binding permit condition: the application documents are part of the permit, monitoring of quantity, quality and characteristics of the high caloric waste material

	used in the installation,
Bezreg Köln	a) General overview: normally just general topic in the permit
Greece	a) General overview: A specific task of the environmental permit is dealt with energy efficiency b) example 1: see examples as above b) example 2: Substitution of fuel (fuel switching), (e.g. pet coke to natural gas…)
Latvia	a) General overview: We don't set any quantitative conditions for energy efficiency, requirements are set into the frame of integrated approach to reach the best available performance of the plant.
The Nether-lands InfoMil	---
The Nether-lands DCMR	a) General overview: see answer 1.3.1 energy use dependent, varying from: - no obligations for low users - requirement to take standard measures for medium-sized users a energy study and implementation of all economic measures for high users b) example 1: see annex example consideration on energy efficiency
Norway	a) general overview: See point 1.1.2 Energy efficiency
Poland	a) General overview: It is incorporated as a recommendation (not always, provision level is not specified)
Romania	a) General overview: *-All EIPs have, in general, a chapter describing the main resources of water, energy and fuels: supply sources, quantities, utilization; actual status by comparison with BAT recommendations; an evaluation of compliance is made and general/ specific requirements are mentioned.* *- Where case, EIPs include a separate sub-chapter: "Efficient use of energy", with a more detailed evaluation.* *- As a general requirement – all companies operating IPPC installations have to periodically perform an energy audit (the audit conditions are specified in the answer 2.1.2.) and to report the results to the competent authorities: Regional EPAs and NEG's local structures.* *- In case of non-compliance (the existing installations), the requirements for energy efficiency are incorporated into the permit as "Actions Plan" – measures to be taken, in order to comply with the legal demands (see the answer 3.2.4.).* *- Beside of this, in the chapters "Monitoring" and "Reporting" of EIPs, specific requirements are formulated (e.g. regarding the monitoring and reporting of the emissions from combustion processes; the reporting of specific energy consumptions etc)* *- A general requirement for EIP-s owners is to present, to the competent authorities, the Annual Environmental Report, which includes the section "Efficient use of energy".*
	b) example 1: *EIP no.16/ 29.12.2005 – first revision: 12.11.2007, issued by the Regional EPA Bacau for the IPPC installations of ARCELORMITTAL TUBULAR PRODUCTS ROMAN SA – activity 2.3. - a: Installations for the processing of ferrous metals/ Hot-rolling mills with a capacity exceeding 20 tones of crude steel per hour (available on the site www.arpmbc.ro).* *Chapter 7. Resources: water, energy, natural gas etc.* *7.1. Water* *7.2. The efficient use of energy (pp.33-35), including the following sections: 7.2.1. Thermal energy; 7.2.2. Power; 7.2.3. Natural gas supply; 7.2.4. Compressed air; 7.2.5. Oxygen for technical use; 7.2.6. Requirements.*
	b) example 2: *EIP no. 157/ 29.10.2007, issued by the Regional EPA Pitesti for the IPPC installations of DONAU CHEM SRL Turnu Magurele – activities 4.2. – a, b: Chemical installations for the production of basic inorganic chemicals, such as gases (ammonia), acids (nitric acid) and 4.3: Chemical installations for the production of phosphorous-, nitrogen- or potassium-based fertilisers (urea and NPK). EIP available on the site www.arpmsm3.ro.* *As a result of evaluation made by comparison with BAT recommendations, the Actions Plan includes the following measures ment to improve the energy*

	consumption in the ammonia production installation: *- The purchase and mountage of a new unit of cracking tubes thin-walled; aim: the decrease of the energy consumption from xxx GJ / t NH_3 to yyy GJ / t NH_3; dead-line: December 2008; actual status: accomplished.* *- The modernization of CO_2 washing unit; aim: the decrease of the energy consumption from yyy GJ / t NH_3 to zzz GJ / t NH_3; dead-line: December 2010; actual status: ongoing.* *- The purchase and mountage of a Hydrogen recovery unit from purge-gases; aim: the decrease of the energy consumption from zzz GJ / t NH_3 to qqq GJ / t NH_3; dead-line: December 2013; actual status: not yet started.*
Spain	a) General overview: We don't require any quantitative goal in energy efficiency or energy consumption, instead we ask for process integrated measures that are selected before the construction of the facility, as the examples already given.
	b) example 1: We ask for, at least, three effects in the evaporators of tomato juice concentrate installations but we don't assess the efficiency of the compressor that pumps the water vapour to the evaporator.
Sweden	a) General overview: *As appropriate. It could be made by a reference to the application or by introducing concrete conditions.* *One should note that the number of concrete conditions so far is limited.*
	Example 1: *Combustion/incineration plants: Limitations of operation conditions when the need for energy is reduced (to avoid waste of energy)*
United Kingdom	Refer to answers 1.2.1, 3.2.1 and 3.2.2

3.4.2 What kind of binding conditions or other requirements are in use or have been used (in particular for the concrete examples)?

Austria	a) General overview: • Obligation to carry out an energy monitoring (e.g. energy intensive installations such as metal industry, waste incineration plants) • measurements of the quantities of thermal and electrical energy produced, monthly calculation of the efficiency rate • Obligation to investigate possibilities for recovery of heat, use of surplus heat • Measurement of CO2 emissions
	b) example 1: • recovery of the blast furnace gases in the walking beam furnace • other conditions: see above answer to 3.3.1.
Bulgaria	---
Cyprus	a) General overview: The binding conditions that are included in the permits are mainly focused at the monitoring of the energy efficiency. b) example 1: Power Stations: The operator is obliged to curry out measurements of air emissions. The operator is obliged to keep detailed records (including fuels/electricity consumption). b) example 2: Cement Industry: The operator is obliged to curry out measurements of air emissions. The operator is obliged to keep detailed records (including fuels/electricity consumption).
Reg. Office Centr. Bohemia	b) example 1: Develop an energy audit and submit its evaluation of the Regional Authority
Czech Env Inspectorate	undefined

Denmark	---
Finland	a) General overview: Requirements for conducting energy analysis, requirements for taking energy efficiency into account in new investments. b) Example 1: "Operator must conduct an expert analysis on energy efficiency of the sulphuric acid plant. Analysis should focus on especially on matching the energy flows between energy systems in sulphuric acid plant and zinc roaster, possibilities to cross-use energy flows and possibilities to utilize waste heat from sulphuric acid plant" (sulphuric acid plant) b) Example 2: Numerous requirements for conducting an energy efficiency analysis and energy efficiency action plan
Berlin	---
Hessen	a) General overview: the permission is binding. b) Example 1: see 3.4.1
Kiel	a) General overview: see 3.4.1, up to now mostly rather general topic in the permit, specific measures depend on what is missing or insufficient in the application documents b) example 1: power plants: permits not yet issued b) example 2: waste incineration plant: monitoring of input material and characteristics including calorific value
Bezreg Köln	---
Greece	a) General overview: provisions and requirements for temperature monitoring, flow rates monitoring etc
Latvia	a) General overview: All the conditions set in the permit are binding for operator (accounting of fuels, consumed energy, CO2 emissions)
The Nether-lands InfoMil	---
The Nether-lands DCMR	---
Norway	a) general overview: See point 1.3.1
Poland	none
Romania	a) General overview: *The legal requirements generally used are the ones included in the main following documents:* *- GO no. 195/ 2005 regarding the environmental protection, approved by the Law no. 265/ 2006;* *- GO no. 152/ 2005 (IPPC), approved by the Law no. 84 /2006;* *- Ministerial Order (MEF) no. 818 /2003 regarding the permitting procedure for EIP, modified by the Ministerial Order (MEF) no. 1158 /2005;* *- Ministerial Order (MEF) no. 36/ 2004, concerning the approval of the General Technical Guidance for the issuing procedure of the Environmental Integrated Permit (EIP);* *- Romanian Standards and Norms (e.g. for emissions limit-values)* *- Where appropriate – the BAT recommendations are also used, in connection with the specific activities in the installation under permitting procedure (see the examples below).*
	b) example 1: *BREF (12.2001) – Ferrous Metals Processing Industry*
	b) example 2: *BREF (08.2007) – Large Volume Inorganic Chemicals – Ammonia, Acids and Fertilisers Industry*
Spain	---
Sweden	a) General interview: *All conditions are of course binding. However, there are no general binding rules (see IPPC Article 9, point 8.)*
United Kingdom	Other than that described in 3.4.1, nothing more.

3.4.4 Are there any differences between new and existing installations (e.g. in terms of the timetable for implementing energy efficiency)?

Austria	a) General overview In general, the authority can grant a transitional period for implementing certain measures. In some cases, an improvement of energy efficiency would imply big changes in existing installations which the operator would only envisage when the plant is at the end of its life-cycle.
Bulgaria	---
Cyprus	a) General overview: There are no legal differences. b) Example 1: However, as regards the existing installations, there is a transition period for implementing energy efficiency depending on the current infrastructure. b) example 2: The new installations are expected to implement energy efficiency requirements at the beginning of their operation.
Reg. Office Centr. Bohemia	a) General overview: see 3.2.4
Czech Env Inspectorate	Undefined
Denmark	a) General overview: Existing installations will be subject to a negotiated improvement programme.
Finland	a) General overview: In general no differences, but in some cases new plants would have more stringent conditions or conditions to make analysis after the operations have started.
Berlin	---
Hessen	a) General overview: no
Kiel	a) General overview: For new installations the the implementation of BAT is required directly. For existing installations the authority may agree with the operator on a transition period for energy efficiency measures as far as legislation does not yet contain clear requirements and defined transition periods.
Bezreg Köln	---
Greece	a) General overview:Transition period is granted to existing IPPC installations. For non-IPPC installations, a transition period is foreseen for existing installations. b) example 1: transition period b) example 2: One year for fuel switching for existing installations in ceramic installations
Latvia	No
The Nether-lands InfoMil	---
The Nether-lands DCMR	a) General overview: A new installation is required to implement BAT directly Existing installations require BAT investment at 'natural moments' (with larger adaptations especially), which can be renovation, maintenance.
Norway	---
Poland	None so far
Romania	a) General overview: *See the answer and the examples given at 3.2.4. and at 3.3.1*.
Spain	a) General overview: Lots of BATs are applicable only in new installations because of the need of great modifications of the installations or equipments. So, it depends on the level of modification needed and the applicability given in the BREF document.
Sweden	a) general overview: *No difference from a general point of view. See answer to 1.3.2.*
United Kingdom	Yes. We expect BAT from the start for new installations. Existing installations will be subject to a negotiated improvement programme.

3.5 Best available technique (BAT)

3.5.1 Please describe your experience with the use of the EU BREF's in the permitting process?

Austria	In general, it is quite common to refer to the BREFs in the IPPC or EIA permitting procedure. For the applicant: BREFs are basic requirements for planning. For the authority: BREFs represent minimal demands for the project
Bulgaria	they are used as a refference
Cyprus	Sectoral BREF's are more often used in the permitting process.
Reg. Office Centr. Bohemia	There is Czech Environmental Information Agency (CENIA) in Czech Republic. CENIA is specialist support in evaluating BAT for Regional Authorities. Its opinions are important in permit procedure.
Czech Env Inspectorate	We evaluating using BAT in process EIA, in references to application about integrated permit and changes in integrated permit.
Denmark	BREF´s are used in general but the horizontal may not have been used that much. The experience from the use of the recommendations in the BREFs are still very limited. In our opinion only very few BREFs deal with energy efficiency in a way that make them useful.
Finland	The use of sector BREF's are widely used in the permitting process, when ever the BREF contains detailed enough information and has quantitative BATAEL's
Berlin	---
Hessen	Not available.
Kiel	In Germany generally relevant limit values and other requirements are laid down in the laws, ordinances, technical instructions and other technical guidance papers or guidelines. They are based on the best available technique and shall protect against any harmful effects on the environment and prevent the emergence of any such effects. Information of BREF documents are taken into account. Permit writers can refer to the BREF documents, but it is not allowed that the requirements in the permit fall behind German law. In the permit procedure the citizens' groups in Schleswig-Holstein often refer to the BREF documents and claim that the authority should check the compliance with the requirements of the BREF documents.
Bezreg Köln	In Germany because of the government decision (BMU) to adopt BREF as legally binding rules, we don't need the BREF papers because you find the "obligations" in TA Luft etc
Greece	---
Latvia	We assess the permit applications under the criteria given by the BREF of the activity.
The Nether-lands InfoMil	---
The Nether-lands DCMR	All IPPC installations are assessed for being BAT with IPPC assessment tools in the IPPC information documents. It includes a gap analysis with approaches to solve non-compliance. In application procedures it is required to present an up-to-date IPPC-information document..
Norway	BREFs are the reference for permit conditions
Poland	Organisation I work for doesn't take part in permitting process
Romania	*The permitting authorities (National and Regional Environmental Protection Agencies) are currently using BREF's in the IPPC permitting procedures (see also the examples of IPPC permits, given above). The informations in the permit application are assesed in relation to the appropriate BREF criteria, including the ones reffering to the use of energy. The inspection authority (National Environmental Guard, through its regional and local structures) has aslo experience with the use of the EU BREF's in the permitting process: they participate to the main steps of the IPPC permitting process, including the Technical Analyzation Committee meetings, where the environmental impact of the installation is assesed and the compliance with BAT requirements is evaluated. In this context, only the use of ENE BREF is relatively new and a better correlation between this one and*

	sectorial BREF's is considered to be necessary.
Spain	We assess the permits applications under the criteria given by the BREF of the activity. We compare the techniques suggested in the installation and the BATs of the sector. In the BREF of the sector in study you usually find data about the energy consumption of a technique or a group of them, but sometimes you are given only qualitative information related to energy efficiency.
Sweden	*Unfortunately, the current EU-BREFs do generally not give much information on BAT for energy efficiency.*
United Kingdom	We are reviewing now how we will make full use of the BREF. One option is to reflect the BREF into a specific format against which our field staff will carry out specific energy efficiency audits.

3.5.2 Are relevant data in BREF's used as benchmarks for energy efficiency in your country?

	yes/no	If yes, please specify
Austria	yes	e.g. benchmark for energy efficiency in the Cement BREF
Bulgaria	yes	The operation is assessed against the description in the relevant BREF
Cyprus	yes	According to the sectoral BREF.
Reg. Office Centr. Bohemia	---	The data are used in process EIA and in evaluating BAT
Czech Env Inspectorate	yes	It's used in process EIA
Denmark	yes	In some extension.
Finland	yes	Benchmarks have been mentioned and used in the permits, when these exist in BREF's and are relevant for certain activity. For instance in LCP sector.
Berlin	---	---
Hessen	---	Not available
Kiel	yes	For the Ammonia production Schleswig-Holstein referred to the energy efficiency benchmark of the BREF "Large Volume Inorganic Chemicals, Ammonia, Acids and Fertilisers Industry.
Bezreg Köln		I don't know
Greece	yes	---
Latvia	no	---
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	no	
Norway	yes	It is often referred to in the reasons for the permit conditions
Poland	yes	
Romania	yes	
Spain	no	
Sweden	---	*See 3.5.1*
United Kingdom	yes	We are reviewing the BREF benchmarks now as well as other benchmarks such as EU ETS benchmarks against which free allowances are issued. We also have guidelines published by Government on Greenhouse Gases – Conversion factors for Carbon Reporting [based on fuel usage, activity data, conversion factors]

3.5.3 Do you use the horizontal BREF (common to several industrial sectors) on energy efficiency techniques?

	Yes/no	If yes, please specify (you can use your examples)
Austria	---	No specific information available It appears that the focus of the authorities is on the process specific energy issues rather than on auxiliary systems and utilities such as mentioned above (see 3.3.2.).
Bulgaria	yes	---
Cyprus	no	It is usually used for obtaining general information.
Reg. Office Centr. Bohemia	yes	This BREF is used for evaluate BAT.
Czech Env Inspectorate	yes	It's using in evaluating in process EIA, in references to application about integrated permit and changes in integrated permit.
Denmark	yes	BREF´s are used in general but the horizontal may not have been used that much.
Finland	no	These have been used as general sources of information, not so much in individual permit considerations.
Berlin	---	---
Hessen	---	Not available
Kiel	---	Authorities mainly refer to the specific BREF document.
Bezreg Köln	no	
Greece	yes	---
Latvia	yes	They are used by not so often
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	yes	Als onderdeel in het IPPC-informatiedokument (indien voorgeschreven)
Norway	---	We probably have a potential of improving our benefit of the ENE BREF
Poland	yes	---
Romania	yes	If yes, please specify (you can use your example) *e.g. Since 2009, ENE BREF is used for the appropriate industrial sectors*
Spain	not yet	
Sweden	no	
United Kingdom	---	We do produce sector guidance notes which incorporate sections on energy efficiency. All are now being reviewed. Eg: http://www.environment-agency.gov.uk/static/documents/Business/IPPC_S2.01June04.pdf

3.5.4 Have you specifically referred to the horizontal or sectoral BREFs in permitting procedures/technical expertise?

	Yes/no	If yes, please specify (you can use your examples)
Austria	yes	In general, it is quite common to refer to the BREFs in the IPPC or EIA procedure. E.g. in the technical expertise required from the EIA authority the experts note that the relevant BREF has been taken into account (however, this experience relates rather to BAT associated emission values mentioned in BREFs than to energy efficiency).
Bulgaria	yes	The technical assessment contains the outcome of the assessment described in 3.5.2
Cyprus	yes	We referred to the sectoral BREF.

Reg. Office Centr. Bohemia	yes	In act 76/2002.
Czech Env Inspectorate	yes	It's noted in act 76/2002 (set up emission limits)
Denmark	yes	From time to time.
Finland	yes	Specific references are made to BATAEL's when setting permit conditions for instance for large combustion plants and chemical plants
Berlin	---	---
Hessen	---	Not available
Kiel	yes	See example waste incineration plant for steam production, answer to question 3.2.1. An external expert had to check the application whether it was in line with the BREF Waste Incineration including the requirements concerning energy efficiency.
Bezreg Köln	No	
Greece	Yes	---
Latvia	No	
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	---	---
Norway	Yes	See point 3.5.2
Poland	No	
Romania	Yes	*Example: EIP no. 15/ 06.08.2007, revision 1/ 21.03.2008, issued by the Regional EPA Bacau for the IPPC installations of the company GA-PRO-CO CHEMICALS SA Savinesti - activities 4.2. – a, b: Chemical installations for the production of basic inorganic chemicals, such as gases (ammonia), acids (nitric acid) and 4.3: Chemical installations for the production of phosphorous-, nitrogen- or potassium-based fertilisers (urea, ammonium-nitrate and Ca-ammonium-nitrate), available on the site www.arpmbc.ro. The permitting procedure, including EIA, reffered quite close to the content of BREF (08.2007) – Large Volume Inorganic Chemicals – Ammonia, Acids and Fertilisers Industry. The sectoral BREF's are used every time where appropriate (e.g. chemical industry, pulp and paper, textile dyeing etc).*
Spain	not yet	
Sweden	Yes	*The BREF for pulp and paper mills is sometimes referred to in permitting procedures for such mills.*
United Kingdom	Yes	We reflect the sectoral BREF notes in our sector guidance notes where appropriate.

3.5.5 Do you use any other sources than the BREF's to evaluate BAT for energy efficiency?

	Yes/no	If yes, please specify
Austria	no	---
Bulgaria	yes	Technical specifications of the equipment for instance
Cyprus	yes	Technical specifications of the equipment can also be considered.
Reg. Office Centr. Bohemia	yes	National official sources: e.g. Catalogue of measures to reduce energy efficiency, Energy intensity of production of selected products
Czech Env Inspectorate	---	undefined

Denmark	yes	Using www.
Finland	yes	Unofficial benchmarking with other installations on same sector
Berlin	---	---
Hessen	---	Not available
Kiel	yes	Brochure with advice on energy efficiency for industry and crafts of the Federal Ministry for the Environment (very general). Environmental Ministries of the federal states or their agencies have published guidelines on efficient energy use. They can be found on the individual homepages, e.g. Bavarian State Agency for the Environment: has 10 general guidance papers (energy efficient use of compressed air, lighting systems, etc.), 15 branch specific guidances with examples (paper industry, paint shop, porcelain industry, plastics processing, glass industry …) and commerce, crafts and services (butcheries, bakeries ..). The website of the German Energy Agency (dena) provides an overview. Guidelines of VDI – Verein Deutscher Ingenieure (Association of German Enigineers) .eg. VDI 4602 ”Energy Management”, VDI 3807 “Characteristic values of energy and water consumption in buildings”, VDI 3922 “Energy consulting for industry and business”, VDI 4661 “Energetic characteristics – definitions – terms - methodology” etc. are a source of information from a non-governmental organisation. The VDI-guidelines are often taken into account for the determination of BAT.
Bezreg Köln	---	---
Greece	yes	National legislation concerning in particular heating boilers, water discharges
Latvia	no	
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	yes	All BAT documents are included in the Dutch bylaw ‘appointed BAT documents’. Standard lists of measures per sector are use for provn energy efficient measures. Specific measures are usually coming from additional energy efficiency studies by sector organisations. Additional energy efficiency policy can be found at provincial level, which has to be implemented by environmental proctection agencies..
Norway	---	To a minor degree, may use other available benchmarks relevant for different industrial sectors
Poland	no	
Romania	no	
Spain	yes	Researches, reports from prestigious sources, for example, from USEPA or EEA or scientific articles
Sweden	yes	*On important source when evaluation what represents BAT for the industrial sector in question can be energy consumption data from other operators in the sector. Sometimes there are also data available in research programmes*
United Kingdom	---	We do look at published literature to review our position but we note that there have been few technical developments in the sience and practice of energy efficiency.

3.5.6 Do you have any national sector-wise evaluation of BAT concerning energy efficiency (including studies)?

	Yes/no	If yes, please specify
Austria	---	The Federal Environment Agency published two studies on energy efficiency in selected industrial sectors.
Bulgaria	no	---
Cyprus	no	---

Reg. Office Centr. Bohemia	yes	Confrontation technological level of Czech and European coking plants, Hutní projekt Frýdek-Místek, říjen 2003 The issues of energy efficiency and the integrated permits of food industry and farming sector, ENVIROS, s,.r.o., 2007
Czech Env Inspectorate	yes	For coking plant – Confrontation technological level Czech and Evropean coking plant
Denmark	yes	Guidelines from The Energy Agency
Finland	no	
Berlin	---	---
Hessen	---	Not available
Kiel	no	
Bezreg Köln	no	
Greece	yes	---
Latvia	no	
The Nether-lands InfoMil	---	---
The Nether-lands DCMR	yes	Via Infomil. DCMR is involved in sector-wise evaluation on a ad hoc basis.
Norway	no	
Poland		Probably yes but I don't know the details
Romania		I don't have any information on this subject
Spain	no	
Sweden	no	
United Kingdom	---	We are reviewing this information and have recently updated our reporting requirements through our resource efficiency programme.

3.5.7 What is still missing?

Austria	
Bulgaria	
Cyprus	An integrated approach of energy efficiency in the permits.
Reg. Office Centr. Bohemia	
Czech Env Inspectorate	
Denmark	The integrated approach and cooperation with other authorities could be improved. In general the permit writer will consider that energy topics are supervised and up to date due to the work done by the Danish Energy Agency.
Finland	Specific legal framework and sector-wise applicable information.
Berlin	
Hessen	Ordinance according to § 5 Abs. 1 Nr. 4 Federal Immission Control Act (BimSchG)
Kiel	
Bezreg Köln	
Greece	
Latvia	Specific legal framework and sector wise applicable information
The Nether-lands InfoMil	
The Nether-lands DCMR	Linking to climate policy
Norway	Reliable benchmarks for different sectors and definition of system boundaries
Poland	Binding new acts

Romania	*A closer and more efficient cooperation between all competent authorities as well as other interested parties.*
Spain	
Sweden	Unfortunately; I do not fully understand the question.
United Kingdom	

4 VOLUNTARY ENERGY SAVING ARRANGEMENTS

4.1 Do you have energy saving arrangements in use in your country? Please provide a concise overview.

	Yes/no	If yes, please provide a concise overview
Austria	---	The Austrian Energy Strategy contains sector specific measures to reach the European objectives for 2020 (adopted by the climate and energy package in 2008) such as funding or tax benefits for energy efficient investments, energy consulting activities for companies, implementation of energy efficiency management systems etc..
Bulgaria		Probably where appropriate according to implemented ISO systems
Cyprus	yes	According to the EMAS system.
Reg. Office Centr. Bohemia	yes	The conditions in integrated permits (conditions for energy saving), EMAS – Environment management system, ISO 14001 – Czech national standard
Czech Env Inspectorate	yes	The conditions in integrated permits (conditions for energy saving), EMAS – Environmental Management system, ISO 14001-Czech national standard
Denmark	yes	Individual companies within specified branches can make voluntary energy saving agreements with the Energy Agency. Energy suppliers have an obligation to buy energy savings e.g. as documented improvement projects at enterprises.
Finland	yes	There are numerous voluntary energy saving schemes established for different industrial, service and primary productions sectors
Berlin		
Hessen	yes	The Umweltallianz Hessen and the authorities related to “Nachhaltigkeitsstrategie Hessen (Hessian Sustainability Strategy)” encourage applicants to use voluntary energy saving systems.
Kiel	yes	Climate-protection agreement of the Federal Government with German industry of November 2000 in which (See 1.1.2) German industry has declared its willingness to reduce the specific greenhouse-gas emissions by 35 % by 2012. Associations of 19 industrial branches have signed the agreement (representing 80 % of energy consumption in the German producing industry). The operators report to the Federal Agency for Statistics. From there the Rheinisch Westfälisches Institut für Wirtschaftsforschung Essen, Germany (RWI) receives the data. Electricity suppliers report to the Association of German Electricity Industry (VDEW). RWI and VDEW evaluate the data and make an annual report.
Bezreg Köln	no	
Greece	yes	Fiscal measures and taxation instruments for installation of solar boilers
Latvia	no	
The Nether-lands InfoMil		Energy saving arrangements in the Netherlands are: • long-term agreements on energy efficiency (LTA3); and • long-term agreements on energy efficiency for ETS enterprises (LEE). See for more information: www.senternovem.nl/LTA/index.asp Yes, on LTA 3 and LEE, see : www.senternovem.nl/LTA/index.asp

The Nether-lands DCMR	yes	If yes, please provide a concise overview: ▪ At national level: negotiated covenants, facilitating energy efficiency obligations ▪ Regional initiatives: Rotterdam Climate initiative (RCI), which is a policy to reduce CO2 emission with 50% before 2025 National Subsidies and fiscal support for energy-efficiency.
Norway	yes	- An energy fund has been established to promote an environmentally sound change in the use and production of energy (ENOVA). - Program for energy efficiency in energy intensive installations (pulp and Paper) - An agreement between the Ministry of Environment in Norway and Norwegian Industry (an organisation organizing a major part of the Norwegian industry) on reducing emissions of greenhouse gases which cover installations that are not included in the EU ETS.
Poland	no	
Romania	yes	If yes, please provide a concise overview *According to GO no. 22/ 2008, art. 9 (1 – c - iv) and 9 (3): "The energy suppliers, the operators in the energy distribution system and/ or the energy retailers have to take measures in order to increase the efficiency of their own energy consumption and they have to (…..) participate to the voluntary agreements proposed by the government".* "*The voluntary agreements mentioned in art. 9 (1 – c - iv) include clearly-defined objectives and also monitoring and reporting requirements, in connection with the procedures that could lead to the revisions and/ or updating the measures, when the objectives are not accomplished or there is a risk not to be accomplished. In order to secure the transparency of the voluntary agreements, they can be available to the public and they are published before the implementation – considering also the confidentiality clauses – in order to receive comments from interested parts."*
Spain	yes	The action arrangement 2008-2012, in industry sector, suggest the following measures: Voluntary agreement (Commitment of company associations in order to achieve an energy saving. Promoting the adoption of measures of saving by industry). Energy auditing (detecting of potential and making easier to decide the investment in energy saving / determining the process benchmarking) Public subvention program (Increasing economic feasibility of inversion in energy saving to achieve the potential) Law action http://www.idae.es/index.php/mod.pags/mem.detalle/idpag.89/relcategoria.1154/relmenu.11
Sweden	---	*Unfortunately, I do not fully understand the question . Maybe I could refer to the answer under 3.2.3 on "PFE".*
United Kingdom	no	For the regulated community, all our schemes are mandatory.

4.2 What is the role of voluntary energy saving agreements in the permit procedure and in inspections?

Austria	The available data can be used in the permit procedure and inspection.
Bulgaria	If it affects the implemented technique
Cyprus	No binding conditions are defined in the permits.
Reg. Office	Voluntary energy saving agreements in the permit procedure is important for

Centr. Bohemia	negotiation.
Czech Env Inspectorate	This role is that, we take control of installation in less time, easier controls and permitting procedure and high level of environment.
Denmark	No role. Not included in the permit.
Finland	These are major information source and basis for energy efficiency analysis in the permit procedure and inspections. Energy efficiency analyses are encouraged during the permits processes and inspections.
Berlin	To decide on individual case
Hessen	See 4.1
Kiel	Background material
Bezreg Köln	---
Greece	In case that such agreements are proposed in the environmental permit application, then these are being included into the environmental permit
Latvia	---
The Nether-lands InfoMil	If an installation works under a LTA3 or LEE, than this is stated in the permit.
The Nether-lands DCMR	In the permit it is a sufficient implementation of the obligations for energy-efficiency investments, as described in the Dutch law on environmental protection. It is not a priority in the inspection strategy. A check on completeness is all that is required.
Norway	We probably have a potential of improving our benefit from voluntary agreements in the permit processing.
Poland	none
Romania	*Theoretically, the conditions in a voluntary agreement are considered as they are, in the permit procedure and in inspections.* *In practice, I had never deal with companies under voluntary agreements.*
Spain	---
Sweden	*See above: Data from "PFE" can be used in the permitting procedure*
United Kingdom	We do not have voluntary energy saving agreements.

5. REPORTING AND SUPERVISION

5.1.1 What kind of monitoring and reporting systems of energy use and efficiency are used in your country? Please give a general overview. Please specify for large combustion plants and waste incineration plants and other energy intensive installations:

Austria	General overview: Monitoring and reporting is carried out according to the conditions in the permit. Large combustion plants: see answer to 3.4.2. a) Waste incineration plants: see answer to 3.4.2. a) another type of energy intensive installation: ---
Bulgaria	General overview: the permit contains relevant monitoring and reporting conditions
Cyprus	General overview: Keep detailed records and submit annual reports. Large combustion plants: The operator is also obliged to carry out measurements of air emissions. Waste incineration plants: Keep detailed records (fuel and electricity consumption) and submit annual reports. another type of energy intensive installation: Keep detailed records (fuel and electricity consumption) and submit annual reports.
Reg. Office Centr. Bohemia	General overview: Operators continuously recorded energy savings and report annually to the Regional Authority.
Czech Env Inspectorate	---

Denmark	General overview: --- Large combustion plants: As listed in directive 2001/80 23. October 2001 (“big combustion plants”) Waste incineration plants: As listed in directive 2000/76 4.December 2000 (Incineration of waste)
Finland	General overview: Supervision is based on annual reports to environmental authorities. Depending on the permit conditions, annual reports contain information on energy use, monitoring and energy efficiency investments. Voluntary energy saving schemes have separate reporting systems.
Berlin	Waste incineration plants: Annual report Another type of intensive installation: report on emissions (comment: does not include data on energy consumtion ..)
Hessen	General overview: not available
Kiel	General overview: In the field of energy efficiency there is not yet implemented a general or specific system for monitoring and reporting to the environmental authority. Up to now there are obligations in the permit that base on the individual case.
Bezreg Köln	---
Greece	General overview: Monitoring and reporting systems of energy use and efficiency are in place for LCP in Greece Large combustion plants: temperature of gas exhaust, temperature of water discharges, flow rate(s) another type of energy intensive installation: as above
Latvia	General overview: Operator has to keep accounting of fuels, consumed/produced energy, CO2 emissions
The Nether-lands InfoMil	---
The Nether-lands DCMR	General overview: The EPRTR is the annual required monitoring and reporting system for environmental data by larger industries, including data on energy. See annex for report on EPRTR Monitoring is being done by some additional national programmes, including the energy covenants (SenterNovem), CO2 emissions (RCI), different statistics (National statistics agency), emission trade (national emission trade agency)
Norway	General overview: See point 1.3.1
Poland	General overview: Energy Regulation Agency (direct translation) monthly questionnaires for large combustion plants
Romania	General overview: Large combustion plants: *(e.g. the company CET IASI SA, EIP no. 9/ 10.05.2006 – activity 1.1. EIP available on the site www.arpmbc.ro)* *- On-line monitoring of the flue gas emissions* *- Annual report regarding energy use and efficiency (part of the Annual Environmental Report)*
	Example 1: Waste incineration plants: *(e.g. the company ECO FIRE SA Constanta, EIP no. 2/ 13.02.2009 – activity 5.1. EIP available on the site www.arpmgl.ro)* *- Continuous monitoring of power consumption, active and reactive voltage, combustion and post-combustion temperatures, through the computerized system for the process control (PLC).* *- Air emissions continuous monitoring, according to the specific requirements for the hazardous waste incinerators; monthly reporting of the results.* *- Annual Environmental Report (including information about energy use and efficiency).* *- Annual Report for the European Register of the Pollutants Released and Transferred (EPRTR), according to the requirements in GD no.140 /2008.*
	Example 2: Another type of energy intensive installation: *(e.g. the company CARPATCEMENT HOLDING SA – branch office Bicaz – EIP no. 9/ 20.10.2005, revision 2: 24.08.2009 – activity 3.1. – production of cement clinker in rotary kilns with a production capacity over 500 tons per day. EIP available on the site www.arpmbc.ro)* *- On-line monitoring of the flue gas emissions from clinker kiln; monthly reporting of the results.*

	- Continuous measurements and daily internal evaluation of the energy specific consumption. *- Annual report regarding energy efficiency (confidential data), as a part of Annual Environmental Report.*
Spain	General overview: The monitoring information related to the use of fossil fuels is needed to accomplish with the Directive 2003/87/CE, but registers of consumption of electricity and fuels is asked in the permits too. The installation must show his capability of registering his energy consumption and of determining his carbon dioxide emissions.
	Large combustion plants: Energy efficiency of those activities is controlled by the national authority and they have to register and report the fuel consumption annually. Real Decreto 430/2004 http://www.boe.es/aeboe/consultas/bases_datos/doc.php?id=BOE-A-2004-5117 Large combustion plants: Energy efficiency of those activities is controlled by the national authority and they have to register and report the fuel consumption annually. Real Decreto 430/2004 http://www.boe.es/aeboe/consultas/bases_datos/doc.php?id=BOE-A-2004-5117
	Waste incineration plants: Energy efficiency of those activities is usually controlled by the national authority and they have to register and report the fuel consumption annually. Real Decreto 430/2004 http://www.boe.es/aeboe/consultas/bases_datos/doc.php?id=BOE-A-2004-5117
Sweden	*General overview: In the annual environment reports data on energy consumption are reported as appropriate*
	Large combustion plants: *No specific or formalised kind of monitoring and reporting system of energy use and efficiency is used. Data on operation-fuel input-energy output is to be found in the annual environment report.*
	Waste incineration plants: see above
United Kingdom	There are a number of different energy efficiency schemes which have their own reporting requirements eg. for trading schemes and government incentives designed to stimulate energy efficiency. But for IPPC sites, see 3.2.2.

5.1.2 To whom and how often are the reports given?

Austria	Case specific depending on permitting conditions regarding energy efficiency. In most cases the operator has to submit the reports once per year.
Bulgaria	To the enforcement authority for the last year, yearly
Cyprus	Annual reports are submitted to the competent authorities (Department of Environment and Department of Labour and Inspection)
Reg. Office Centr. Bohemia	See 5.1.1
Czech Env Inspectorate	---
Denmark	The Ministry of Environment. At least yearly.
Finland	Reports are given to supervising authority once a year, end of February. Reports are public, if parts of them are not declared confidential.
Berlin	Permit authority, annual, every 4 years
Hessen	Not available
Kiel	---
Bezreg Köln	---
Greece	Regularly to the environmental permitting authorities, as well as in case of inspections
Latvia	During inspections inspectors check accounting records, operators annually shall submit reports on emissions (CO2, NOx, SOx), generated waste
The Nether-lands InfoMil	---
The Nether-	Annually (see 51.1)

lands DCMR	
Norway	Yearly reports to the Pollution Control Authorities
Poland	Energy Regulation Agency monthly questionnaires
Romania	*-The reports are forwarded to the Regional Environmental Protection Agencies (the IPPC permitting authorities) and to the local (county) structures (commissariats) of the National Environmental Guard (the control authority in the field of environmental protection.* *- According to the specific content of each report type, the reporting frequency is different (as exemplified above): monthly, quarterly, yearly – the most common*
Spain	Annually, to Spanish government. Ministerio de Industria.
Sweden	*To the competent authority once a year*
United Kingdom	---

5.1.3 How often is the monitoring carried out?

Austria	Case specific, self monitoring is carried out according to the specific permit conditions
Bulgaria	There is a guideline how to measure it.
Cyprus	Annual reports are submitted and several inspections are carried out.
Reg. Office Centr. Bohemia	continuously
Czech Env Inspectorate	---
Denmark	As mentioned in the directives.
Finland	Monitoring is site specific.
Berlin	if possible annually
Hessen	Not available
Kiel	As it is not a requirement with a legal background the permit writer can fix case specific periods. Concerning the agreement with the German government companies have to report their annually annually to the Federal Agency for Statistics.
Bezreg Köln	---
Greece	Depend on the case, usually for the air and water temperature as well as for flow rates, continuous monitoring is foressen
Latvia	---
The Nether-lands InfoMil	---
The Nether-lands DCMR	annually
Norway	Yearly
Poland	Every month
Romania	*Depending on the specific of the installation: on-line monitoring of certain parameters; daily, monthly, quarterly, yearly measurements (see also the answer 5.1.1.).*
Spain	Pollutant emissions must be monitored continuously and also gaseous fuel
Sweden	*Unfortunately, I do not fully understand the question*. The operator monitors of course the consumption of energy continuously. Moreover, there is an obligatory legal request on operator self monitoring which also covers energy issues.
United Kingdom	Monitoring is carried out by continuous monitors and is available for inspection. Operators are required to provide annual total reports based on usage.

5.1.4 Which parameters are monitored?

Austria	See answer to 3.4.2. • quantities of thermal and electrical energy produced • Measurement of CO2 emissions
Bulgaria	See the permit conditions section. The permit conditions are monitored.
Cyprus	Type of fuels / fuels and electricity consumption
Reg. Office Centr. Bohemia	Various
Czech Env Inspectorate	---
Denmark	As mentioned in the directives.
Finland	Energy and fuel use, energy production, investments. Details are site specific.
Berlin	during routine inspections
Hessen	Not available
Kiel	---
Bezreg Köln	---
Greece	Temperature, flow rates, etc
Latvia	---
The Nether-lands InfoMil	---
The Nether-lands DCMR	Energy use (type, amount), CO2-emission
Norway	kWh / tonne produced
Poland	
Romania	(*see also the answer 5.1.1)* *e.g. Flue gas parameters (concentration of: SO_2, NO_x, CO, CO_2, TSP, H_2O_{vap}, O_2, temperature, gas-flow etc) – as a relevant indicator for the combustion efficiency.* *Specific consumption of thermal energy (where relevant, in terms of steam/ hot water specific consumption).* *Power specific consumption.* *Total consumption of thermal energy and/ or power (usually, on annual base) etc.*
Spain	Pollutant emissions to the air and fuel consumption
Sweden	*The different types of energy sources used*
United Kingdom	See 3.2.2

5.2 Follow-up

5.2.1 Is a follow-up required/undertaken by the authority in your country?

Austria	In general: as appropriate For EIA projects a post-project analysis has to be carried out: Three years at the earliest and five years at the latest after notification of completion or at a date specified in the development consent order, the authorities shall jointly inspect, on the initiative of the EIA authority, EIA projects for compliance with the development consent order and to verify whether the assumptions and forecasts of the environmental impact assessment correspond to the actual effects of the project on the environment
Bulgaria	follow up to what. The whole permit- enforcement cycle is applied.
Cyprus	A letter of compliance is notified to the operator. Several inspections are also carried out.
Reg. Office	Yes

Centr. Bohemia	
Czech Env Inspectorate	---
Denmark	In case a condition (concerning energy issue) is violated the authoritative will make the prober enforcement.
Finland	Based on annual reports, missing information needs to be resupplied. If the activity will not fulfil requirements, supervising authority will take necessary action. There is no
Berlin	Yes, a follow-up usually is required
Hessen	---
Kiel	---
Bezreg Köln	---
Greece	---
Latvia	In case of violation of conditions, State environmental Service makes a proper enforcement. Operators have to resubmit all required corrected or missing information.
The Nether-lands InfoMil	---
The Nether-lands DCMR	Yes, the energy convenant per 4 years. BAT compliance is a remaining requirement. It is an assessment check when the permit is issued.
Norway	As appropriate
Poland	Can't say on my own
Romania	Yes
Spain	Yes, but in large combustion installation, energy efficiency is followed up by Spanish government meanwhile regional government inspect the compliance with the "autorización ambiental integrada" permit conditions.
Sweden	*As appropriate*
United Kingdom	Yes, regular inspections are carried out.

5.2.2 Is an inspection or audit system concerning energy efficiency arranged by the authorities in your country?

Austria	No specific inspection or audit system concerning energy efficiency but environmental inspections
Bulgaria	Yes, as far as it is relevant to the specific case
Cyprus	It is covered through the general inspection arranged by the competent authorities.
Reg. Office Centr. Bohemia	Yes
Czech Env Inspectorate	---
Denmark	Individual companies within specified branches can make voluntary energy saving agreements with the Energy Agency. The agreement will include an energy management. In connection with the agreement there will be an intern audit. Inspection will be made by the authority. Audit will be made by the installation.
Finland	No specific energy efficiency inspections. The energy efficiency issues have been addressed as part of the environmental inspections, when relevant. Motiva Oy has sector-specific guidelines for voluntary energy efficiency audits.
Berlin	Up to now, not in Berlin
Hessen	See 5.2.1
Kiel	no
Bezreg Köln	no

Greece	Energy efficiency is inspected in the frame of general environmental inspection procedure. In parallel, the establishment of the new authority named Energy inspection authority will focussed on the energy use and energy efficiency issues.
Latvia	No, it is voluntary and it depends on operator.
The Nether-lands InfoMil	---
The Nether-lands DCMR	no
Norway	We have experience only from few inspections on the energy management system implemented in installations
Poland	None, according to my knowledge
Romania	yes (see also the answers 2.1.2.-B, 2.1.3, 2.1.4.) *It is stipulated in IPPC permit that a company under the provisions of IPPC Directive must perform an audit for energy efficiency. The audit frequecy differs, according to the "energy specificity" of the installations: yearly, each two/ three years, but an internal evaluation of energy efficiency has to be yearly performed and the results of it have to be included in the Annual Environmental Report.* *The National Environmental Guard, through its central, regional and local structures, carries-out regular inspections at IPPC installations.* *The inspection procedure is based on specific Technical Norms for Inspections in the field of Environmental Protection – last revision approved by the Ministerial Order (MEF) no. 464/ 21.04.2009.* *During the IPPC inspection, the aspects of energy efficiency are evaluated too, in the specific context of the installation inspected.*
Spain	Yes, but in large combustion installation, energy efficiency is followed up by Spanish government meanwhile regional government inspect the compliance with the "autorización ambiental integrada" permit conditions.
Sweden	No
United Kingdom	We are currently exploring this issue.

6 FINAL QUESTIONS

6.1.1 Is the obligation to use energy efficiently also applied to other installations than those mentioned in the IPPC Directive, Annex I?

	Yes/no	If yes, please specify
Austria	yes	Indirectly for all EIA projects (infrastructure, mining, tourism etc.), via the provisions in the EIA Act • on the climate and energy concept which has to include a certificate of an authorised consulting engineer or technical consulting office stating that the measures included in the climate and energy concept comply with the state of the art and • that emissions of polluting substances shall be controlled in accordance with the state of the art.
Bulgaria	yes	Yes, for example if the EIA procedure requires so
Cyprus	no	---
Reg. Office Centr. Bohemia	yes	Obligation to use energy efficiently applied to all installations, which have energetic audit.
Czech Env Inspectorate	yes	The obligation have all installations, which have energetic audit (obligation of act 406/2000)
Denmark	yes	In principle, all installations are obliged to use energy efficiently. The incentive to do so is coming from the taxation of energy and CO2 and grants for energy saving projects.

Finland	yes	Legislation does not make a difference between IPPC-installations and non-IPPC-installations on energy efficiency. In practice the obligations have been applied mainly on the IPPC-installations and other installations on sectors where energy efficiency is relevant concern.
Berlin		Draft climate protection act
Hessen	yes	To all plants except those without a formal permission under environmental law.
Kiel	yes	To all plants under the Federal Immission Control Act (BImSchG). It covers more installations than those which are mentioned in Annex I of IPPC Directive.
Bezreg Köln	no	
Greece	yes	Relevant provision and terms are foreseen in the environmental permits
Latvia	yes	B category installations have to apply cleaner production principles. This includes requirement to use energy efficiently.
The Nether-lands InfoMil	---	
The Nether-lands DCMR	yes	BAT documents (including BREF's) are linked to the Dutch Environmental management Act. All permits (not only IPPC) have to be assessed according this act.
Norway	yes	According to the basis for The Pollution Control Act (PCA) all installations or activities are obliged to use energy efficiently.
Poland	no	
Romania	yes	*- The provisions of the Governmental Ordinance no. 22/ 2008 regarding the energetic efficiency and the promotion of the utilization, at the final consumers, of the renewable energy resources are applicable to all final consumers, as they are defined in the article 2 – f: "Any person and company (physical and juridical entity) which buys energy exclusively for its own consumption".* *- The measures meant to improve the energetic efficiency and the final consumers' obligations are presented in the chapter II of GO no. 22/ 2008.*
Spain	no	No, from our competency
Sweden	yes	*From chapter 2, sections 3, 5 and 7 of the Code follows that the obligation to use BAT for energy conservation applies to all professional activities*
United Kingdom	yes	UK implementation of the IPPC Directive as regards to energy efficiency is currently delivered in part through participation in Climate Change Agreements (CCAs) and the Carbon Reduction Commitment (CRC). The climate change levy is a tax on the use of energy in industry, commerce and the public sector and additional support for energy efficiency schemes and renewable sources of energy. But the Government recognises the need for special consideration to be given to the position of energy intensive industries given their energy usage, the requirements of the Integrated Pollution Prevention and Control regime and their exposure to international competition. Consequently, the Government has provided an 80% discount from the levy for those sectors that agree challenging targets for improving their energy efficiency or reducing carbon emissions. The CRC is a mandatory emissions trading scheme aimed at reducing UK carbon dioxide emissions and improve energy efficiency. It will affect up to 5,000 organisations, primarily large businesses and public sector organisations including government departments, universities, retailers, banks, water companies, hotel chains and local authorities. Those organisations using at least 6,000 MWh per year settled on the half-hourly market, representing an annual electricity bill of around £1 million, will have to participate in a mandatory 'cap

		and trade' scheme. Each year this will require them to monitor and report their energy use and surrender sufficient allowances to cover their carbon dioxide (CO2) emissions.

6.1.2 In your opinion, what are the main problems with energy efficient energy use in the environmental permit procedure?

Austria	• Efficient energy use for a certain installation depends often on the location (e.g. whether the use of surplus heat is possible). Some (old) industrial sites cannot fulfil this goal, however the application cannot be rejected on the basis of suboptimal site conditions. • The BREFs so far do not offer concrete benchmarks for energy efficiency, mostly they refer to a bundle of possible measures. • Some plants do have site specific technical solutions – a comparison with given benchmarks could be difficult and not representative. • Level of detail for small energy-consuming plants, machines etc. (see horizontal BREF on energy efficiency): How deep should the level of detail be in the permitting procedure (check whether a single electric motor/lighting system is energy efficient?). Is this information available in the permitting procedure or only afterwards? Is this information relevant when dealing with very energy-intensive installations (e.g. cement plant)? • Some authorities don´t have the technical expertise to check the energy efficiency in detail.
Bulgaria	BREFs so far do not pay sufficient attention to this issue
Cyprus	In some cases of existing installations, we face some difficulties due to the fact that the process that is already in use has to be changed in order to be complied with energy efficiency requirements.
Reg. Office Centr. Bohemia	lack of experts in regional authority and lack of specialist support
Czech Env Inspectorate	undefined
Denmark	It is difficult to assess whether an installation is run energy efficient. It is difficult to benchmark installations due to different kind of production and equipment. The authority in Denmark concerning energy issues and energy efficiency is The Danish Energy Agency, which is a part of The Ministry of Climate and Energy. The Danish reimbursement scheme for the CO2-tax on industry provides subsidies for companies making an agreement on energy saving measures with the Energy Agency (formerly an agency within the Ministry of Environment and Energy, now a part of the Ministry of Climate and Energy). The agreement is not a part of environmental permit. The Energy Agency has published a number of pamphlets and guidelines on energy saving measure in order to inspire companies and an 'Energy Management Scheme' like the known voluntary environmental management schemes. Since the energy issues in general are dealt within another authority it is difficult to include energy use of energy in the environmental permit procedure. Until now there has not been taken steps to coordinate the two authorities work concerning energy issues. Further more, it is my opinion that it is difficult to express clear and exact terms of conditions concerning energy use and energy efficiency.
Finland	Vague legal framework and lack of sector specific information.
Berlin	For acting legally compliant and perhaps against the will of the applicant/operator the analysis of the installation would be needed. This would be personnel-intensive and there is a need for good knowledge in that spezcial field. Authorities are not so very much qualified for that task. Thus often only rather general information can be

	provided on similar installations / process steps hoping that operators will consider it as economically reasonable. Often engineers are forced to plan with very short periods of amortisation for ecologically reasonable measures (e.g. projects have to amortise within three years). This is against many useful measures in the field of energy efficiency.
Hessen	Regulations (Rechtsverordnung) according to § 5 Abs. 1 Nr. 4 BImSchG are still missing.
Kiel	In case of big new installations you do not know the detailed planning and the individual device that will be integrated into the installation Then it is difficult to check if requirements can be met. Waste incinerators are often operated at remote places so that CHP is difficult for them. The problems might be very complex. If an installation consists of many components e.g. pumps, electric motors etc. it is not possible for the permit writer to check the efficiency for each part of it and to evaluate the energy efficiency assessment the operator has submitted. Where to start and where to end?
Bezreg Köln	---
Greece	Since environmental permit issuing procedure is mainly based on the content and quality of applications and Environmental Impact Assessment Studies, further improvement of energy use and energy efficiency methods and means, proposed by applicants is needed.
Latvia	No legal framework and lack of knowledge on energy efficiency issues
The Nether-lands InfoMil	---
The Nether-lands DCMR	The applicability of BAT in existing installations is not always good because of factors like high costs, lack of building space and other specific situations..
Norway	Existing installations are always different from what is described in benchmarks. Defining the "system" and the resulting benchmark is a challenge. Besides, electricity is produced from hydropower in Norway and represent a weight indicator different from electricity use in the EU area.
Poland	There is no binding energy saving law act
Romania	*- The difficulty to "put together" different BAT recommendations (e.g. from sectorial BREFs), in order to establish a coherent and relevant set of requirements for an IPPC installation (partly – solved by ENE BREF)* *- Better cooperation between the specialists from all interested parties*
Spain	It depends mainly on the technique you use in your main process but also on many auxiliary activities and equipment. In my opinion the environmental authority must assess the first factor and the industrial authority the second, that needs a more detailed evaluation and inspection that, if it was carried out by environmental authority, would promote a loss in other relevant aspects as environmental emissions from installation.
Sweden	*The issue of energy conservation if often complicated, process-related and depending on system boundaries. It requires qualified and experienced Competent Authorities . The learning curve for how to tackle energy issues can extend over a long period of time.* *The basis for a successful permitting procedure is a good application based on that the applicant knows his/her processes and presents costs and benefits of taking measures including BAT.* *In the next step there must be a transparent way of finding what measures are reasonable, including calculation of annual investment costs and monetising changes in emissions.*
United Kingdom	Consistent approach to monitoring particularly with regard to fuel usage and conversion factors. Plus verification of data.

6.1.3 In your opinion, what suggestions are there for further development of efficient energy use in the environmental permit procedure?

Austria	Tackle the problems mentioned in 6.1.2.
Bulgaria	---
Cyprus	A publication on specific case studies and good practices for the various types of installations can help the development of efficient energy use in the environmental permit procedure.
Reg. Office Centr. Bohemia	Closer and voluntary cooperation between authorities and operators.
Czech Env Inspectorate	undefined
Denmark	In Denmark: Cooperate with the Danish Energy Agency to asses if (further) conditions concerning energy and energy efficiency should be a part of the environmental permits in general. More discussions and knowledge on the issue e.g in the BREFs in order to develop enforceable conditions for energy efficiency in an individual permit.
Finland	More specific legislation on the issue.
Berlin	---
Hessen	See above
Kiel	---
Bezreg Köln	---
Greece	---
Latvia	---
The Nether-lands InfoMil	---
The Nether-lands DCMR	Increased pressure by governmental organisations, including forbidding emissions of heat, structural and improved stimulation to innovate..
Norway	Consider any benefit from the new CEN-standard for energy management systems (EN-16001)
Poland	It should be obligatory to “recommend only”
Romania	*- Training for the employees involved in the permitting procedure, based mainly on case-studies.* *- Exchange of experience, between the UE Member States’ authorities directly involved in the environmental permitting procedure and inspection, with the participation of specialists in energy efficiency.* *- A better and “more aggressive” exposure of the final documents produced as the result of different projects on this issue.*
Spain	a better cooperation between authorities named before.
Sweden	*A common understanding between member states on* - *that the implementation of Art 3 (d), “energy is used efficiently”, requires the use of BAT for this purpose* - *what the applicant shall present in the application* - *how to balance between costs and benefits* - *how conditions can be written*
United Kingdom	We are looking at specific energy efficiency audits

6.1.4 What kind of support do you need for tackling the energy efficiency issue properly?

Austria	Revision of BREFs: More concrete information on energy efficiency measures. Specific training and/or guidance for permitting and inspection authorities.
Bulgaria	more attention to the issue at a Community level
Cyprus	This workshop and others like this one can help the permitting authorities to tackling the energy efficiency issue properly
Reg. Office Centr. Bohemia	We need specific regulations, directives and more experts in regional authority.
Czech Env Inspectorate	We need for tackling the energy efficiency regulations, directives, decision (EU)
Denmark	More guidelines and more education of environmental officers.
Finland	The legal framework for taking energy efficiency into account should be further developed and more sector specific information.
Berlin	Easily accessible information for authorities and users/interested persons on frequent errors concerning energy intensive process steps with cross-references to the BREF „Energy Efficiency“ and new relevant examples including advantages
Hessen	See above
Kiel	A concept for dealing with energy efficiency in the permit procedure.
Bezreg Köln	more detailed obligations in German legislations
Greece	---
Latvia	Guidelines on evaluation of energy efficiency at installations and examples on conditions for several sectors
The Nether-lands InfoMil	---
The Nether-lands DCMR	Increased pressures higher authorities to forbid heat emissions, structural policy to stimulate innovations, taking initiatives in activities that go beyond company and sector responsibilities (for instance a heat infratstructure)
Norway	Experience and guidance from other lead countries.
Poland	Proper guidance(s) for decision and permitting persons
Romania	*- As an environmental inspector, I consider that specific training for the inspectors dealing with “environmental/ energy efficiency” problems, based on case-studies too, could be a very useful support.* *- Exchange of experience (e.g. in the frame of an “environmental/ energy forum”) could also be an effective tool.*
Spain	For example, a rule that implements energy consumption limits similar to emissions limit values. That would be an objective tool to assess and inspect installations
Sweden	*It would be interesting to compare approaches in different MS*
United Kingdom	We are reviewing this issue.

Further comments on this questionnaire / <u>miscellaneous</u>:

Cyprus	Some questions are representative and some others need to be more specific.
Finland	Very long questionnaire. Many of the questions were repetitive. Case study / best practice example: During a short consultation we did not come to think any good case studies were the role of environmental permit has had a key role in fostering energy efficiency. There are of course numerous good examples available on cases where improvements on energy efficiency have been made by economic reasons.
Romania	*No comments, especially due to the fact that the questionnaire is focused mainly on permitting items; or, my professional experience comes in principal from the inspection activity.*

Can you provide a case study / best practice example for the workshop? Please give a short description.

Sweden:

We might be able to make a presentation on how we deal with energy conservation issues in permitting, e.g. of major IPPC-installations. However, currently we do not know if this will be possible. Such a presentation could cover :

- *Data needed in applications to assess if measures shall be taken in the field of energy conservation*

  (e.g. current consumption of heat and electricity in different process areas and total for the plant, BAT associated consumption levels, investment and operating costs for coming closer to or reaching BAT associated consumption levels, expected life time of measures and consequences for emissions. Current production of heat and electricity and how it can be improved)

- *How cost-benefit-analyses for energy conservation measures can be made*

- *How decision can be reached on whether or not a measure shall be taken*

- *Examples of conditions from, the so far rather few, explicit decisions taken*

ANNEX II: AGENDA OF THE WORKSHOP AND LIST OF PARTICIPANTS

Agenda

Wednesday, 16 June	
10:30 – 11:00	Registration of particpants
11:00 – 11:15	**Opening and introduction** *Mr. Vilis Avotiņš, Latvia*
11:15 – 13:00	Topics/leader of topic: **Background of the project** **Questionnaire. Analysis of responses** *Ms. Gisela Holzgraefe Holzgraefe, Germany* **Implementation of the IPPC directive in connection with energy efficiency** *Ms. Gisela Holzgraefe Holzgraefe, Germany* **Definition of efficient energy use** *Ms. Dagnija Blumberga, Latvia*
13:00 – 14:00	Lunch
14:00 – 15:30	Topics/leader of topic: **Implementation in practice including voluntary agreement** *Ms. Sirpa Salo-Asikainen, Finland* **Introduction about Role Game "To save or not to save". Tasks for groups** *Ms. Andra Blumberga, Latvia*
15:30 – 16:00	Coffee break
16:00-17:00	Topics/leader of topic: **Analysis of energy efficiency indicators in case studies. Practical calculations** *Ms. Dagnija Blumberga, Latvia*
19:00	Dinner. Informal discussion Hosted by State Environmental Service
Thursday,17 June	
9:00 – 11:00	Topics/leader of topic: **Competent authorities and organisations in energy efficiency Cooperation. Experience** *Ms. Susanna Eberhartinger-Tafill, Austria* **Relation between energy efficiency and emission trading** *Ms. Marika Rosa, Latvia* **Energy efficiency permitting procedure. Application** *Ms.Judite Dipane, Latvia*
11:00 – 11:30	Coffee break
11:30 – 12:30	Topics/leader of topic: **Energy efficiency permitting procedure. Permit conditions. Use of BREF** *Ms.Gisela Holzgraefe Holzgraefe, Germany*
12:30 – 13:30	Lunch
13:30 – 14:40	Topics/leader of topic:

	Energy efficiency experience in Sweden *Mr.Eric Nystrom, Sweden* **Energy efficiency in BREF** *Ms. Dagnija Blumberga, Latvia* **Case study. Experience in steel production** *Ms. Susanna Eberhartinger-Tafill, Austria*
14:40 – 15:00	Coffee break
15:00 – 17:00	Topics/leader of topic: **Role Game. "To save or not to save"** *Ms. Andra Blumberga, Latvia*
19:00	Dinner. Informal discussion Hosted by State Environmental Service
Friday,18 June	
9:00 – 11:00	Topics/leader of topic: **Monitoring and verification for energy end user** *Mr. Claudio Rochas, Latvia* **Reporting and Supervision** *Ms. Susanna Eberhartinger-Tafill, Austria* **Final questions, recommendations and discussions** *Ms. Gisela Holzgraefe Holzgraefe, Germany*
11:30 – 12:30	Lunch
13:30 – 15:30	**Study tour to Riga Dairy**

Participants of the IMPEL workshop in Riga, 16-18.06.2010

NAME, SURNAME	COUNTRY	INSTITUTION	E-MAIL	PHONE
Stella **Perikenti**	Cyprus	Department of Environment / Ministry of Agriculture, Natural Resources and Environment	sperikenti@environment.moa.gov.cy	+357 2240 8942
Boyko **Malinov**	Bulgaria	Ministry of Environment and Water	malinov@moew.government.bg	+369 2940 6035
Evgeni **Iliev**	Bulgaria	Ministry of Environment and Water	iliev@moew.government.bg	+359 5940 6298
Eva **Hrabovska**	Czech Republic	Regional Office of Central Bohemia Region	hrabovska@kr-s.cz	+420 2572 8092 9
Tomaš **Zagora**	Czech Republic	IPPC/Chech Environmental inspectorate	zagora@cizp.cz	+420 2228 6023 9
Hans Erling Lundman **Jensen**	Denmark	Environment Centre Roskilde Danish Ministry of the Environment	haeje@ros.mim.dk	+457 2548 148
Marianne **Ripka**	Denmark	Environment Centre Aarhus Danish Ministry of the Environment	marip@aar.mim.dk	+457 2488 261
Jaakko **Kuisma**	Finland	Southern Finland regional State Administrative agency	jaakko.kuisma@avi.fi	+358 4002 8579 3
Kristina **Trube**	Germany	Ministerium für Landwirtschaft, Umwelt und ländliche Räume	kristina.trube@mlur.landsh.de	+494 3198 8709 9
Lilija Dukaļska	Latvia	State Environmental Service	lilija.dukalska@vvd.gov.lv	+371 6708 4238
Andra Blumberga	Latvia	Institute of Energy Systems and Environment, Riga Technical university	Andra.Blumberga@rtu.lv	+37129516506
Marika Rošā	Latvia	Institute of Energy Systems and Environment, Riga Technical university	Marika.Rosa@rtu.lv	+37129712389
Claudio Rochas	Latvia	Institute of Energy Systems and Environment, Riga Technical university	Claudio@ekodoma.lv	
Līga Ozoliņa	Latvia	Institute of Energy Systems and Environment, Riga Technical university	liga.ozo@gmail.com	

Artūrs Biedris	Latvia	Institute of Energy Systems and Environment, Riga Technical university	arturs.biedris@rtu.lv	+37126093966
Kaspars Siliņš	Latvia	Institute of Energy Systems and Environment, Riga Technical university	Kaspars.Silins@rtu.lv	+3712620589
Alise Bērziņa	Latvia	Institute of Energy Systems and Environment, Riga Technical university	Alise.Berzina@rtu.lv	
Bruno Lyonels	Latvia	Institute of Energy Systems and Environment, Riga Technical university	sighe82@yahoo.fr	
Corne **Oosterhuis**	The Netherlands	Afdeling SEO, team Handhaving, Province Drenthe	c.oosterhuis@drenthe.nl	+315 9236 5815
John **Visbeen**	The Netherlands	Province of Utrecht	john.visbeen@provincie-utrecht.nl	+316 1830 0452 +313 0258 2150
Gunn **Sormo**	Norway	Climate and Pollution Agency	gunn.sormo@klif.no	+ 772 2573 562
Jaroslaw **Gontek**	Poland	Silesian Voievodiship Inspectorate of Environemnatl Protection	jgontek@katowice.pios.gov.pl	+483 2207 7889
Cristina **Miclaus**	Romania	National Environmental Guard Suceava Regional Commissariat Neamt County Commissariat	cmiclaus59@yahoo.com cjneamt@gnm.ro	+402 3321 8964
Erik **Nystrom**	Sweden	Swedish EPA	erik.nystrom@naturvardsverket.se	+468 6981 220
Howard **Leberman**	United Kingdom	Environmental Agency England and Wales	howard.leberman@environment-agency.gov.uk	+441 7093 1282 2
Susanna **Eberhartinger-Tafill**	Austria	Federal Ministry of Agriculture, Forestry, Environment and Water Management	susanna.eberhartinger-tafill@lebensministerium.at	+I43 1515 2221 14
Gisela Holzgraefe **Holzgraefe**	Germany	Ministry of Agriculture, the Environment and Rural Areas	gisela.holzgraefe@mlur.landsh.de	+494 3198 8713 3
Sirpa **Salo-Asikainen**	Finland	Ministry of the Environment	sirpa.salo-asikainen@ymparisto.fi	+358 4001 7833 7

Vilis **Avotiņš**	Latvia	State Environmental Service	vilis.avotins@vvd.gov.lv	
Judīte **Dipāne**	Latvia	State Environmental Service	judite.dipane@vvd.gov.lv	
Dagnija Blumberga	Latvia	Institute of Energy Systems and Environment, Riga Technical university	dagnija@btv.lv	+37129419783
Dace Zahare	Latvia	Institute of Energy Systems and Environment, Riga Technical university	dace.zahare@rtu.lv	+37129867350

Annex III: Riga dairy plant – characteristic data

„Rīgas piena kombināts" is the largest milk-processing enterprise in Latvia and one of the leading enterprises of the industry in the Baltics. „Rīgas piena kombināts" is stable, classical value guided enterprise that holds involvement in the creation of a healthy rising generation as its main mission. „Rīgas piena kombināts" respects eating habits of the inhabitants of Latvia therefore it produces real butter, traditional cheese, milk, kefir, sour cream, ice-cream, at the same time keeping up with the tendencies of the world as well as in cooperation with the scientists of Latvia it produces particularly healthy products.

The planned production amounts in a year are shown in table V.1.1.

Table V.1.1 Production amounts

product	amount
milk	124000 t (340 t in a day)
Milk products	49780 t
Ice cream	4400 t
cheese	5400 t
Whey powder	3800 t

To ensure manufacturing process the company has their own boiler house. In the boiler house there are several equipment (see table V.1.2).

Table V.1.2 Equipment in boiler house

Equipment	Name	Power	Efficiency	Comments
Steam boiler	VAPOR TTK-250+ ECO13/195	7.0 MW	94%	In boiler is installed OILON fuse GP-700M
Steam generator with economaizer	SEG-404	3.9 MW	94%	-
Heat exchanger for heating	AKN-100/2	3,2 MW	-	-
2 hot water heat exchanger	-	-	-	-
Whey drying unit	VRC-4	1.72 MW	-	The gas fuse “WEISHAUPT”
fuse	Evergreen Q7	26.9 kW	-	-

The boiler is regulated automatically and fuel used in them is natural gas. “Rīgas piena kombināts” is participating in greenhouse gas (GHG) emission trading scheme.

For production company use also water from artesian boring well with volume 590000 m3/a (1616 m3 in a day).

Company is working 24 hours in a day, 265 days in a year.

ANNEX IV: TERMS OF REFERENCE FOR IMPEL PROJECT

No	Name of project
2010/	***Energy Efficiency in permitting and inspections*** Exchange of experiences on how the issues of energy efficiency and reduction of greenhouse gases are dealt with in permit procedures and inspections in the Member States, to help to reach the goals of climate change policy and indentification of further IMPEL projects in the field of energy efficiency and reduction of greenhouse gases(2010).

1. Scope

1.1. Background	**History of the project:** Energy is a priority issue within the European Union for at least three related reasons - climate change: the burning of fossil fuels to release energy is the major anthropogene source of greenhouse gases - the continuing large scale use of fossil fuels and the need to achieve sustainability - security of supply: the EU imports more than 50% of its energy fuel supplies and this is expected to rise to more than 70 % in the next 20 – 30 years There are therfore many important high level policy statements addressing these issues. “We intend jointly to lead the way in energy policy and climate protection and make our contribution to averting the global threat of climate change.” Berlin Declaration, Council of Ministers, 50th anniversary of the Treaty of Rome, Berlin 25th March 2007. The EU Climatechange and Energy Package forsees an increase in energy efficiency of 20 % and a reduction of greenhouse gases by 20 % till 2020 The work on the BREF Energy Efficiency was specifically mandated by a special request of 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 asked that effective implementation of the energy efficiency provisions of the IPPC Directive are promoted. The Communication from the Commission to the European Parliament, Council, den European Economic and Social Committee and the Committee of the Regions on implementing European Community Environmental Law (18.11.2008) mentions in chapter 2.2 climate change as a specific challenge. During the discussion on fututre work of IMPEL at the General

	Assembly 3 – 5 June 2009 in Prague the representatives of the member states mentioned explicitly energy efficiency as a field that IMEL has to work on. They mentioned the following reasons: - increased efficiency in the use of energy is the quickest, most effective way to tackle the issue of climate change, - by developing the same standards and requirements throughout Europe and the consequent enforcement it has to be made sure that the individual Member States are not played off one against the other by industry, - small and middle sized enterprises have to be included into the efforts of minimising greenhouse gas emissions. In 2003 IMPEL has carried out a project on energy efficiency with Finland as lead country. This project is a follow-up and will explore the experiences gained and the progress made since 2003.
1.2. Link to MAWP and IMPEL's role and scope	**Legal Background:** The Sixth Community Environment Action Programme calls for the encouragement of more effective implementation and enforcement of Community legislation on the environment, among other things through the promotion of improved standards of permitting, inspection, monitoring and enforcement by Member States and through improved exchange of information on best practice on implementation. Article III, Para. 4 of Recommendation 2001/331/EC providing for Minimum Criteria for Environmental Inspections in the Member States pursues the same objectives. The MAWP 2007 – 2010 has climate change as one of the urgent topics.
1.3. Objective (s)	The main objectives are to identify: - how Member States have implemented in practice the energy efficiency provisions of the IPPC Directive and handle obstacles, - how Member States enforce their legal requirements in this field, - what kind of information is required in permit applications, e.g. energy efficiency indicators - how Member States work with the BREF Energy Efficiency and the information of other BREFs related to energy efficiency - exchange of information on existing guidance material, - what is needed most to support Member States in the enforcement - which projects IMPEL can carry out in the field of energy efficiency and climate change - support for inspectors to become fit for the challenges of the 21st century by using a questionnaire, carrying out a workshop and analysing the results.
1.4. Definition	The project will help to promote the enforcement of the energy efficiency provisions of the IPPC Directive, the BREF Energy

	Efficiency and the information of other BREFs related to energy effieciency and perhaps national provisions concerning energy efficiency. As a first step it will analyse the present situation in the Member States and the current needs of permit writers and inspectors concerning enforcemnt of requirements in the field of energy efficiency. Additionally it will identify which projects IMPEL should carry out in the field of energy efficiency. It will be carried out by a project working group consisting of representatives of four IMPEL Member States. For the evaluation of the present situation and the needs a questionnaire will be sent out to the Memebr States. A workshop will be held with max. 40 participants from IMPEL Member States. A consultant will support and assist the group. The project participants will meet once in 2010 to discuss the evaluation of the questionnaires, exchange of experiences and the identification of most urgent needs. A final report will be written which will cover the findings and make recommendations for further projects.
1.5. Product(s)	A final report with the findings, outcomes and recommendations for further projects.

2. Structure of the project

2.1. Participants	▪ Inspectors preferably with experience in the enforcement of energy efficiency provisions will be invited as participants from IMPEL member states, ▪ IMPEL secretariat and Commission are invited to participate
2.2. Project team	*Project team:* *representatives of Germany, Austria, Latvia and Finland* A representative of a consulting agency, who will - prepare the questionnaire - prepare the evaluation of the questionnaire - prepare the meeting of the working group - document the results of the presentations and the discussions during the meeting of the working group. - incorporate participants' recommendations into the evaluation of the questionnaire - prepare the draft final report Project bearer: ▪ *Ministry for Agriculture, the Environment and Rural Areas of Schleswig-Holstein* .
2.3. Manager Executor	- *Gisela Holzgraefe, Ministry for Agriculture, the Environment and Rural Areas of Schleswig-Holstein*
2.4. Reporting arrangements	The project progress will be reported to Cluster "Improving permitting, inspection and enforcement" (Cluster 1, first interim

	report in September 2010), to the participants and to possible observers and to other Clusters which might be concerned. Cluster 1 will submit interim reporting to the IMPEL General Assembly and the IMPEL secretariat. The final report of the project is expected to be submitted to the IMPEL General Assembly in Winter 2010. Interim Reports: Summer 2010 Final Report: Winter 2010
2.5 Dissemination of results/main target groups	After adoption of the final report by the IMPEL General Assembly, report and the recommendations for further IMPEL projects (in English) will be disseminated through IMPEL (website). It will be sent to the IMPEL national coordinators. The report will also be sent to other target groups (via IMPEL secretariat at the European level, via national coordinators at the national level),

3. Resources required

3.1 Project costs and budget plan		**2010**	
	1. Overhead (organisation) cost (€):	5.000	
	2 Project meeting costs (€)		
	Meeting 1[1]: workshop in Juni 2010		
	No of Participants: 40		
	Travel[2]:	24.000	
	Accommodation[3]:	8.000	
	Catering:	4.000	
	Meeting venue:	*	
	3. Other costs (€):		
	Consultant	20 000	
	Translation:		
	Dissemination:	*	
	Other (specify) Project team meeting 2, 10 participants per each, 1 night Accommodation: 100 €/capita	14.000	
	Other (specify) Project team meeting participants per each, 1 night Accommodation: 100 €/capita	*	
	TOTAL cost per year €	**75 000**	
	TOTAL project cost €		
3.2. Fin. from IMPEL budget	*2. Project meeting costs plus partly 3. other costs(€)* *3. Other costs (€): consultant*	*50.000* *20.000*	
3.3. Co-financing by MS (and any other)	*1. Overhead costs (€):* as co-financing contribution for the **meeting venue** by one of the members of the project team ,	5 000	
	3. Other costs (€) as co-financing contribution; by Austria		
3.4. Human from MS	Meeting preparation and participation: 160 days (based on 40 participants)		
3.5 Human from Host countries	Meeting preparation and support: 20 days Meeting participation: 24 days (based on 10 participants) Project management support: 10 days		

4. Quality review mechanisms

[1] *specify, like Review Group Meetings, Workshop etc.*

[2] *normative: €600/person*

[3] normative: *€100/person/night*

**** not yet calculated***

The quality of the project will be reviewed by the project participants and appraised by the Cluster "Improving permitting, inspection and enforcement" (Cluster 1). It will then be submitted to the IMPEL General Assembly for appraisal and adoption.

5. Legal base

5.1. Directive/Regulation/Decision	IPPC Directive; BREF document « Energy Efficiency « , Directive (2006/32/EC) on Energy end-use efficiency and Energy Services; Recommendation 2001/331/EC providing for Minimum Criteria for Environmental Inspections in the Member States
5.2. Article and description	Article 3, Para. 4: establishment of a scheme, under which Member States report and offer advice on inspectorates and inspection procedures in Member States
5.3 Link to the 6th EAP	Article 3. Strategic approaches to meeting environmental objectives. Para. 2: " Encouraging more effective implementation and enforcement of Community legislation on the environment […] - promotion of improved standards of permitting, inspection, monitoring and enforcement by Member States; […] improved exchange of information on best practice on implementation including by the European network for the Implementation and Enforcement of Environmental Law (IMPEL network) within the framework of its competencies".

6. Project planning

6.1. Approval	*A document with input material for the project was presented at the Cluster 1 meeting in Brussels 14/15 September 2009. After that a ToR was developed and presented and supported by Cluster "Improving permitting, inspection and enforcement".*
(6.2. Fin. Contributions)	The project is supported by IMPEL , Austria, Finland, Latvia,
6.3. Start	The project start is scheduled for 04/2010
6.4 Milestones	Milestones: - From April 2010 onward: request for input to first draft of the questionnaire - May 2010: dissemination of the questionnaire to participants - June 2010: workshop - September 2010: draft of final report - winter 2010: final project report
6.5 Product	Final project report
6.6 Adoption	Presentation of the final report to the IMPEL Plenary is planned for winter 2010.

ANNEX IV: COGENERATIONVERSUS POWER STATION

/Dr. Ivars Veidenbergs, professor, Riga Technical University/

IV.1. What is cogeneration?

The principle behind cogeneration is simple. Conventional power generation, on average, is only 35% efficient – up to 65% of the energy potential is released as waste heat. More recent combined cycle generation can improve this to 55%, excluding losses for the transmission and distribution of electricity. Cogeneration reduces this loss by using the heat for industry, commerce and home heating/cooling.

Cogeneration is the simultaneous generation of heat and power, both of which are used. It encompasses a range of technologies, but will always include an electricity generator and a heat recovery system. Cogeneration is also known as 'combined heat and power (CHP)'.

In conventional electricity generation, further losses of around 5-10% are associated with the transmission and distribution of electricity from relatively remote power stations via the electricity grid. These losses are greatest when electricity is delivered to the smallest consumers.

Through the utilisation of the heat, the efficiency of cogeneration plant can reach 90% or more. In addition, the electricity generated by the cogeneration plant is normally used locally, and then transmission and distribution losses will be negligible. Cogeneration therefore offers energy savings ranging between 15-40% when compared against the supply of electricity and heat from conventional power stations and boilers.

Because transporting electricity over long distances is easier and cheaper than transporting heat, cogeneration installations are usually sited as near as possible to the place where the heat is consumed and, ideally, are built to a size to meet the heat demand. Otherwise an additional boiler will be necessary, and the environmental advantages will be partly hindered. This is the central and most fundamental principle cogeneration.

When less electricity is generated than needed, it will be necessary to buy extra. However, when the scheme is sized according to the heat demand, normally more electricity than needed is generated. The surplus electricity can be sold to the grid or supplied to another customer via the distribution system.

IV.1.1. The benefits of cogeneration

Provided the cogeneration is optimised in the way described above (ie sized according to the heat demand), the following benefits arise:

- Increased efficiency of energy conversion and use;
- Lower emissions to the environment, in particular of CO_2, the main greenhouse gas;
- In some cases, where there are biomass fuels and some waste materials such as refinery gases, process or agricultural waste (either anaerobically digested or gasified), these substances can be used as fuels for cogeneration schemes, thus increasing the cost-effectiveness and reducing the need for waste disposal;

- Large cost savings, providing additional competitiveness for industrial and commercial users, and offering affordable heat for domestic users;
- An opportunity to move towards more decentralised forms of electricity generation, where plant is designed to meet the needs of local consumers, providing high efficiency, avoiding transmission losses and increasing flexibility in system use;
- Improved local and general security of supply - local generation, through cogeneration, can reduce the risk that consumers are left without supplies of electricity and/or heating. In addition, the reduced fuel need which cogeneration provides reduces the import dependency - a key challenge for Europe's energy future;
- An opportunity to increase the diversity of generation plant, and provide competition in generation. Cogeneration provides one of the most important vehicles for promoting liberalisation in energy markets;
- Increased employment - a number of studies have now concluded that the development of cogeneration systems is a generator of jobs.

IV.1.2. Energy and cost savings

A well-designed and operated cogeneration scheme will always provide better energy efficiency than conventional plant, leading to both energy and cost savings. A single fuel is used to generate heat and electricity, so cost savings are dependent on the price-differential between the primary energy fuel and the bought-in electricity that the scheme displaces. However, although the profitability of cogeneration generally results from its cheap electricity, its success depends on using recovered heat productively, so the prime criterion is a suitable heat requirement.

The timing of the site’s electricity demand will also be important as the cogeneration installation will be most cost effective when it operates during periods of high electricity tariffs, that is, during the day.

At current fuel prices and electricity tariffs, and allowing for installation and life-cycle maintenance costs, payback periods of three to five years can be achieved on many cogeneration installations.

IV.1.3. Environmental savings

In addition to direct cost savings, cogeneration yields significant environmental benefits through using fossil fuels more efficiently. In particular, it is a highly effective means of reducing carbon dioxide (CO2) and sulphur dioxide (SO2) emissions. Oxides of nitrogen (NOx) are also generally reduced by the introduction of modern combustion plant.

IV.1.3.1. CO_2 savings

The assessment of the carbon savings from a cogeneration project is hotly debated, as it is very difficult to prove what electricity it displaces. This issue has been at the heart of a long running discussion in European markets, with no agreement. Does the cogeneration scheme displace:

a. The mix of electricity production in the country?

b. The most marginal power plant on the system?
c. The next power plant to be built by the power industry?
d. The best theoretical power plant available?

Depending on the answer the savings in carbon dioxide can vary from 100 kg per MWh to more than 1000 kg MWh. The same issue faces all projects that displace other electricity generation.

IV.1.3.2. NO_x and SO_2 savings

To calculate NO_x and SO_2 savings, the same principle applies, it is necessary to look at what is being displaced.

IV.1.4. How does cogeneration works?

Cogeneration uses a single process to generate both electricity and usable heat or cooling. The proportions of heat and power needed (power: heat ratio α) vary from site to site, so the type of plant must be selected carefully and an appropriate operating regime must be established to match demands as closely as possible. The plant may therefore be set up to supply part or all of the site heat and electricity loads, or an excess of either may be exported if a suitable customer is available.

Cogeneration plant consists of four basic elements:

- a prime mover (engine);
- an electricity generator;
- a heat recovery system;
- a control system.

Depending on site requirements, the prime mover may be a steam turbine, reciprocating engine or gas turbine. In the future new technology options will include micro-turbines, Stirling engines and fuel cells. The prime mover drives the electricity generator and usable heat is recovered. The basic elements are all well established items of equipment, of proven performance and reliability.

Cogeneration plants are available to provide outputs from 1 kWe to 500 MWe. For larger scale applications (greater than 1 MWe) there is no "standard" cogeneration kit: equipment is specified to maximise cost-effectiveness for each individual site. For small-scale cogeneration applications, equipment is normally available in pre-packaged units, helping to simplify installations.

Plants for industrial applications typically fall into the range 1-50 MWe, although some larger systems have been installed. It is difficult to define what is large and what is small, because every country has different sizes and different appreciations in this respect. In general, it can be said that from 1 MWe to 10 MWe it will be medium, and bigger than 10 MWe will be large. Non industrial applications cover also a full range of sizes, from 1 kWe for a domestic

dweling to about 10 MWe for a large district heating cogeneration scheme. Everything under 1 MWe can be considered small-scale. "Mini" is under 500 kWe and "micro" under 20 kWe.

IV.2. Technology overview

IV.2.1. Reciprocating Engines

Reciprocating internal combustion engines represent a widespread and mature technology for power generation. Reciprocating engines are used for all types of power generation, from small portable generator sets to larger industrial engines that power generators of several megawatts. Spark ignition engines for power generation use natural gas as the preferred fuel – although they can be set up to run on propane or gasoline. Diesel-cycle, compression ignition engines operate on diesel fuel or heavy oil, or can be set up in a dual-fuel configuration that can burn primarily natural gas with a small amount of diesel pilot fuel. Reciprocating engines offer low first cost, easy start-up, proven reliability when properly maintained, and good load-following characteristics. Drawbacks of reciprocating engines include relatively high noise levels, relatively high air emissions, and the need for regular maintenance. The emissions profiles of reciprocating engines have been improved significantly in recent years by the use of exhaust catalysts and through better design and control of the combustion process. Gas-fired reciprocating engines are well suited for packaged CHP in commercial and light industrial applications of less than 5 MW. Smaller engine systems produce hot water. Larger systems can be designed to produce low-pressure steam.

Figure IV.1 shows the set-up of a diesel and gas engine CHP plant.

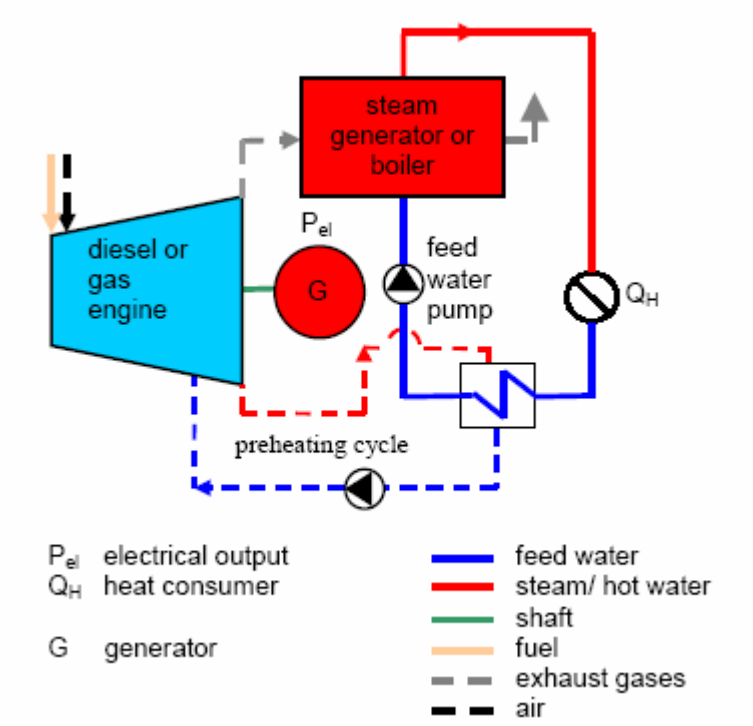

Figure IV.1. The set-up of a diesel and gas engine CHP plant.

The economics of natural gas engines in on-site generation applications are enhanced by effective use of the thermal energy contained in the exhaust gas and cooling systems, which is generally equal to 60% to 70% of the input fuel energy. There are four sources of usable waste heat from a reciprocating engine: exhaust gas, engine jacket cooling water, lube oil cooling water, and charge air cooling. Heat is generally recovered in the form of hot water or low-pressure steam. Medium pressure steam can be generated from the engine's high-temperature exhaust gas, but the hot exhaust gas contains only about one-half of the available thermal energy from a reciprocating engine resulting in correspondingly lower overall system efficiency. Some industrial CHP applications use the engine exhaust gas directly for process drying. Generally, the hot water and low-pressure steam produced by reciprocating engine CHP systems is appropriate for low temperature (<120ºC) process needs.

IV.2.2. Gas Turbines

Gas turbines are an established technology in sizes from several hundred kilowatts up to about 50 MW. Gas turbines produce high-quality heat that can be used to generate steam for on-site use or for additional power generation (combined-cycle configuration). Gas turbines can be set up to burn natural gas, a variety of petroleum fuels or can have a dual-fuel configuration. Gas turbine emissions can be controlled to very low levels using water or steam injection, advanced dry combustion techniques, or exhaust treatment such as selective catalytic reduction (SCR). Maintenance costs per unit of power output are among the lowest of DG technology options. Low maintenance and high-quality waste heat make gas turbines an excellent match for industrial or commercial CHP applications larger than 5 MW. Technical and economic improvements in small turbine technology are pushing the economic range into smaller sizes as well. An important advantage of CHP using gas turbines is the high-quality waste heat available in the exhaust gas. The high-temperature exhaust gas is suitable for generating high-pressure steam, making gas turbines a preferred CHP technology for many industrial processes. In *simple cycle* gas turbines, hot exhaust gas can be used directly in a process or by adding a heat-recovery steam generator (HRSG) that uses the exhaust heat to generate steam or hot water. Because gas turbine exhaust is oxygen-rich, it can support additional combustion through supplementary firing. A duct burner can be fitted within the HRSG to increase the steam production at lower-heating value efficiencies of 90% and greater.

There are several variations of the Brayton cycle in use today. Fuel consumption may be decreased by preheating the compressed air with heat from the turbine exhaust using a recuperator or regenerator; the compressor work may be reduced and net power increased by using intercooling or precooling; and the exhaust may be used to raise steam in a boiler and to generate additional power in a combined cycle.

Figure IV.2 shows the primary components of a simple cycle gas turbine.

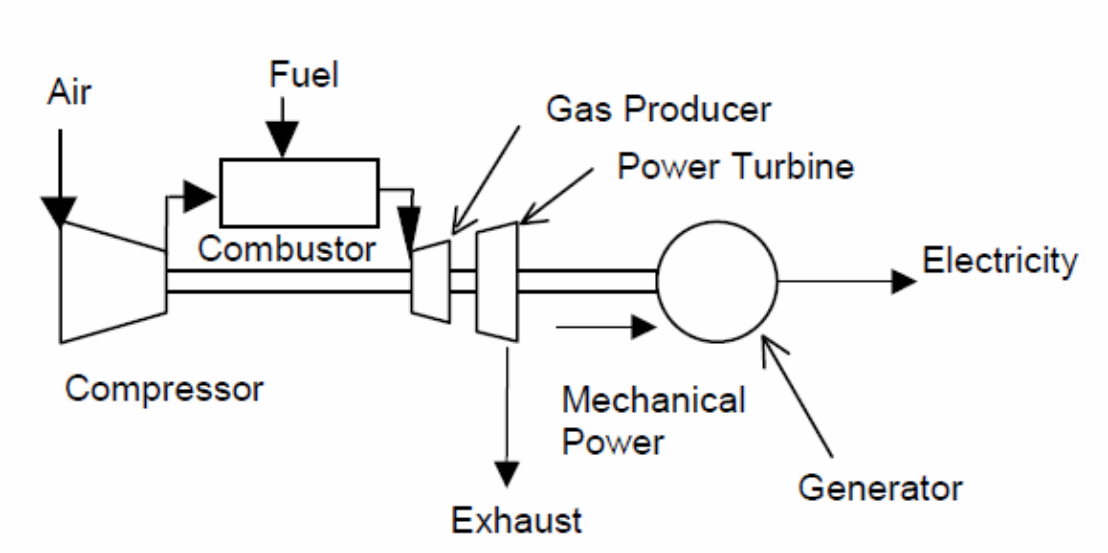

Figure IV.2. Primary components of a simple cycle gas turbine

Gas turbine exhaust is quite hot, up to 400 to 500°C for smaller industrial turbines and up to 600°C for some new, large central station utility machines. Such high exhaust temperatures permit direct use of the exhaust. A gas turbine based system is operating in combined heat and power mode when the waste heat generated by the turbine is applied in an end-use. For example, a simple-cycle gas turbine using the exhaust in a direct heating process is a CHP system, while a system that features all of the turbine exhaust feeding a HRSG and all of the steam output going to produce electricity in a combined-cycle steam turbine is not.

IV.2.3. Steam Turbines

Steam turbines convert steam energy into shaft power and are one of the most versatile and oldest prime mover technologies used to drive generators or mechanical machinery. The capacity of steam turbines can range from fractional horsepower to several hundred MW for large utility power plants. A steam turbine is captive to a separate heat source and does not directly convert a fuel source to electric energy. Steam turbines require a source of high-pressure steam that is produced in a boiler or heat recovery steam generator (HRSG). Boiler fuels can include fossil fuels such as coal, oil, or natural gas or renewable fuels like wood or municipal waste. Steam turbine CHP systems are primarily used in industrial processes where solid or waste fuels are readily available for boiler use. In CHP applications, steam is extracted from the steam turbine and used directly in a process or for district heating, or it can be converted to other forms of thermal energy including hot water.

Figure IV.3 shows the primary components of a boiler/steam turbine system.

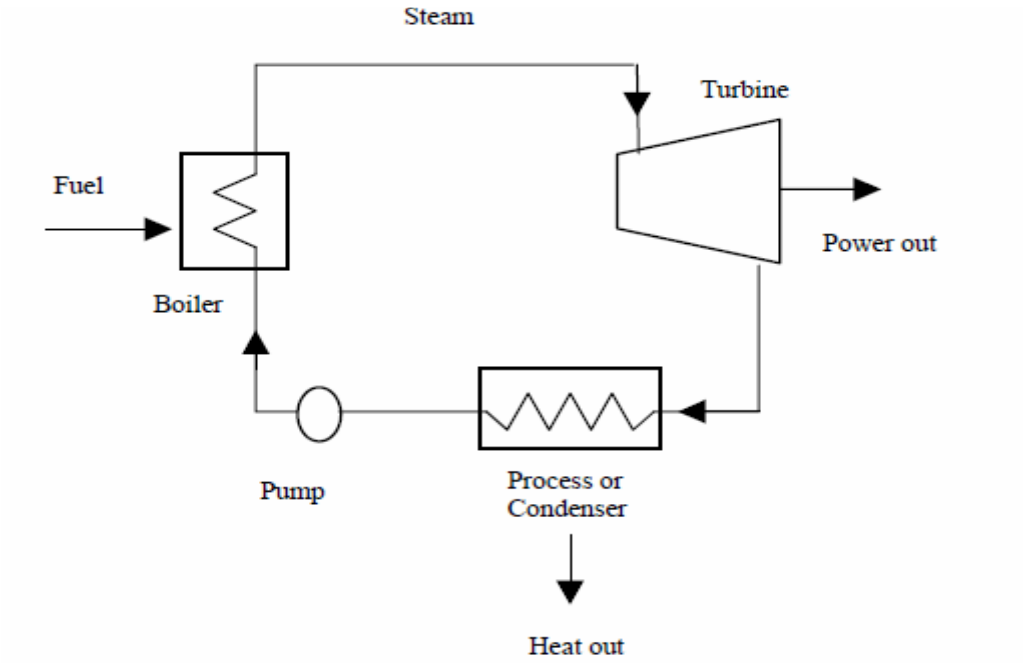

Figure IV.3. Primary components of a boiler/steam turbine system

The thermodynamic cycle for the steam turbine is the Rankine cycle. The cycle is the basis for conventional power generating stations and consists of a heat source (boiler) that converts water to high-pressure steam. In the steam cycle, water is first pumped to medium to high pressure. It is then heated to the boiling temperature corresponding to the pressure, boiled (heated from liquid to vapor), and then most frequently superheated (heated to a temperature above that of boiling). A multistage turbine expands the pressurized steam to lower pressure and the steam is then exhausted either to a condenser at vacuum conditions or into an intermediate temperature steam distribution system that delivers the steam to the industrial or commercial application. The condensate from the condenser or from the steam utilization system returns to the feedwater pump for continuation of the cycle.

IV.2.4.Microturbines

Microturbines are very small combustion turbines that are currently offered in a size range of 30 kW to 250 kW. Microturbine technology has evolved from the technology used in automotive and truck turbochargers and auxiliary power units for airplanes and tanks. Several companies have developed commercial microturbine products. In the typical configuration, the turbine shaft, spinning at up to 100,000 rpm, drives a high-speed generator. Electrical efficiencies of 23-26% are achieved by employing a recuperator that transfers heat energy from the exhaust stream back into the combustion air stream. Microturbines are compact and lightweight, with few moving parts. Low-emission combustion systems, which provide emissions performance approaching that of larger gas turbines, are being demonstrated. Microturbines' potential for low emissions, reduced maintenance, and simplicity promises to make on-site generation much more competitive in the 30 to 300 kW size range characterized by commercial buildings or light industrial applications. Microturbines for CHP duty are typically designed to recover hot water or low-pressure steam.

Figure IV.4 shows the primary components of a microturbine-based CHP system.

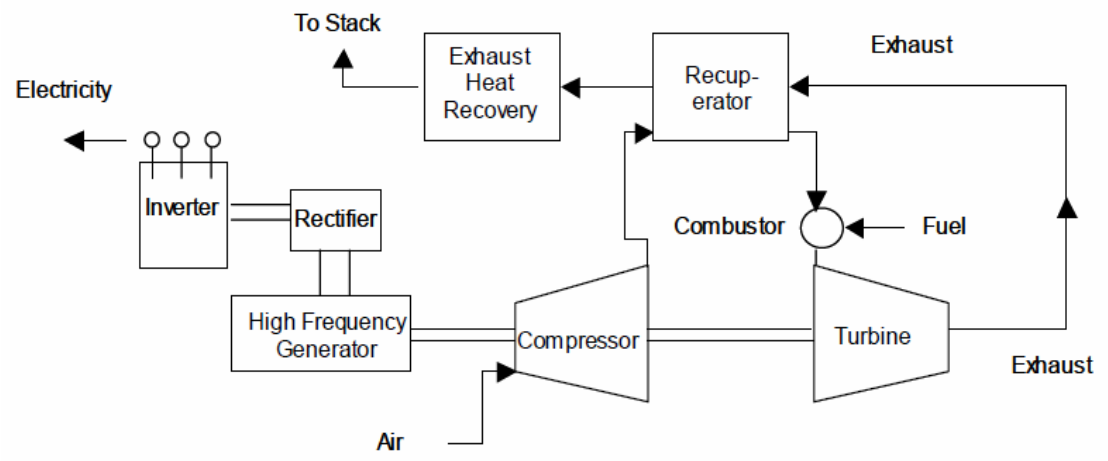

Figure IV.4. Microturbine-based CHP system

The basic components of a microturbine are the compressor, turbine generator, and recuperator. The heart of the microturbine is the compressor-turbine package, which is commonly mounted on a single shaft along with the electric generator. Recuperators are heat exchangers that use the hot turbine exhaust gas (typically around 650ºC) to preheat the compressed air (typically around 150ºC) going into the combustor, thereby reducing the fuel needed to heat the compressed air to turbine inlet temperature. Depending on microturbine operating parameters, recuperators can more than double machine efficiency. However, since there is increased pressure drop in both the compressed air and turbine exhaust sides of the recuperator, power output typically declines 10 to 15% from that attainable without the recuperator. Recuperators also lower the temperature of the microturbine exhaust, reducing the microturbine's effectiveness in CHP applications.

IV.2.5. Fuel Cells

Fuel cells produce power electrochemically, more like batteries than conventional generating systems. Unlike storage batteries, however – which produce power from stored chemicals – fuel cells produce power when hydrogen fuel is delivered to the cathode of the cell, and oxygen in air is delivered to the anode. The resultant chemical reactions at each electrode create a stream of electrons (or direct current) in the electric circuit external to the cell. The hydrogen fuel can come from a variety of sources, but the most economic is steam reforming of natural gas – a chemical process that strips the hydrogen from both the fuel and the steam. Several different liquid and solid media that can be used inside fuel cells – phosphoric acid (PAFC), molten carbonate (MCFC), solid oxide (SOFC), and proton exchange membrane (PEMFC). Each of these media comprises a distinct fuel cell technology with its own performance characteristics and development schedule. Fuel cells have higher efficiency than generation technologies based on heat engine prime movers. In addition, fuel cells are inherently quiet and extremely clean running. Many fuel cell technologies are modular and capable of application in small commercial and even residential markets; other technology operates at high temperatures in larger sized systems that would be well suited to industrial CHP applications.

Each fuel cell system consists of three primary subsystems: 1) the fuel cell stack that generates direct current electricity; 2) the fuel processor that converts the natural gas into a hydrogen rich feed stream; and 3) the power conditioner that processes the electric energy into alternating current or regulated direct current.

Figure IV.5 illustrates the electrochemical process in a typical single cell, acid-type fuel cell.

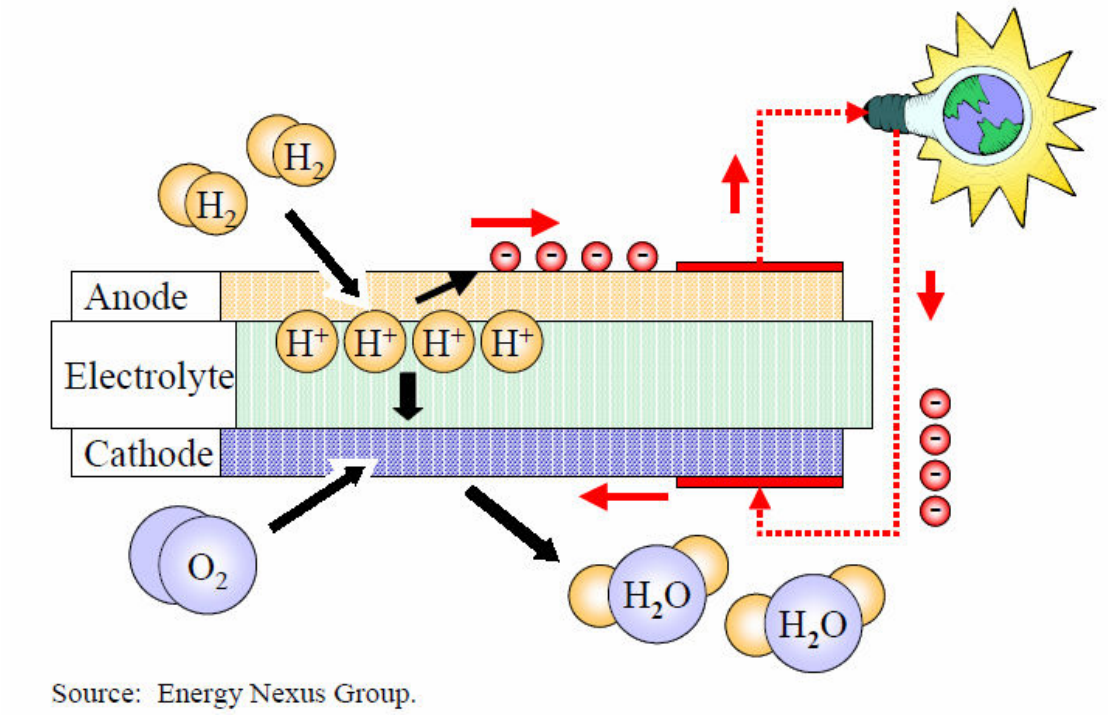

Figure IV.5. The electrochemical process in a typical single cell, acid-type fuel cell

A fuel cell consists of a cathode (positively charged electrode), an anode (negatively charged electrode), an electrolyte and an external load. The anode provides an interface between the fuel and the electrolyte, catalyzes the fuel reaction, and provides a path through which free electrons conduct to the load via the external circuit. The cathode provides an interface between the oxygen and the electrolyte, catalyzes the oxygen reaction, and provides a path through which free electrons conduct from the load to the oxygen electrode via the external circuit. The electrolyte, an ionic conductive (non-electrically conductive) medium, acts as the separator between hydrogen and oxygen to prevent mixing and the resultant direct combustion. It completes the electrical circuit of transporting ions between the electrodes. The hydrogen and oxygen are fed to the anode and cathode, respectively. The hydrogen and oxygen gases do not directly mix and combustion does not occur. Instead, the hydrogen oxidizes one molecule at a time, in the presence of a catalyst. Because the reaction is controlled at the molecular level, there is no opportunity for the formation of NOx and other pollutants. At the anode the hydrogen gas is electrochemically dissociated (in the presence of a catalyst) into hydrogen ions (H+) and free electrons (e-).

Anode Reaction:

$$2H_2 \rightarrow 4H+ + 4e^-$$

The electrons flow out of the anode through an external electrical circuit. The hydrogen ions flow into the electrolyte layer and eventually to the cathode, driven by both concentration and potential forces. At the cathode the oxygen gas is electrochemically combined (in the presence of a catalyst) with the hydrogen ions and free electrons to generate water.

Cathode Reaction:

$$O_2 + 4H+ + 4e^- \rightarrow 2H_2O$$

The overall reaction in a fuel cell is as follows:

$$2H_2 + O_2 \rightarrow 2H_2O \text{ (vapor)} + \text{Energy}$$

Energy can be used for CHP applications.

IV.3. Chose of cogeneration plant capacity

Any cogeneration plant development begins with assessment of the consumer's heat load. The optimal cogeneration tehnology and capacity choose basing on consumers required quantity of heat. Technology must be choosen taking into account several factors: expenses of technology, fuel availability, equipment operational efficiency at certain loads etc. By selecting cogeneration technology also estimate how much electroenergy technology will develop on specific heat load base (α-value).

The ratio α value is important index which provides tehnology operational efficiency. In sequestered system without connection to electricity grid the technology can produce only that much energy as much is necessary for consumers. In case when cogeneration plant have opertunity to deliver surplus electroenergy in grid, need to chose tehnology which can produce as much as possible electroenergy on consumer heat load base (higher α-value). In this case, owner of power plant achieve extra income by selling electricity surplus. Especially it is gainfully to sell electricity to grids in places where operate a special power purchase tariff. Since cogeneration electricity constitutes only that part which is produced on consumer returned heat base, the owner of the plant is interested to produce as much as possible electroenergy on existing heat load base. In most cases cogeneration plants cover utility load, wich charactize changes during the year. The heating needs and hot water consumption determine utility load. Heating is necessary 6-7 months in a year and for it consumes significant amount of heat energy. The load of hot water in generally is steady over the year time, in our latitudes it is till 25% from heating loads and it is permanent.

For example, the length of heat load time in one populated place is given in figure III.6.

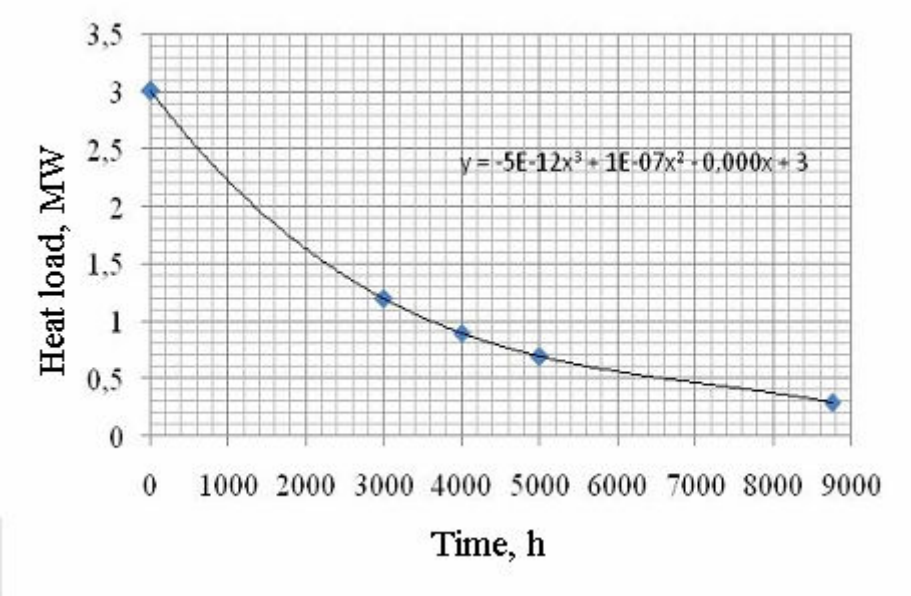

Figure IV.6. Duration of heat load scheldue

Choosing the cogeneration plant with installed capacity $Q_{CHP} = 0.5\ Q_{max}$, it can work with full capacity for 2200 hours in heating season time and can produce 3300 MWh heat energy. Choosing the cogeneration plant with installed capacity of heat $Q_{CHP} = Q_{hot\ water}$, cogeneration plant can work all year, working more than 8000 hours in a year and producing about 250 MWh heat energy. In this case technology works with full capacity but the capacity of equipment is small and accordingly also small heat energy output. It means that need to choose technique with possibly larger capacity which can run more longet time.

Optimal cogeneration technique will be the one which will produce maximal possible, according to duration of load schedule, heat energy amount in a year time, working at full selected capacity. It means that the capacity of technique will determine recktangle with maximal possible area (maximal recktangle), which is written in load duration scheldue. In example discussed before the optimal capacity is about 1 MW, produced heat energy amount is 3600 MWh and cogeneration plant can operate with full capacity 3600 h in a year.

The electroenergys output is proportional to the heat energy output. It is determined by multiplying heat energy output with technological equipement power/ heat ratio- α value. If for cogeneration use internal combustion engine plant, which α is about 0,75, then cogeneration electroenergy output is:

$$W = Q_{th}.\ \alpha = 3600.0{,}75 = 2700\ \text{MWh}.$$

Since co-generation energy production is more energy efficient, compering with shared energy production, CHP reaches maximal fuel savings and emission reduction.

IV.4. CHP versus Separate Heat and Power (SHP) Production

Figure III.7 shows the efficiency advantage of CHP compared with conventional central station power generation and on-site boilers. When considering both thermal and electrical processes together, CHP typically requires only ¾ the primary energy separate heat and power systems require. This reduced primary fuel consumption is key to the environmental benefits of CHP, since burning the same fuel more efficiently means fewer emissions for the same level of output.

Source: Tina Kaarsberg and Joseph Roop, "Combined Heat and Power: How Much Carbon and Energy Can It Save for Manufacturers?"

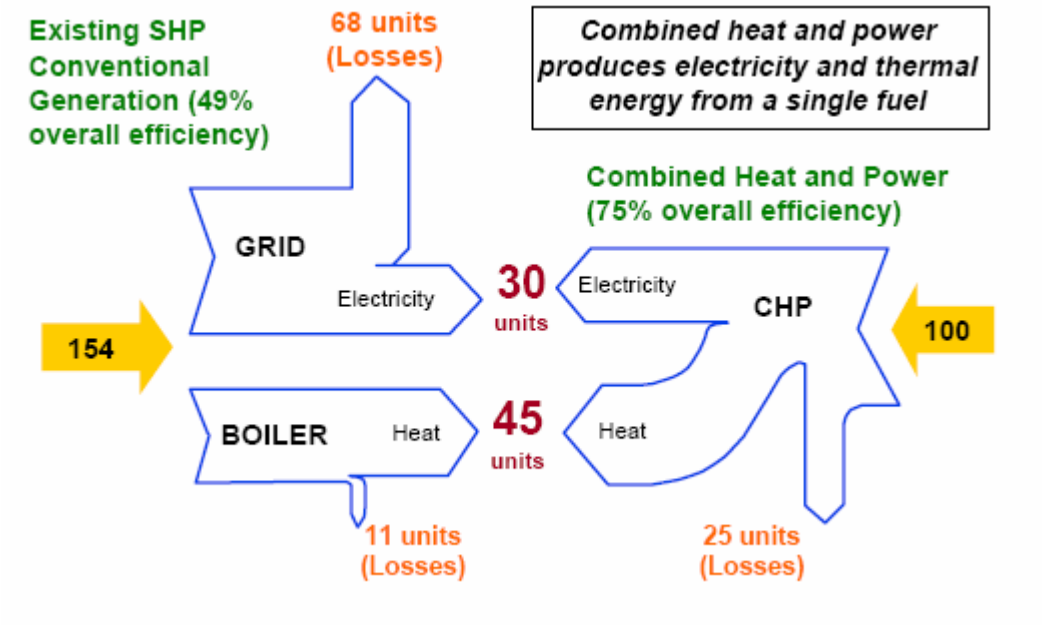

Figure IV.7. CHP versus Separate Heat and Power (SHP) Production

Many of the benefits of CHP stem from the relatively high efficiency of CHP systems compared to other systems. Because CHP systems simultaneously produce electricity and useful thermal energy, CHP efficiency is measured and expressed in a number of different ways.

Table III.1 summarizes the key elements of efficiency as applied to CHP systems.

Table III.1

Measuring the Efficiency of CHP Systems

System	Component	Efficiency measure	Description
Separate heat and power (SHP)	Thermal Efficiency (Boiler)	$\eta_{Q.sep} = \frac{Q}{Q_{f.B}}$	Net useful thermal output for the fuel consumed
	Electric-only generation	$\eta_{el.sep} = \frac{W}{Q_{f.PS}}$	Electricity purchased from power stations via transmission grid

Combined heat and power (CHP)	Thermal CHP efficiency	$r_Q = \frac{Q}{Q_{f.cog}}$	CHP net useful thermal output divided by the total CHP fuel Qf.cog consumed.
	Electrical CHP efficiency	$r_{el} = \frac{W}{Q_{f.cog.}}$	CHP electricity output divided by the total CHP fuel Qf.cog consumed.
	Total CHP system efficiency	$\eta_{cog} = \frac{W+Q}{Q_{f.cog}}$	Sum of the net power and net useful thermal output divided by the total fuel Qf.cog consumed.
	Relative fuel energy savings	$\delta Q = \left(1 - \frac{Q_{f.cog}}{\frac{W}{\eta_{el.sep}} + \frac{Q}{\eta_{Q.sep}}}\right)$	Relative fuel energy savings compares the fuel used by the CHP system to a separate heat and power system. Positive values represent fuel energy savings while negative values indicate that the CHP system is using more fuel than SHP.
	Fuel energy savings	$\Delta Q = \delta Q.\left(\frac{W}{\eta_{el.sep}} + \frac{Q}{\eta_{Q.sep}}\right)$	Fuel energy savings in energy terms
	Fuel savings	$\Delta B = \frac{\Delta Q}{LHV}$	Real fuel savings

$\eta_{Q.sep}$ – efficiency of displaced electric generation
Q – net useful thermal energy from CHP system
$Q_{f.B}$ - boiler fuel consumption
W – net power output from CHP system
$Q_{f.PS}$ – power station fuel consumption
$Q_{f.cog.}$ – CHP fuel consumption
LHV – lower heat value of real fuel

As illustrated in Table I the efficiency of electricity generation in power-only systems is determined by the relationship between net electrical output and the amount of fuel used for the power generation.

In CHP systems the total CHP efficiency seeks to capture the energy content of both electricity and usable heat and is the net electrical output plus the net useful thermal output of the CHP system divided by the fuel consumed in the production of electricity and heat.

EPA considers fuel savings as the appropriate term to use when discussing CHP benefits relative to separate heat and power (SHP) operations. Fuel savings compares the fuel used by the CHP system to a separate heat and power system (i.e. boiler and electric-only generation).

In the relative fuel energy saving equation given above in the table, the numerator in the bracket term denotes the fuel used in the production of electricity and heat in a CHP system. The denominator describes the sum of the fuel used in the production of electricity ($W/\eta_{el.sep}$)

and thermal energy ($Q/\eta_{Q.sep}$) in separate heat-and-power operations. Positive values represent fuel savings while negative values indicate that the CHP system in question is using more fuel than separate heat and power generation.

IV.5. Meaningful applications of cogeneration

Cogeneration is above all meaningful for applications where there is a large and continuous (not just seasonal) demand for heat close to the cogeneration facility. If there is no demand for heat from a cogeneration facility, its efficiency for the production of electricity will be lower than for optimised thermal power stations. Larger cogeneration facilities have in general lower production costs than smaller units. But on the other hand, transport of heat to users takes longer and is more expensive. CHP is most efficient when the heat can be used on site or very close to it. Overall efficiency is reduced when the heat must be transported over longer distances. This requires heavily insulated pipes, which are expensive and inefficient; whereas electricity can be transmitted along a comparatively simple wire, and over much longer distances for the same energy loss.

However, since the cogeneration facility is a technical compromise between the production of power and heat the use of a cogeneration plant for the generation of electricity only will be less ecologically efficient than the production of electricity in a condensing power plant.

IV.6. District heating system

District heating plays a key role in supplying energy in Eastern European countries, providing residential buildings with thermal heat and hot water. In some large cities, district heating covers more than 60% of space heating. Recently in these systems needed to perform large scale modernization because heat losses of 20 – 30% were quite common.

District heating is a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space heating and water heating. The heat is often obtained from a cogeneration plant burning fossil fuels but increasingly biomass, although heat-only boiler stations, geothermal heating and central solar heating are also used, as well as nuclear power. District heating plants can provide higher efficiencies and better pollution control than localized boilers. According to some research, District Heating with Combined Heat and Power - is the cheapest method of cutting carbon, and has one of the lowest carbon footprints of all fossil generation plants.

After generation, the heat is distributed to the customer via a network of insulated pipes. District heating systems consists of feed and return lines. Usually the pipes are installed underground but there are also systems with overground pipes. Within the system heat storages may be installed to even out peak load demands. The common medium used for heat distribution is water.

At customer level the heat network is connected to the central heating of the dwellings by heat exchangers (heat substations). The water used in the district heating system is not mixed with the water of the central heating system of the dwelling.

Typical annual loss of thermal energy through modern distribution used preinsulated pipes is around 10%.

Insulated pipes (called also preinsulated pipes) are widely used for district heating and hot water supply in Europe. They consist of a steel pipe, an insulating layer, and an outer casing. The main purpose of such pipes is to maintain the temperature of the fluid in the pipes. A common application is the hot water from district heating plants. Most commonly used are single insulated pipes, but more recently in Europe it is becoming popular to use two pipes insulated within the same casing.

Figure III.8 shows preinsulated pipes.

Figure III.8. Preinsulated pipes

The insulating material usually used is polyurethane foam or similar, with a coefficient of thermal conductivity k=0.033-0.024 W/mK. Outer casing is usually high-density polyethylene. Production of preinsulated pipes for district heating in the European Union is regulated by the standard.According to standard, pipes must be produced to work at constant temperature of 130 °C for 30 years, keeping heat conductivity less than or equal to λ=0,033 W/mK. There are three insulation thickness levels.
Insulated pipelines are usually assembled from pipes of 6 m, 12 m, or 16 m in length, laid underground in depth 0.4–1.0 m. Efficient working life of district heating pipelines networks is estimated at 25–30 years, after which they need to be replaced with new pipes.