



D3.1: Analysis of the future impact of EU Directives on conditions for balancing of CHP and wind power and analysis of the impact of country-specific regulatory conditions on balancing - DRAFT

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Abstract: This document summarises the most relevant articles of the EU-Directives affecting the balancing techniques proposed in DESIRE, and described the ways in which those directives have been implemented in national regulation in the countries participating in the project.



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ACRONYMS

BETTA	British Electricity Trading and Transmission Arrangements (UK)
BSC	Balancing and Settlement Code (UK)
CCL	Climate Change Levy (UK)
CDM	Clear Development Mechanism
CER	Certified Emission Reduction
CHP	Combined Heat and Power
CHPQA	Quality Assurance for Combined Heat and Power (UK)
CNE	National Energy Commission (Spain)
CO ₂	Carbon Dioxide
CORES	Corporation for Strategic Reservoirs of Oil Products (Spain)
CTC	Costs for Transition to Competition (Spain)
DEFRA	Department for Environment and Rural Affairs (UK)
DH	District Heating
DKK	Danish Krone (currency: 7.5 DKK ~ 1 EUR)
DSO	Distribution System Operator
DTI	Department of Trade and Industry (UK)
EC	European Commission
EEE	Electric Equivalent Efficiency (Spain)
EEG	Renewable Energy Sources Act (Germany)
EEK	Estonian Kroon (currency: 15.5 EEK ~ 1 EUR)
EnWG	Electricity Act (Germany)
ERU	Emission Reduction Unit
ETS	Emissions Trading Scheme
EU	European Union
EUR	Euro (currency)
GEMA	Gas and Electricity Market Authority (UK)
GHG	Greenhouse Gases
IDAE	Institute for Energy Diversification and Saving (Spain)
JI	Joint Implementation
LEC	Levy Exemption Certificate (UK)
LNG	Liquefied Natural Gas
NAP	National Allocation Plan
NETA	New Electricity Trading Arrangements (UK)
NGC	National Grid Company (UK)
Ofgem	Office of Gas and Electricity Markets (UK)
PER	Renewable Energy Plan (Spain)
RD	Royal Decree (Spain)
REE	Electric Grid of Spain (Spain)
RES	Renewable Energy Sources
REZ	Renewable Energy Zone (UK)
TMR	Average or Reference Tariff (Spain)
TSO	Transmission System Operator
T&D	Transmission and Distribution
UK	United Kingdom

1. INTRODUCTION

The DESIRE project will disseminate cutting edge software tools and systems that will enable small- and medium-sized CHP-plants to partly balance the fluctuating output of wind power plants. We need an overview of how the EU Directives are affecting the conditions for this balancing now and in the future.

In Chapter 2, the most important articles in the directives affecting the conditions for this balancing are pointed out, while later sections describe how those articles have been implemented in national legislation in the different countries. To be more precise, Chapter 3 describes the implementation of EU Directives in Spanish regulation, Chapter 4 describes how directives have been implemented in Danish regulation, Chapter 5 describes the regulation in the UK related to directives under analysis, Chapter 6 summarises German regulation, Chapter 7 Polish regulation and Chapter 8 Estonian regulation. Last, Chapter 9 summarises the conclusions of the whole WP3.

In WP4 and WP5, we are focusing on the balancing services: Regulating Power, Upward Regulating reserves and Downward Regulating reserves. Thus, we are especially focusing on the articles in the directives expected to affect the conditions for the delivery of these balancing services.

On the other hand, it is important to keep in mind that this report will not present solutions to any potential barriers. These solutions, as well as further recommendations, will be proposed in WP6.

For further information on the historical development of renewable energy sources or combined heat and power, see other deliverables from DESIRE project, in particular deliverable 2.1 and deliverable 3.2.

2. EU DIRECTIVES

In order to find the directives at the homepage of European Union (EU), go to <http://europa.eu.int/eur-lex/>. Choose language, to the left in the Search-window, choose “All”, then put in the year (e.g. 2003), put in the number of the document (e.g. 55) and press search, this will give you access to the wanted directive (e.g. the directive 2003/55/EC of the European Parliament and of the Council Concerning common Rules for the Internal Market in Natural Gas and Repealing Directive 98/30/EC, 26.6.2003).

2.1. Directive 2003/54/EC

The Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC establishes common rules for the generation, transmission and distribution of electricity. Those rules relate to the organisation and functioning of the electricity sector, access to the market, the criteria and procedures applicable to calls for tenders and the granting of systems authorisations.

Directive 96/92/EC made significant contributions towards the creation of an internal market for electricity. Experience in implementing this directive showed the benefits that may result from the internal market in electricity, in terms of efficiency gains, price reductions, higher standards of service and increased competitiveness. However, possibilities for improving the functioning of the market remain. The freedoms which the Treaty guarantees European citizens – free movement of goods, freedom to provide services and freedom of establishment – are only possible in a fully open market, which enables all consumers freely to choose their suppliers and all suppliers freely to deliver to their customers. The main obstacles in arriving at a fully operational and competitive internal market relate amongst other things to issues of access to the network, pricing issues and different degrees of market opening between Member States.

This 2003/54/EC Directive proposes a series of measures to open up the electricity market completely to the benefit of European consumers. Its objective is to create the conditions needed for a genuine, fair competition and to put in place a true single market. It forces Member States to take the measures necessary to attain clearly defined objectives, such as to protect vulnerable customers and consumers’ fundamental rights, and to promote economic and social cohesion. Electricity undertakings must be operated under commercial principles, with no discrimination between undertakings as regards either rights or obligations, in order to achieve a competitive, secure and environmentally sustainable market in electricity. To that end, Member States must:

- impose on electric companies public service obligations which may relate to security, including security of supply, regularity, quality and price of supplies and environmental protection, including energy efficiency and climate protection;
- ensure that all household customers and small enterprises, at least, enjoy the right to be supplied with electricity of a specified quality within their territory at reasonable, easily and clearly comparable and transparent prices;
- take appropriate measures to protect end-users and vulnerable customers, including measures to help them avoid disconnection;
- ensure the implementation of a system of third party access to the transmission and distribution (T&D) systems for all eligible customers;
- inform the European Commission (EC) upon implementation of this directive. This implementation must be made not later than 1 July 2004.

Authorisation procedures should not lead to an administrative burden disproportionate to the size and potential impact of electricity producers. Member States must ensure the possibility of providing for new capacity or energy efficiency/demand-side management measures through a tendering procedure equivalent in terms of transparency and non-discrimination, on the basis of published criteria. Details of the tendering procedure for generating capacity and energy efficiency/demand-side management measures must be published in the Official Journal of the European Union at least six months prior to the closing date for tenders.

Member States must designate, or require the undertakings owning transmission or distribution systems to designate, one or more transmission or distribution system operators for a period to be determined by Member States having regard to considerations of efficiency and economic balance. Each transmission system operator (TSO) is responsible for:

- ensuring long-term ability of the system to meet reasonable demands for the transmission of electricity;
- contributing to security of supply through adequate transmission capacity and system reliability;
- managing energy flows on the system, taking into account exchanges with other interconnected systems;
- providing the operator of any other system to which its system is interconnected with sufficient information to ensure secure and efficient operation;
- ensuring non-discrimination between system users;
- giving to system users the information they need for efficient access to the system.
- Member States may require the system operator, when dispatching generating installations, to give priority to generating installations using renewable energy sources (RES) or waste or producing combined heat and power (CHP).

The tasks of the distribution system operator (DSO) are:

- to maintain a secure, reliable and efficient electricity distribution system in its area with due regard for the environment;
- to ensure non-discrimination between system users;
- to provide system users with the information they need for efficient access to the system;
- to give priority to generating installations using renewable energy sources or waste producing combined heat and power;
- to procure the energy they use to cover energy losses and reserve capacity in their system according to transparent, non-discriminatory and market-based procedures;
- to take energy efficiency/demand-side management and/or distributed generation measures that supplant the need to upgrade or replace capacity.

The minimum criteria which must be applied to safeguard the independence of transmission and distribution system operators are that:

- they may not participate in the integrated electricity undertaking responsible, directly or indirectly, for the day-to-day operation of the generation, transmission or supply of electricity;
- appropriate measures must be taken to ensure that the professional interests of the persons responsible for the management of the distribution system operator are taken into account so that they are capable of acting independently;
- they must have effective decision-making rights, independent from the integrated electricity undertaking, with respect to assets necessary to operate the network;
- they must establish a compliance programme, which sets out the measures taken to exclude discriminatory conduct, and make sure that it is adequately monitored.

In order to ensure non-discriminatory network access, it is appropriate that the distribution and transmission systems are operated through legally separate entities, if vertically integrated undertakings exist. It is important however to distinguish legal separation from ownership unbundling. Legal separation does not imply a change of ownership of assets; electricity companies must keep separate internal accounts for each of their transmission and distribution activities, as they would be required to do if the activities in question were carried out by separate companies, to avoid discrimination, cross-subsidisation and distortion of competition.

Member States must designate one or more competent bodies with the function of regulatory authorities. These authorities must be wholly independent from electricity industry interests, as they are responsible for ensuring non-discrimination, effective competition and the efficient functioning of the market.

Electricity customers should be able to choose their supplier freely, but Member States may appoint a supplier of last resort. Member States and, where appropriate, national regulatory authorities should work towards more homogenous conditions and the same degree of eligibility for the whole of the internal market. To that end, they must ensure that all consumers can select electricity supplier from 1 July 2007 (1 July 2004 for non-household customers).

Member States shall ensure that electricity suppliers specify in or with the bills and in promotional materials made available to final customers the contribution of each energy source to the overall fuel mix of the supplier over the preceding year and, at least, the reference to existing reference sources, where information on the environmental impact, in terms of, at least, emissions of carbon dioxide (CO₂) and the radioactive waste resulting from the electricity produced by the overall fuel mix of the supplier over the preceding year is publicly available.

Non-discriminatory and cost-reflective balancing mechanisms are needed to ensure effective market access for all market players, including new entrants. As soon as the electricity market is sufficiently liquid, this should be achieved through transparent market-based mechanisms for the supply and purchase of electricity needed in the framework of balancing requirements. In the absence of such a liquid market, national regulatory authorities should play an active role to ensure that rules and tariffs adopted by TSOs for balancing the electricity system are objective, transparent, non-discriminatory and cost-reflective. At the same time, appropriate incentives should be provided to balance in-put and off-take of electricity and not to endanger the system.

The Commission must monitor and review application of this directive and submit an overall progress report to the European Parliament and the Council before the end of the first year following the entry into force of the directive and, thereafter, on an annual basis. Not later than 1 January 2006, the Commission must submit to the European Parliament and to the Council a detailed report outlining the progress made on creating the internal electricity market. A new progress report is expected for the end of 2006, where further regulatory measures may be proposed. In its latest annual report, COM (2005) 568 (corrigendum D (2006) of January 2006), the Commission points out that the transposition of the directive remains disappointing. In most Member States, the legislation implementing the directive has been in force for less than a year and the others have not yet implemented it at all. Regarding the security of supply, a Directive on Security of Supply and Infrastructure Development in Electricity will be adopted, which has to be implemented by the end of 2007. Other results from the evaluation include that:

- the degree of market integration is still insufficient, as can be seen because of the price differences in the internal market and the low level of cross-border trade;
- the opening up of the internal market in energy by July 2007 should allow all customers to choose the most attractive electricity supplier;
- the use of RES must be promoted, to reduce greenhouse gases (GHG) emissions;

- regarding climate change policy, the EU emissions trading scheme became applicable in January 2005, implying a increase in the price of the allowances.

In April 2006, the Commission opened infringement procedures against 17 Member States, because they did not efficiently open their energy markets, including Estonia, Germany, Poland, Spain and United Kingdom (UK). These countries were sent a “letter of formal notice” and have two months to reply. After that, the Commission may consider further steps, such as fines.

Most relevant articles for DESIRE project include:

1. Scope (Article 1): This directive is the general framework for every operations in the interconnected European electricity system, including generation, transmission, distribution and supply. Therefore, DESIRE project will be ruled by this directive.
2. Public service obligations and customer protection (Article 3): Member States must ensure that electric companies fulfil security of supply and environmental protection conditions and that electricity suppliers specify in their bills the contribution of each energy source to the total mix of the supplier in the year before and the environmental impacts of the different energy sources. Environmental protection might be a decision criterion for consumers when choosing supplier, so technologies used in DESIRE, being more environmentally-friendly than other ways of generating electricity, are likely to be promoted.
3. Monitoring of security of supply (Article 4): Member States must monitor security of supply issues, so, since solutions as those proposed in DESIRE help improving the security of supply, those techniques are likely to be promoted.
4. Operation of transmission and distribution systems (Articles 9 & 14): Transmission System Operators must ensure the long-term ability of the system to meet reasonable demands for the transmission of electricity; and they also must manage the energy flows in the system. Distribution System Operators must maintain a secure, reliable and efficient electricity distribution system, with due regard for the environment. As a result, local balancing techniques, such as those proposed in DESIRE, will be very helpful for them when fulfilling their obligations. Therefore, they will try to promote these techniques.
5. Dispatching and balancing (Articles 11 & 14): Member States may require Transmission System Operators and Distribution System Operators, when dispatching generating installations, to give priority to generating installations using renewable energy sources or combined heat and power. These articles promote DESIRE in two ways: they encourage the use of both wind and CHP, and, since they encourage the use of fluctuating renewable energy sources, they also increase the need for local balancing techniques.
6. Planning of distribution networks (Article 14): When planning the development of the distribution network, energy efficiency measures and distributed generation that might replace the need to upgrade electricity capacity must be considered. This article forces Distribution System Operators to evaluate the use of distributed generation, such as that proposed in DESIRE, before upgrading the network.
7. Implementation (Article 30): The directive must be included in national legislation not later than 1 July 2004.

Summarising, there is no article which hinders the possibility of using the balancing techniques proposed in DESIRE, and several articles promote them, by establishing duties and responsibilities on different actors which can be more easily performed by using our techniques.

2.2. Directive 2003/55/EC

The Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in natural gas and repealing Directive 98/30/EC establishes common rules for the storage, transmission, supply and distribution of natural gas. Its objective is to gradually open up national gas markets to competition and improve security of supply and industrial competitiveness. To that end, it lays down detailed rules on the organisation and functioning of the natural gas sector, including liquefied natural gas (LNG), biogas and gas from biomass and other types of gas. The new directive also regulates market access, the criteria and procedures that apply to the granting of licences for the transmission, storage, distribution and supply of natural gas, and the operation of the systems.

Firms in the natural gas sector must be operated on a commercial basis and may not be discriminated as regards their rights and obligations. In this respect, Member States may:

- impose on undertakings operating in the gas sector, in the general economic interest, public service obligations, which may relate to security, including security of supply, regularity, quality and price of supplies and environmental protection;
- take appropriate measures to protect final customers and to ensure high levels of consumer protection, and ensure that there are adequate safeguards to protect vulnerable customers, including appropriate measures to help them avoid disconnection;
- implement appropriate measures to achieve the objectives of social and economic cohesion and environmental protection;
- inform the Commission of all measures taken to fulfil public service obligations, including consumer and environmental protection, and their possible effect on national and international competition, and whether or not such measures require a derogation.

Where the construction and operation of natural gas facilities are subject to prior authorisation, the Member State concerned or any other competent authority it designates is to grant the authorisation on the basis of objective and non-discriminatory criteria. On the same basis, the Member State may grant authorisations:

- for the supply of natural gas;
- to wholesale customers.

Member States must ensure that the reasons for any refusal to grant an authorisation are objective and non-discriminatory and are given to the applicant. Reasons for such refusals must be forwarded to the Commission for information. Member States may refrain from applying the provisions on distribution authorisation where the granting of permits would prevent the fulfilment of public service obligations imposed on the natural gas undertakings, but only if this does not unduly affect the development of trade.

Member States must monitor security of supply issues. These include the supply/demand balance on the national market, the level of expected future demand and available supplies, envisaged additional capacity being planned or under construction, and the quality and level of maintenance of the networks, as well as measures to cover peak demand and to deal with shortfalls of one or more suppliers. By 31 July each year, the competent authorities must publish a report outlining the findings resulting from the monitoring of these issues and forward it to the Commission.

The technical rules establishing the minimum technical design and operational requirements for the connection to the system of LNG facilities, storage facilities, other transmission or distribution systems and direct lines must ensure the interoperability of systems, be objective and non-discriminatory and be notified to the Commission.

Each transmission and distribution operator must:

- operate, maintain and develop secure, reliable and efficient facilities under economically acceptable conditions, with due regard for the environment;
- avoid any discrimination between network users;
- provide any other system operator (natural or legal persons carrying out the function of transmission and/or distribution and responsible for operating, maintaining and developing the system) with sufficient information to ensure that the transmission and storage of natural gas may be effected in a manner compatible with the secure and efficient operation of the interconnected system;
- provide system users with the information they need for efficient access to the system;
- adopt objective, transparent and non-discriminatory rules, including rules for the charging of system users of their networks for energy imbalance;
- must preserve the confidentiality of commercially sensitive information.

Where the transmission or distribution system operator is part of a vertically-integrated undertaking, it must be independent, at least in terms of its legal form, organisation and decision making, from other activities not relating to transmission or distribution. Transmission and distribution system operators must:

- refuse to participate in company structures of integrated natural gas undertaking responsible, directly or indirectly, for the day-to-day operation of the production, transmission/distribution and supply of natural gas;
- act independently to ensure that the professional interests of the persons responsible for the management of the transmission/distribution system are taken into account;
- have effective decision-making rights to operate, maintain or develop the network;
- establish a compliance programme which sets out measures taken to ensure that discriminatory conduct is excluded, and ensure that observance of it is adequately monitored.

Member States may impose on distribution undertakings and/or supply undertakings an obligation to supply customers located in a given area and/or of a certain category. The tariff for such deliveries may be regulated to ensure equal treatment of the customers concerned.

Member States or any competent authority they designate, including the dispute settlement authorities, have the right of access to the accounts of natural gas undertakings provided that such consultation is needed to carry out their functions and that they preserve the confidentiality of commercially sensitive information. Regarding unbundling, the directive lays down the rules which must apply to the accounts of natural gas undertakings. Annual accounts must be drawn up, audited and published according to the rules of national law concerning the annual accounts of limited liability companies adopted pursuant to Community legislation. Undertakings which are not obliged to publish their annual accounts must nevertheless keep a copy of them at the disposal of the public. Integrated national gas undertakings must keep separate accounts for their natural gas transmission, distribution, LNG and storage activities with a view to avoiding discrimination, cross-subsidisation and distortion of competition. Until 1 July 2007, they must keep separate accounts for supply activities for eligible customers and for non-eligible customers. A balance sheet and a profit and loss account must be drawn up for each activity.

Member States may organise access to the system in one of two ways:

- negotiated access on the basis of publication of the main commercial conditions for use of the system;
- regulated access on the basis of tariffs and/or other published clauses and obligations for use of the system.

Gas undertakings may refuse access to the system on the following grounds:

- a lack of capacity;
- access to the system would prevent them from performing public service obligations;
- economic and financial difficulties with take-or-pay contracts (long-term contracts in which the producer guarantees that gas will be made available and the operator guarantees payment, whether it takes delivery of the gas or not).

Duly substantiated reasons must be given for such refusal. Member States must designate an independent competent authority to settle any disputes relating negotiations on access to the system.

Member States must ensure that from 1 July 2007, all consumers are eligible and that, therefore, they can choose their gas supplier (1 July 2004 for non-household customers). Member States must ensure that eligible customers can be supplied through a direct line. Member States must ensure that natural gas undertakings and eligible customers are able to obtain access to upstream pipeline networks. Safeguard measures may be taken in the event of a sudden crisis in the energy market or where the physical safety or security of the persons, apparatus or installations or system integrity is threatened.

Derogation from some of the provisions of this directive is provided for:

- where natural gas undertakings encounter serious economic and financial difficulties because of their take-or-pay commitments;
- for Member States which are not directly connected to the interconnected system of another Member State and which have only one single main external supplier;
- for Member States which have the status of an emerging market;
- for Member States faced with serious problems in a geographically limited area as a result of the implementation of the directive, in particular as regards the development of transmission infrastructure.

By no later than 1 January 2006, the Commission must send the European Parliament and the Council a detailed report outlining progress in creating the internal gas market. A new progress report is expected for the end of 2006, where further regulatory measures may be proposed. In its latest annual report, COM (2005) 568 (corrigendum D (2006) of January 2006) the Commission points out that the transposition of the directive remains disappointing. Most Member States have transposed the directive with delay and the others have not yet implemented it at all. Other results from the evaluation include that:

- the gas market suffers from a lack of liquidity of gas and transport capacity;
- the degree of market integration is still insufficient and the globalisation of the market and diversification of imports is more difficult to achieve than for electricity;
- the security of supply is regulated by the Directive on Security of Gas Supply (2004/67/EC);
- the opening up of the internal market in energy by July 2007 should allow all customers to choose the most attractive gas supplier;
- the use of renewable sources of energy must be promoted, to reduce greenhouse gases (GHG) emissions.

Member States must bring into force the laws, regulations and administrative provisions necessary to comply with this directive not later than 1 July 2004, but they can postpone the legal unbundling of distribution system operators until 1 July 2007, although decision making must be unbundled.

Some relevant provisions of the directive are expected to influence the ability of small and medium sized CHP-plants to partly balance the fluctuating output of wind power plants. As this affects the balancing techniques proposed in DESIRE project, most important outcomes are listed below:

1. Penalties for imbalances and peaks in gas consumption (Articles 8 & 12, Opening remark 15): When small and medium sized cogeneration plants are to deliver e.g. Regulating Power, more starts at the cogeneration units are expected and more imbalances in the gas consumption will be introduced, compared to what have been traded at the day-ahead natural gas market. Therefore it is important, that the penalties these cogeneration plants have to pay for imbalance in the gas consumption and for peak consumptions are reasonable, so that these penalties do not prevent them to deliver e.g. Regulating Power. In order to ensure effective market access for all market players, including new entrants, non discriminatory and cost-reflective balancing mechanisms are necessary. In a first step, when the market is not liquid enough, national regulatory authorities will play an active role to ensure that balancing tariffs are non-discriminatory and cost-reflective. However, when market liquidity is reached, market-based mechanisms for the supply and purchase of gas must be set up. Both transmission system operators and distribution system operators must include objective, transparent and non-discriminatory rules for balancing the gas transmission and distribution systems, including rules for the charging of system users of their networks for energy imbalance. In addition, appropriate incentives are required to balance the input and off-take of gas, with a view not to endanger the system.
2. Natural gas regulatory authority (Article 25): The natural gas regulatory authority has the important tasks of ensuring non-discrimination, effective competition and the efficient functioning of the market. Therefore, it is important that the regulatory authority is wholly independent of the gas industry. This authority is responsible for fixing or approving prior to their entry into force, at least the methodologies used to calculate or establish the terms and conditions for the connection and access to national networks, including transmission and distribution tariffs, and the provision of balancing services.
3. Public service obligations (Article 3): Each country is allowed to impose on gas undertaking public service obligations which may relate to security, including security of supply, regularity, quality and price of supplies, and environmental protection, including energy efficiency and climate protection. Such obligations must be clearly defined, transparent, non discriminatory, verifiable and must guarantee equality of access for EU gas companies to national consumers. As a result of those public service obligations, Member States can impose special fees or taxes on gas consumption in order to fund specific programmes, such as a programme to improve energy efficiency.
4. Obligation to grant access for RES-fuels to the gas grid (Article 1, Opening remark 24): Biogas and gas from biomass or other types of gas must be granted a non-discriminatory access to the gas system, as long as they can technically and safely be injected into, and transported through, the natural gas system.

As in the case of the directive on the internal electricity market, this directive on the internal gas market does not prevent DESIRE techniques to be employed and, besides, some articles promote their use.

2.3. Directive 2001/77/EC

The Directive 2001/77/EC of the European Parliament and of the Council, of 27 September 2001, on the promotion of electricity produced from renewable energy sources in the internal electricity market was issued to create a community framework which will facilitate a significant increase in the amount of electricity generated out of renewable energy sources in the European Union in the medium-term. This directive concerns electricity produced from non-fossil renewable energy sources, such as wind, solar, geothermal, wave, tidal, hydroelectric, biomass, landfill gas, sewage treatment gas and biogas energies.

The potential for the exploitation of renewable energy sources is underused in the Community at present. Since renewable energy sources contribute to environmental protection and sustainable development, the promotion of electricity from renewable sources of energy is a high Community priority. Other reasons for their promotion are the security and diversification of energy supply, creation of local employment and social and economic cohesion.

The directive follows up the White Paper on renewable sources of energy, which confirmed a target of 12% of gross inland energy consumption from renewable energy sources for the Community as a whole by 2010, which would imply a 22.1% of electricity produced from RES. It also constitutes an essential part of the package of measures needed to comply with the commitments made by the EU under the 1997 Kyoto Protocol on the reduction of greenhouse gases emissions, and of any policy package to meet further commitments.

Companies in the EU are currently among the world leaders in developing new technologies connected with RES. The directive aims to give boost to stepping up the contribution of these energies while respecting the principles of the internal market. Increased market penetration of electricity produced from renewable energy sources will allow for economies of scale, thereby reducing costs. It is therefore necessary to ensure that this potential is better exploited within the framework of the internal electricity market, which is the aim of this directive.

Member States must adopt and publish, by October 2002 at the latest, and every five years subsequently, a report setting the indicative Member State targets for future RES electricity consumption for the following ten years and showing what measures have or are to be taken to meet those targets. The Member State targets must take account of the reference values set out in the Annex to the directive for Member States' indicative targets concerning the share of electricity produced from renewable energy sources in the gross electricity consumption in 2010¹. They must also be compatible with all the national commitments entered into as part of the commitments accepted by the Community at Kyoto. Reference values for countries participating in DESIRE are:

- Denmark: 29.0%
- Germany: 12.5%
- Spain: 29.4%
- United Kingdom: 10.0%
- Poland: 7.5%
- Estonia: 5.1%

¹ Data for Poland and Estonia were set up in their respective accession treaties, since they were not part of the EU when the directive entered in force.

Member States are required to publish by 27 October 2003, and every two years subsequently, a report which includes an analysis of success in meeting the national targets. The report should also indicate what climatic factors are likely to affect meeting the targets and to what extent the measures taken are consistent with national commitments regarding climate change.

At Community level evaluation, the Commission must publish a biannual report, the first on October 2004, based on the national reports assessing the extent to which:

- the Member States have progressed towards achieving the national targets;
- the national indicative targets are compatible with the global indicative target of 12% of gross domestic energy consumption in 2010, and in particular with the indicative share of 22.1% of electricity from renewable energy sources out of the total electricity consumption of the Community in 2010.

Should the Commission's report conclude that the national targets are liable to be inconsistent with the main objectives of the directive, the Commission may present proposals to the European Parliament and to the Council with respect to the targets, including, if needed, proposals for obligatory targets.

In the first report, COM(2004) 366, the Commission pointed out that all the Member States have adopted national targets on the share of electricity produced from renewable energy sources, as well as measures aimed at increasing the use of renewable energy sources. However, if current trend continues, only a share of 10% of gross domestic energy consumption and between 18 and 19% of electricity consumption will be reached in EU-15. According to the report, the situation varies considerably from one Member State to another, and three groups can be distinguished: countries which should be able to reach their national targets under present energy policy (Germany, Denmark, Spain and Finland), countries which have begun adopting policies and measures which would also allow them to achieve their national targets (Austria, Belgium, France, Ireland, the Netherlands, the United Kingdom and Sweden) and countries which must improve their policies since these will not enable them to reach their targets (Greece and Portugal)². The situation in the new Member States will undergo an initial evaluation in the 2006 report.

The need for public support in favour of renewable energy sources is recognised in the Community guidelines for State aid for environmental protection, which, amongst other options, take account of the need to internalise external costs of electricity generation. Member States operate different mechanisms of support for renewable energy sources at the national level, including green certificates, investment aid, tax exemptions or reductions, tax refunds and direct price support schemes. One important means to achieve the aim of this directive is to guarantee the proper functioning of these mechanisms, until a Community framework is put into operation, in order to maintain investor confidence. This framework would enable electricity from renewable energy sources to compete with electricity produced from non-renewable energy sources and limit the cost to the consumer, while, in the medium term, reduce the need for public support. It is too early to decide on a Community-wide framework regarding support schemes, in view of the limited experience with national schemes and the current relatively low share of price-supported electricity produced from renewable energy sources in the Community. It is, however necessary to adapt, after a sufficient transitional period, support schemes to the developing internal electricity market. It is therefore appropriate that the Commission monitors the situation and presents a report on experience gained with the application of national schemes.

² Information is not available for Italy and Luxembourg

The Commission must present, by October 2005 at the latest, a report on the experience gained concerning the application and coexistence of the different support schemes in the Member States. This report must evaluate the success, including the cost-effectiveness ratio, of the support schemes for the promotion of RES electricity consumption. This report must be accompanied, if necessary, by a proposal for a Community framework for support schemes for RES electricity. The Commission stated in this report, COM(2005) 627³, that competition between different support schemes appears to be beneficial in this first phase of promotion of RES electricity and that, therefore, no Community framework for support schemes for electricity produced from renewable energy sources will be proposed yet.

The directive provides for a system concerning the guarantee of origin of RES electricity in order to facilitate exchanges of RES electricity and to increase transparency, while facilitating customer choice. The guarantees of origin indicate both the renewable energy source from which the electricity is produced and the date and place of production. It is important that all forms of electricity produced from renewable energy sources are covered by such guarantees of origin. It is important to distinguish guarantees of origin clearly from exchangeable certificates (green or white certificates): schemes for the guarantee of origin do not by themselves imply a right to benefit from national support mechanisms established in different Member States. The system of guarantees of origin is to be set up at national level and must be put in place by 27 October 2003 at the latest. Member States define objective and non-discriminatory criteria and issue the guarantees when requested. They can designate one or more competent bodies independent of production and distribution to supervise the issuing of guarantees. In addition, taking account of the principles of the internal market and in order to permit RES electricity exchanges in the Community, the guarantees of origin are to be mutually recognised by Member States. Any refusal to recognise the certificates, such as for reasons linked to fraud prevention, must be based on objective, transparent and non-discriminatory criteria. In order to ensure that mutual recognition works properly, the Member States are required to put into place appropriate mechanisms to ensure that their certification system is both accurate and reliable. These mechanisms must be set out in detail in the report describing national targets and measures. Any disputes are to be settled by the Commission.

One major barrier to the further development of RES electricity is the administrative and planning procedures that potential generators must respect, which is particularly a problem for small and medium-sized companies, which make up a significant proportion of companies in this sector. With this in mind, Member States are required to review their existing legislative and regulatory frameworks concerning authorisation procedures in order to reduce regulatory and non-regulatory obstacles, to rationalise and speed up administrative procedures and to ensure that the rules are transparent and non-discriminatory. What is more, it is important for the rules to take account of the particular characteristics of the different technologies using renewable energy sources. Member States must publish, at the latest on 27 October 2003, a report on this review procedure defining actions to be taken to reduce obstacles in this area. This report should give an overview of progress in particular on:

- co-ordination between the different administrative bodies involved concerning time limits, reception and handling of authorisation requests;
- the establishment of possible guidelines for activities connected with targets, so as to improve administrative procedures and the feasibility of speedy planning for RES electricity producers;
- the appointment of an authority to act as a mediator in disputes between authorities responsible for issuing authorisations and requesters.

³ This Communication also covered other Commission's obligations under this directive.

In the Commission's final report on the implementation of the directive and on the basis of Member States' reports, the best practices for reducing regulatory and non-regulatory barriers to increasing RES electricity production must be evaluated.

Under certain circumstances it is not possible to ensure fully transmission and distribution of electricity produced from renewable energy sources without affecting the reliability and safety of the grid system. As a result, transmission and distribution system operators may impose strict requirements for the connection of new RES plants. Therefore, connection to the grid can be costly to the producers of RES electricity. Care must be taken to ensure that the high costs of connection do not hamper either the development of RES electricity – which has economic and other advantages, such as that of environmental protection – or the functioning of the internal market, which must guarantee fair conditions to all producers. To this end, Member States are to put in place a legal framework or are to require transmission and distribution system operators:

- to guarantee the transmission and distribution of electricity produced from renewable energy sources. Member States may agree on priority access for RES electricity. As regards the distribution of electricity by production installations, priority will be given to installations using renewable energy sources to the extent permitted by the national electricity system;
- to define and publish standard rules on responsibility for the costs of technical adaptations needed to enable a new RES electricity producer to feed his electricity into the interconnected grid. Member States may require operators to bear some or all of the costs;
- to define and publish standard rules on sharing the costs of the system installations among all the producers benefiting from it, such as for the strengthening of the grid;
- to supply new producers who wish to be connected to the grid with a complete and detailed estimate of the connection costs. Member States may allow producers to call for tenders for connection work.

Member States must ensure that transmission and distribution costs do not in any way discriminate against electricity produced from renewable energy sources. Member States are also required to examine the measures to be taken to facilitate the access of RES electricity to the grid, considering in particular the need to introduce two-way metering (the possibility of purchasing electricity from the grid when RES electricity production is not sufficient).

The Commission must present a report on the implementation of the directive, no later than 31 December 2005 and every five years subsequently. This report must:

- assess progress made in reflecting the external costs of electricity produced from non-renewable energy sources, and the impact of public aid granted for production of electricity;
- take particular account of the ability of Member States in achieving the national targets and the global target established in the directive and whether there is any discrimination between the various energy sources.

If required, the Commission had to accompany its reports with supplementary proposals to the European Parliament and to the Council.

Member States must bring into force the laws, regulations and administrative provisions necessary to comply with this directive not later than 27 October 2003. When they implement the provisions of this directive in national regulation, they must inform the Commission, and the implementation must contain a reference to this directive or be accompanied by such a reference on the occasion of their official publication.

Most relevant articles for DESIRE project include:

1. Purpose (Article 1): The Commission states its interest in promoting electricity produced from renewable energy sources, so that public regulation will facilitate the integration of the electricity produced from renewable energy sources in electricity grids, which also includes wind energy. As a result, it will be easier for promoters to build new wind capacity, so requirements for local balancing will increase, thus making DESIRE techniques more attractive to investors.
2. National indicative targets (Article 3): Member States must establish national targets for electricity produced from renewable energy sources, but most of them are not likely to meet those targets with the measures taken so far. Therefore, it is likely that Member States will further promote the use of renewable energy sources. One of the main characteristics of electricity produced from renewable energy sources is that it is intermittent. Consequently, balancing requirements will increase and, therefore, the incentives to use balancing techniques as the ones proposed in DESIRE. On the other hand, these balancing techniques will help transmission and distribution system operators to manage energy flows through the grid and, thus, they will allow the connection of more capacity of fluctuating renewable energy sources. The outcome of this process will be that Member States will more easily reach the targets established.
3. Support schemes (Article 4): Support schemes improve the economics of wind farms, so new capacity will be likely to be built. Consequently, balancing requirements will increase and, as a result, local balancing will be promoted.
4. Guarantee of origin (Article 5): It is a way to demonstrate that the electricity produced from renewable energy sources is really produced from wind energy. For certain electricity consumers, it might be a decision criterion when choosing electricity supplier, so this kind of electricity generation can have better economics.
5. Administrative procedures (Article 6): These procedures may imply big barriers for developers when trying to build new wind capacity. According to the directive, they should not be a barrier.
6. Grid system issues (Article 7): Electricity produced from renewable energy sources, and therefore electricity produced from wind energy, must be integrated in the grid and Member States are allowed to force transmission and distribution system operators to give priority to these technologies. As a result, wind capacity is likely to increase and, in parallel, the need for balancing.
7. Summary report (Article 8): This report analyses national reports, so that the comparative situation in different countries can be assessed. Where the situation is good, investments can be made in wind capacity and where not, the Commission can suggest changes in regulation to improve the situation and promote investments in wind power.
8. Transposition (Article 9): All Member States must include this directive in national regulation by the 27th of October of 2005.

Summarising, there is no article which hinders the possibility of using the balancing techniques proposed in DESIRE project, and the directive promotes the use of fluctuating renewable energy sources, which increases the need for local balancing techniques.

2.4. Directive 2004/8/EC

The Directive 2004/8/EC of the European Parliament and of the Council, of 11 February 2004, on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC was issued 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, that is, to increase the use of cogeneration in the EU.

The energy-saving potential of cogeneration is underused in the EU nowadays. As a result, the 2004/8/EC Directive is aimed towards facilitating the installation and operation of electrical cogeneration plants in order to save energy and mitigate climate change. The cogeneration technology allows the production of heat and electricity in one process, so it is also often called Combined Heat and Power or CHP.

The Green Paper entitled 'Towards a European strategy for the security of energy supply' and published in 2000 highlighted the need to limit the energy dependency of the EU and reduce the greenhouse gas emissions. In fact, external energy supplies currently account for 50% of requirements and they are projected to rise to 70% by 2030 if current trends persist. Besides, carbon dioxide emissions in the EU are currently on the rise, making it difficult to meet the commitments under the Kyoto Protocol.

Cogeneration saves energy and improves security of supply. Cogeneration accounted for 11% of total electricity production in the EU in 1998. If the share of electricity production from cogeneration increased to 18%, the energy savings could represent around 3 to 4% of total gross consumption in the EU. Electricity/heat cogeneration installations can achieve energy efficiency levels of around 90%. The development of cogeneration could avoid the emission of 127 million tonnes of CO₂ in the EU in 2010. Other benefits from cogeneration are that it:

- reduces electrical grid losses, as cogeneration plants are usually closer to consumption point;
- increases competition among electricity producers;
- allows new enterprises to be set up;
- is well suited to isolated or extremely remote areas.

The forthcoming legislative framework on cogeneration should overcome the major obstacles:

- inadequate control of longstanding monopolies;
- inadequate support from regional and local authorities;
- incomplete liberalisation;
- regulatory obstacles having a negative effect;
- no European standards for network connection.

The objective of this directive is to establish a transparent common framework in order to promote and facilitate the installation of cogeneration plants where demand for useful heat exists or is anticipated. This overall objective translates into two specific aims:

- in the short term, the directive makes it possible to consolidate existing cogeneration installations and promote new plants;
- in the medium term and long term, the directive should serve as a means to create the necessary framework for high efficiency cogeneration, aimed at reducing emissions of CO₂ and other substances, to contribute to sustainable development.

The Commission must establish harmonised efficiency reference values by 21 February 2006 for separate production of electricity and heat. Revised reference values were presented at a Committee meeting on 1 February (see [20]). However, according to a report of DEFRA [19], these values are still in process of being developed and the final agreement is expected by mid-2006. The Commission will review the harmonised values for the first time on 21 February 2011, and every four years thereafter, to take account of technological developments and changes in the distribution of energy sources. Member States implementing this directive before the establishment of harmonised efficiency reference values by the Commission, should adopt their national efficiency reference values for separate production of heat and electricity.

Member States must ensure, on the basis of the harmonised efficiency reference values and within six months of their adoption, that the origin of electricity produced from high-efficiency CHP can be guaranteed according to objective, transparent and non-discriminatory criteria laid down by each Member State. High-efficiency CHP obtains more than 10% energy savings. Member States, or a designated competent body, independent of other electric activities, must ensure that the guarantee of origin of the electricity enables producers to demonstrate that the electricity they sell is produced from high-efficiency cogeneration. A guarantee of origin must:

- specify the lower calorific value of the fuel source from which the electricity was produced, specify the use of the heat generated together with the electricity, and dates and places of production,
- specify the quantity of electricity from high-efficiency cogeneration,
- specify the primary energy savings, based on the harmonised efficiency reference values established by the Commission.

Member States must analyse the national potential for the application of high-efficiency cogeneration. On request by the Commission, Member States must evaluate progress towards increasing the share of high-efficiency cogeneration, for the first time by 21 February 2007, and thereafter every four years. This report must also include an analysis of barriers to cogeneration, and of measures taken to ensure the reliability of the guarantee system.

Member States or the competent bodies must evaluate the existing legislative and regulatory framework with regard to authorisation procedures, with a view to:

- encouraging the design of CHP units to match economically justifiable demands for useful heat output and avoiding production of more heat than the useful heat,
- reducing the regulatory and non-regulatory barriers to an increase in cogeneration,
- streamlining and expediting procedures at the appropriate administrative level and
- ensuring that the rules are objective, transparent and non-discriminatory.

Member States operate different public support mechanisms for CHP at the national level: investment aid, tax exemptions or reductions, exchangeable certificates, direct price support. In order to maintain investor confidence, the good functioning of these mechanisms must be guaranteed, until a harmonised Community framework is put in operation. The schemes should:

- focus mainly on support for cogeneration based on economically justifiable demand for heat and cooling,
- be consistent with the provisions of the Community guidelines on State aid for environmental protection, including as regards the non-accumulation of aid,
- have a stable economical and administrative environment for investments in new cogeneration installations. Member States should be encouraged to address this need by designing support schemes with a duration period of at least four years and by avoiding frequent changes in administrative procedures etc., and
- respect the phase-out principle.

Member States must, not later than 21 February 2006, publish a report with the results of the analysis and evaluations carried out in relation with guarantees of origin, national potentials and administrative procedures. They must also submit to the Commission, for the first time before the end of December 2004 covering data for the year 2003, and thereafter on an annual basis, statistics on national electricity and heat production from CHP, CHP capacities and fuels used. On the basis of Member States' reports, the Commission will review the application of this directive and submit to the European Parliament and to the Council not later than 21 February 2008 and thereafter every four years, a progress report on the implementation of this directive. If appropriate, proposals to the European Parliament and the Council will go with the report.

Member States must bring into force the laws, regulations and administrative provisions necessary to comply with this directive not later than 21 February 2006, they must inform to the Commission and national implementations must contain a reference to the directive.

Most relevant articles for DESIRE project include:

1. Purpose (Article 1): The Commission shows its interest in promoting CHP, so regulation will facilitate its integration in electricity grids. As a result, it will be easier for promoters to build new CHP plants and, thus, the number of potential wind-balancing plants increases.
2. Efficiency criteria of CHP (Article 4): CHP units to be promoted must have a high energy-efficiency, so a heat demand must exist. If the heat demand is not constant, a thermal storage could be necessary, which also increases the opportunities for DESIRE balancing.
3. Guarantee of origin (Article 5): It is a way to demonstrate that real high-efficiency CHP is used. For certain electricity consumers, it might be a decision criterion for electricity supplier choice, so the economics of this kind of electricity generation are likely to increase.
4. National potential for high-efficiency cogeneration (Article 6): The report resulting from this article will show the opportunities for installing new CHP plants, which will encourage promoters to install CHP and, thus, more potential wind-balancing plants will be available.
5. Support schemes (Article 7): Support schemes improve the economics of cogeneration plants, and new capacity is more likely to be built. As a result, more potential balancers will be in place.
6. Administrative procedures (Article 9): These procedures may imply big barriers for CHP developers when trying to build new plants. According to the directive, they must not.
7. Member States' reporting (Article 10): This report will give an idea of the situation of CHP in the country. Therefore CHP investors will know in advance whether conditions are good.
8. Commission reporting (Article 11): This report analyses national reports, to compare the situation in different countries. Where the situation is good, investments can be made in cogeneration and where not, the Commission can suggest changes in regulation to improve the situation and promote investments in cogeneration.
9. Transposition (Article 15): All Member States must include this directive in national regulation by 21 February 2006.

Summarising, there is no article which hinders the possibility of using the balancing techniques proposed in our project, and the directive promotes the use of CHP, which is an essential part of DESIRE, so more potential users will exist if the directive is properly applied.

2.5. Directive 2003/87/EC

The Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowances trading within the Community and amending Council Directive 96/61/EC establishes a Community greenhouse gas (GHG) emission trading scheme (ETS) from 1 January 2005. In this context, “allowance” means the entitlement to emit a tonne of carbon dioxide or an amount of any other greenhouse gas with an equivalent global warming potential during a specified period.

The Green Paper on greenhouse gas emissions trading within the European Union launched a debate on the suitability of such a scheme and the ways in which it might operate. This directive is based on the results of the debate. The adoption of the Kyoto Protocol by the Commission and its Member States in 2002 commits them to reduce their greenhouse gas emissions by 8% in relation to 1990 levels between 2008 and 2012. In the longer term, global emissions of GHG will need to be reduced by approximately 70%, compared to 1990 level. This directive, by establishing a market in GHG emission allowances, will help the Community and its Member States to meet the commitments made in the framework of the Kyoto Protocol in a cost-effective manner, with the least possible diminution of economic development and employment.

With effect from 1 January 2005, all installations carrying out any of the activities listed in Annex I to this directive (energy sector, iron and steel production and processing, the mineral industry and the wood pulp, the paper and card industry) and emitting the specific greenhouse gases associated with that activity must have an appropriate permit issued by the competent authorities. Applications for greenhouse gas emissions permits must describe:

- the installation, its activities and the technology used;
- the materials used which could emit the GHG listed in Annex II to the directive;
- the sources of gas emissions;
- the measures planned to monitor and report emissions.

The authorities will issue a permit, provided that the operator of the installation is capable of monitoring and reporting the emissions. A permit may cover one or more installations operated by the same operator on the same site. Permits contain, among others, details of the activities and emissions of the installation, and the obligation to surrender, during the first four months of each year, a quantity of allowances proportional to the total emissions over the previous year.

Each Member State will draw up a national plan, indicating the allowances it intends to allocate for the relevant period and how it proposes to allocate them to each installation (Annex III to the directive). The plans covering the initial three-year period specified in this directive (starting 1 January 2005) should be published by 31 March 2004 at the latest, and those relating subsequent periods should be published, at least, eighteen months before the beginning of the relevant period. When drawing up the plans, Member States should take due account of comments from the public. If a plan does not comply with the criteria in this directive, the Commission may reject it within three months of notification. At least 95% of the allowances for the initial three-year period are allocated to the installations free of charge. For the five-year period beginning the 1 January 2008, Member States must allocate 90% of the allowances free of charge. Member States will ensure the free circulation of allowances within the European Community. Each year, on 30 April at the latest, they will also make sure that the operators of the installations surrender the correct quantity of allowances commensurate with the total emissions over the previous year. The surrendered allowances are subsequently cancelled.

At the end of the year, the operator must submit a report to the competent authority detailing the greenhouse gas emissions produced by the installation during that year. These reports must follow the “guidelines for the monitoring and reporting of emissions” (Decision 2004/156/EC), adopted on the basis of the criteria laid down in Annex IV to this directive. When verifying the reports submitted by operators, due account must be taken of the principles set out in this directive. If a report is not verified as satisfactory in accordance with the criteria in the directive, the operator must cease trading allowances until the report is deemed satisfactory.

Any operator failing to surrender, by 30 April at the latest, the quantity of allowances needed to compensate the emissions from his installation during the previous year will be required to pay an excess emission penalty. The penalty will be 100 Euro for each tonne of carbon dioxide equivalent (40 Euro during the three-year period starting on 1 January 2005) and will not release the operator from the obligation to surrender an amount of allowances equal to the excess emissions. Each Member State will determine its own sanctions regime covering infringements of this proposal and will notify the Commission accordingly by 31 December 2003 at the latest.

Directive 2004/101/EC reinforces the link between the EU’s emission allowance trading scheme and the Kyoto Protocol by making the latter’s “project-based” mechanisms (Joint Implementation and the Clean Development Mechanism) compatible with the scheme. This will enable operators to use these two mechanisms in the allowance trading scheme to fulfil their obligations. The result will be lower compliance costs for installations in the scheme. It is estimated that annual compliance costs in the period 2008-2012 for all covered installations in the enlarged Union will be reduced by more than 20%. This directive thus recognises joint implementation (JI) and clean development mechanism (CDM) credits as equivalent to emission allowances, except for those from land use, land use change and forestry activities. Credits from JI projects are called “emission reduction units” (ERU), while credits from CDM projects are called “certified emission reductions” (CER). The directive also takes steps to prevent ERUs and CERs being counted twice, where they result from activities which also lead to a reduction in, or limitation of, emissions from installations covered by Directive 2003/87/EC. With a view to ensuring mutual recognition of allowances and the promotion of JI and CDM, the Community may conclude agreements with third countries (which have ratified the Kyoto Protocol and are listed in its Annex B) using other greenhouse gas emissions trading schemes. Although project-based mechanisms, including JI and CDM, are stated to be important to achieve the overall goals, their use should be supplemental to domestic action.

The Commission adopted the regulation No 2216/2004 on the establishment of a system of registries in the form of an electronic database for monitoring the issue, holding, transfer and cancellation of allowances. These registries will also guarantee public access to information, confidentiality and conformity with the provisions of the Kyoto Protocol. The Commission will nominate a Central Administrator to maintain an independent transaction log recording the issue, transfer and cancellation of allowances at Community level. The Central Administrator will conduct an automated check on each transaction relating to allowances. If irregularities are identified, the transactions in question will be suspended until irregularities have been corrected.

If the Commission agrees, from 2008, Member States may apply the emission allowance trading scheme to activities, installations and greenhouse gases other than those listed in this directive, after studying the consequences of this on the internal market, competition and the emission allowance trading scheme. Member States may apply to the Commission for certain installations to be temporarily excluded from the scheme (until 31 December 2007 at the latest). During the three-year period starting on 1 January 2005, Member States may apply to the Commission for certain installations to be issued with additional allowances in cases of *force majeure*. The Commission has determined which situations constitute *force majeure*.

Member States may allow operators of installations listed in the directive to form a pool of installations carrying out the same activity (for the three-year period starting on 1 January 2005 and the five-year period starting on 1 January 2008). Operators wishing to form a pool must nominate a trustee to manage the installations' allowances and be responsible for surrendering allowances equal to the total emissions from the installations in the pool.

Starting with the five-year period from 2008 to 2012, transfers of allowances to another Member State will involve corresponding adjustments of assigned amount units under the Kyoto Protocol. Member States will submit to the Commission an annual report on the application of this directive. The Commission will publish an annual report based on these reports.

The directive will encourage the use of energy efficient technologies, including combined heat and power technology, which will be very beneficial for using the balancing techniques proposed in DESIRE. Most important provisions for DESIRE are listed below.

1. "Allowance" means an allowance to emit one tonne of carbon dioxide equivalent during a specified period (Article 3a).
2. From 1 January 2005 no type of installation specified in Annex 1 to the directive should undertake any activity resulting in emission of greenhouse gases unless its operator holds a permit issued by a competent authority (Art. 4).
3. For the five-year period from 2008 to 2012 Member States shall allocate at least 90% of the allowances free of charge (Art.10). The decision concerning the total quantity of allowances allocated by a Member State shall be taken at least 12 months before the five-year period, i.e. latest on 1 January 2007 (Art. 11, 2).
4. Each year the Member States shall submit to the Commission a report on the application of the directive. The first report is due on 30 June 2005 (Art. 21, 1).
5. Member States must stipulate the establishment and maintenance of a registry (Art. 19, 1).
6. Any person may hold allowances (Art. 19, 2).
7. Member States may allow operators of installations to form a pool of installations from the same type of activity for the above mentioned five-year period (Art. 28, 1).
8. On the basis of the progress achieved, the Commission shall draw up a report on the application of the directive, considering e.g. (Art. 30, 2b, 2g and 2k):
 - the relationship of Community emission allowance trading with the international emissions trading that will start in 2008;
 - the level of excess emission penalties, taking into account, *inter alia*, inflation;
 - the practicality of developing Community-wide benchmarks as a basis for allocation, taking into account the best available techniques and cost-benefit analyses.
9. Member states shall lay down the rules on penalties for exceeding the emission quota. The penalties must be effective, proportional and dissuasive (Art. 16, 1).
10. During the three-year period beginning 1 January 2005, Member States shall apply a lower excess emissions penalty of 40 Euro for each tonne of carbon dioxide equivalent emitted for which the operator has not surrendered allowances (Art 16, 4).

3. SPAIN

3.1. Directive 2003/54/EC

The Directive 2003/54/EC is not yet transposed to Spanish legislation but the Directive 96/92/EC, repealed by this one, was implemented into the Spanish legislation via the Electric Power Act 57/1997 on the electric power sector.

At the moment of writing this report, the government is considering a deep review of the legislation related to the electricity sector. In 2005, the government asked a group of experts to write a White Book on the status of the Spanish electricity sector, which should include proposals for its improvement. The White Book was published in Summer 2005 and, since then, some Royal Decrees have been published with a view to include different proposals of the White Book. Some of them have even included major changes in the organisation rules of the electricity market.

As a result, different actors involved in the electricity sector expect a new Act on the electricity sector to be published at any moment. This likely new Act would probably be in line with all the provisions of the Directive 2003/54/EC and it would also be used as its official implementation.

Most of the indications in the Directive 2003/54/EC have been implemented in Spanish regulation by different pieces of legislation, as listed below.

1. The Act 57/1997 on the electric power sector. The Electricity Sector Act incorporates into Spanish legislation the provisions contained in the European Parliament and Council Directive 96/92/EC on common rules for the internal electricity market.
2. The Law 34/1998 Hydrocarbons Act, where the National Energy Commission (regulatory authority for the electricity and gas sectors) is set up.
3. The Royal Decree 1339/1999, where the rules for the National Energy Commission are approved. Afterwards, the Royal Decree-Law 4/2006 modified some of these rules and functions.
4. The Royal Decree-Law 6/2000 on urgent actions to intensify competition. This Royal Decree-Law was issued to promote competition in the Spanish electricity market.
5. The Royal Decree 1955/2000, regulating transmission, distribution, trading and supply activities and authorisation procedures for electric power installations. Some of its provisions were changed by the Royal Decree 1454/2005, which adapts all the regulations regarding the electricity sector to the provisions of the Royal Decree-Law 5/2005.
6. The Royal Decree 1435/2002, regulating the basic terms and conditions of contracts for power purchases and for access to low voltage grids, also modified by the Royal Decree 1454/2005.
7. The Royal Decree-Law 5/2005, regarding urgent reforms to boost productivity and to improve public contracts. The Royal Decree 1454/2005 further implemented its provisions.

8. The Royal Decree-Law 3/2006, modifying the mechanism of matching sale and purchase bids simultaneously presented in the daily and intra-daily markets by market participants belonging to the same business group. Since the release of this Royal Decree-Law, the sale and purchase bids presented and matched by these participants will be assimilated to bilateral contracts (before the resulting matching programme). This way, they can only participate in the resulting matching programme with the net position of their group not assimilated to a bilateral contract. This net position can result in purchases or sales and, from the year 2007, affected companies will be free to set the price of the energy, but, during 2006, the price of the bilateral contracts resulting from the application of this Royal Decree-Law is set by the government at 42.35 €/MWh.

The Electricity Sector Act 57/1997 tries to regulate all the activities involved in the supply of electric power, consisting of generation, transmission, distribution, retailing (supply sales) and intra-Community and international exchanges, as well as the economic and technical management of the electric power system. The aim of regulating these activities is to ensure that electric power supply meets consumer needs and that these activities are rationalised, made more efficient and optimised. Environmental protection is yet another element to be taken into account. The activities involved in the supply of electric power shall be carried out in a coordinated way according to the principles of objectiveness, transparency and free competition.

The European Commission admits that there exists all the legislation required in the directives for the liberalisation of the gas and electricity markets, but there is no direct mention to directives. Therefore, Spain has been penalised for not implementing into national legislation the European Directives. Another penalisation procedure is open because of the existence of regulated prices in the electricity sector, which are blocking the access of new electricity suppliers.

3.1.1. Security of supply and environmental protection conditions

The main objective of the Electricity Sector Act 54/1997 is guaranteeing the electricity supply, the quality of that supply, and ensuring that the supply is offered at the lowest possible price, without overlooking the environment. The Act also stipulates that all consumers are entitled to the supply of electricity, nation-wide, under quality and safety requirements laid down by regulation.

According to Article 4 of the Electricity Sector Act, electrical planning for the electrical transmission grid is carried out by the government, with the participation of the Autonomous Communities (regional governments), with these objectives in mind. Planning shall be mandatory in the case of transmission installations and the principles of objectivity, transparency and free competition must be employed by the Transmission System Operator when deciding between the different options which arise in the course of its activities.

In addition, the National Energy Commission must draw up, on an annual basis, a study for short-term electrical coverage, which is a specific report on demand of electricity and gas over a five-year timescale.

In Spain, there are some incentives for the construction of new capacity. The power guarantee payment (or capacity payment) is an incentive that remunerates the power plant's fixed costs in accordance with availability, without considering its operation. As far as the special regime is concerned, there are special tariffs or bonuses on top of market prices.

3.1.2. Information on the source of the electricity

With respect to the information on the source of the electricity, the Royal Decree 1454/2005 contains a section on consumer protection measures, including information on the source of the electricity consumed and its environmental impact, as well as the minimum requirements that must be included in contracts signed with domestic customers. Specifically, a new chapter has been added to the Royal Decree 1955/2000, with two new articles – 110 bis and 110 ter (which is explained in next section). Article 110bis establishes the obligation to inform the consumer on the source of the electricity consumed and its environmental impact. This information must be specified in the bills or in promotional materials which are sent together with them and includes:

- the contribution of each energy source to the overall fuel mix of the supplier over the preceding year,
- the reference to existing reference sources, where information on the environmental impact is publicly available (emissions of CO₂ and the radioactive waste resulting from the electricity produced by the overall fuel mix of the supplier over the preceding year).

With respect to electricity obtained via an electricity exchange or imported from an undertaking located outside the EU, aggregated figures provided by the system operator over the preceding year may be used. To that end, the system operator shall publish these aggregated figures during the first term of the year following that to which the information refers.

3.1.3. Information on the contracts

Regarding Article 110ter, the minimum requirements of contracts signed with domestic customers are set down: information about the distributor, the contract, applicable prices and rates, minimum quality level required, etc. Consumers should also be notified of any intention to change the contract conditions and informed of their right to terminate the contract upon receiving this notification.

Other articles of the Royal Decree 1955/2000 include also the existing regulations on contracts signed between electricity suppliers and consumers. Articles 79, 80 and 81 set that the supply shall take place by means of fixed-rate supply contracts or freely contracting energy and the relevant network access contract. These contracts shall be contracted with the distributors by signing a contract and the duration shall be annual and extended by agreement for equal periods.

Fixed-rate supply contracts can be signed by any consumer who do not have a qualified status or, having this, do not exercise it in accordance with existing law. The consumer has the right to be informed and advised by the distributor upon signing the contract, regarding the information provided on rates and the most suitable power supply or power supplies to contract, extra rates and other conditions in the contract.

Network access contracts can be signed with distributors by any qualified consumer or by qualified agents. Qualified consumers can opt to contract the energy and network access together with a supplier or another qualified agent. In this case, the supplier or qualified agents shall be obliged to inform the consumer, on an annual basis, about the breakdown of the bill that corresponds to the access rate that they have contracted with the distributor on their behalf, unless the consumer decides that they want this to be included in each bill. In this case, the supplier is obliged to provide this information.

Any qualified consumer who chooses to contract the electricity purchasing and network access separately, must contract the network access directly with the distributor. In this case, the consumer has the right to be informed by the distributor, upon signing the contract, about the available power supplies and their terms and conditions, in accordance with the different available voltages in the area.

In addition, the Royal Decree 1955/2000 gives some information about the third party access to the networks. In the 6th temporary provision, it is stated that all qualified persons and consumers who, prior to being given their qualified status, received a fixed-rate supply, shall automatically be given the right to access the networks. This access will be done at the power supply assigned to the installation, which in no case can be lower than that contracted in the price, without there being any charge as a guarantee deposit, unless the contracted power supply increases. With regard to making claims, Article 98 establishes that disagreements caused by the fixed-rate supply or network access contract (or by the bills resulting from these) shall be settled by administrative procedures by the competent energy authority of the Autonomous Region. Further to these general conditions, the Royal Decree 1435/2002 regulates the basic conditions of energy purchasing and network access contracts for consumers connected at low voltage.

3.1.4. System operator and transmission grid operator

“Red Eléctrica de España” (REE) is the system operator and transmission grid operator, so it is responsible for developing and expanding the electricity transmission grid, as well as for guaranteeing the maintenance and development of the grid. It performs its functions in coordination with the market operator (OMEL). Likewise, it shall manage the transit of electricity between external systems that go ahead using the Spanish electricity system networks. The functions of REE are set out by the Royal Decree-Law 5/2005 (article 22), which amends pre-existing regulations. The most relevant functions are the following:

- Indicative forecasting and control of the level of electricity supply guarantee of the system in the short- and medium-term.
- Predicting, in the short- and medium-term, the use of the generation equipment, especially, the use of the hydro reserves, according to the demand forecast, the availability of electric equipment and the different hydraulic conditions that may happen within the forecasting period.
- Receiving the necessary information about the maintenance plans of the production units, breakdowns or other circumstances that can imply the exemption of the obligation of presenting bids, in order to confirm them.
- Coordinating and modifying (when necessary) the maintenance plans of transmission installations, ensuring their compatibility with the maintenance plans of the generating groups and the availability of the grid for guaranteeing the security of supply.
- Establishing and controlling the reliability measures of the generation and transmission systems and operating plans for restoration of the service in the event of general failures in the supply of electric power and coordinating and controlling their implementation.
- Giving the operating instructions for the transmission grid, including the international interconnections, for the real-time actuation.
- Setting up the use capacity of the international interconnections and establishing the short-term electricity exchanging programmes with external electricity systems.
- Receiving, from the market operator and from the participants in the bilateral contracts, the necessary information, in order to set the planning of the electricity inputs and for settlement purposes.
- Programming the operation of the generators, according to the results of the bid matching process, with the information given by the participants in bilateral contracts.

- Giving instructions for the correct exploitation of the production and transmission systems, in accordance with security and reliability criteria established, and managing the necessary balancing markets.
- Economic management of the balancing services (supply guarantee) and deviations.
- Cooperating with every operator in the Iberian Energy Market.

3.1.5. Distribution system operators

The Royal Decree 1955/2000 (Articles 39-41) defines a distribution system operator for each of the electricity distribution areas. Agreements can also be made between distribution companies to designate a single distribution system operator for several areas. Each distribution system operator shall perform, among others, the following functions within the scope of their own electricity distribution area:

- Coordinate operating and maintenance actions in their own area and with the operators of adjacent distribution systems.
- Analyse the applications for connection to the distribution system in their own area and, where applicable, make access to the network, conditional whenever there is not enough capacity or the reliability and safety criteria are not met.
- Participate as suppliers in the supplementary voltage control service for the transmission grid, following the operating procedures laid down by the system operator.
- Issue, whenever they are requested to do so by the competent Authority, a report on the administrative authorisation for constructing installations to be connected to their grid.
- Communicate information on service quality, prices, consumptions, billing and sale conditions applicable to consumers, consumer distribution and corresponding volume by consumption categories that may be established or have been established.

3.1.6. Summary

The Directive 2003/54/EC is not yet transposed to Spanish legislation but the most of the indications given by it are carried out by different pieces of legislation.

1. Regarding public service obligation, it is defined in the Electricity Sector Act 54/1997 and in the Royal Decree 1955/2000, taking into account three aspects:
 - a) Security of supply, quality of that supply and the lowest possible price for it. There are some incentives for the construction of new installations.
 - b) It is also established the obligation to inform the consumer on the source of the electricity consumed and the environmental impact.
 - c) The minimum requirements of contracts signed with domestic customers are set down. Information on the contracts.
2. The Transmission System Operator has been assigned the responsibility for development and enlargement of grid installations. It deals with the maintenance and improvements in accordance with uniform and coherent criteria. It manages also the transit of electricity traded between foreign systems and which must pass through the Spanish electricity system. It also guarantees third party access to these networks so that all traders in the sector can use the grid under uniform conditions and without any discrimination.
3. The Distribution System Operators, on the other hand, have the responsibility of coordinate all the operating and maintenance actions in their own area and analyse the viability of new connections, taking into account safety, reliability and efficiency criteria.

3.2. Directive 2003/55/EC

The Directive 2003/55/EC has not been implemented to Spanish legislation, but the previous one (Directive 98/30/EC) was transposed with the Hydrocarbons Act 34/1998. Most of the indications in Directive 2003/55/EC are already in force, but the coming transposition of this directive will somehow modify the legislation, contributing to a better operation of the gas sector. The most relevant pieces of regulation are the following:

1. The Law 34/1998 Hydrocarbons Act.
2. The Royal Decree 1339/1999, where the rules for the National Energy Commission are set.
3. The Royal Decree 6/2000, on urgent actions to intensify competition.
4. The Royal Decree 949/2001, regulating third party access to gas installations and establishing an integrated economic system for the natural gas industry.
5. The Royal Decree 1434/2002, regulating natural gas transportation, distribution, sale and supply activities and authorisation procedures for natural gas installations.
6. The Royal Decree 1716/2004, regulating the obligation of keeping minimum security stocks, diversifying the supply of natural gas and the corporation in charge of the strategic stocks, "Corporación de Reservas Estratégicas de Productos Petrolíferos" (CORES).
7. The Royal Decree-Law 4/2006, varying the functions of the National Energy Commission.

The Hydrocarbons Act 34/1998 regulates the legal framework for activities involving liquid and gaseous hydrocarbons, which shall be performed under the principles of objectivity, transparency and free competition:

- Exploration, research and mining of tanks and underground stores of hydrocarbons.
- Foreign trade, refining, transportation, storage and distribution of crude oil (petroleum) and petroleum products including liquefied petroleum gases.
- The acquisition, production, liquefaction, re-gasification, transportation, storage, distribution and trading of gas fuels through pipelines.

The complete opening of the Spanish Gas Market took place in January 1st 2003, including industrial, residential and commercial sector, in accordance with the Royal Decree-Law 6/2000, which set the opening schedule, lowering gradually the threshold to become eligible consumer. Even though, the separation of transmission and distribution activities is still insufficient and a penalization process has been opened by the Commission, therefore.

3.2.1. Regulatory Authority

The National Energy Commission (Comisión Nacional de Energía or CNE) is the regulatory body for Spain's energy systems (electricity and gas sectors). It was set up under the Hydrocarbons Act 34/1998 and developed by the Royal Decree 1339/1999, which approved the Commission's Bye-laws. In February 2006, a Royal Decree was approved to correct some insufficiencies found in the legislation in force, varying some of the functions of the regulator.

The National Energy Commission has been assigned several functions in order to ensure the existence of effective competition in the Spanish energy systems and their objective and transparent functioning for the benefit of all agents operating in those systems, including the consumers. It also acts as an advisory body on energy matters to the Central State Administration and the Governments in the Autonomous Regions. Regarding gas sector, the Hydrocarbons Act 34/1998 assigned to the National Energy Commission the functions below:

1. Implementing legal rules and standards: The rules and standards contained in Royal Decrees and Orders issued by the Ministry of Economy to develop energy legislation are developed and implemented by means of Circulars.
2. Issuing proposals and mandatory reports in the following processes:
 - a) Drafting of general provisions affecting energy markets and, in particular, the regulatory development of the Hydrocarbons Act.
 - b) Energy planning.
 - c) Drafting proposals for establishing tariffs, rates and the payment for energy activities.
3. Defending free competition between agents participating in energy markets.
4. Settling disputes submitted to the CNE and concerning contracts for third party access to transmission and distribution networks. It acts as an arbitrator in any disputes that may arise between the agents carrying on activities in the hydrocarbons industry or between qualified consumers and those agents with regard to the management of the system.
5. Inspecting of the technical conditions of installations; the compliance with the requirements stipulated in authorisations; reliability and quality of the supply; the availability of power plants under the ordinary regime; etc. In addition, the CNE may carry out the necessary checks to confirm the accuracy of the information in compliance with its Circulars.

ENAGAS is currently the main gas transportation company in Spain (90%) and, according to the Royal Decree-Law 6/2000, it has also been designed as the Technical Manager of the Gas System. Among its main functions, there are guaranteeing the continuity and security of the natural gas supply and the correct coordination between the points of access, the storages, the transportation and the distribution.

Regarding the distribution system, “Gas Natural” is the main management operator. Its functions are the supply, distribution and commercialisation of natural gas and it has also diversified its business with generation and commercialization of electricity.

3.2.2. Public service obligations

According to the Hydrocarbons Act 34/1998 (implemented by the Royal Decree 1716/2004) regarding public service obligation in relation to security of supply, all agents incorporating gas to the system must maintain minimum security stocks equivalent to thirty five days of sales (for gas transporters and traders) or final consumption (for qualified consumers). Transporters, who deliver gas to the system, and traders must diversify their provisioning and the Ministry of Industry and Energy may impose similar supply provisioning diversification obligations on qualified consumers for that portion of their consumption not purchased from traders when this may have a negative impact on the supply balance on the domestic market because of the volume and origin of the said portion. The compliance with the security and diversification requirements and conditions set out may be examined by the competent Administration.

Quality and continuity of gas supply must be ensured by companies holding the suitable authorisations. Gas companies and, more particularly, distributors and traders, must also include advanced technologies in metering and for the control of the quality of the supply of gas fuels.

Hydrocarbons Act establishes also all the criteria for determining tariffs, rates (tolls) and fees. The system to determine tariffs, rates (tolls) and fees shall be set for periods of four years, it will be reviewed on the last year of each four-year term and may be adapted to the situation forecast for the forthcoming period. Natural gas prices are annually determined by Ministerial Order, establishing a three-monthly inspection procedure of prices for final consumers. Tariffs, rates (tolls) and fees must be set in such a manner that they comply with the following criteria:

- They should ensure that the investment made by the owners is paid back during the useful life of the facilities.
- They should allow reasonable return on the capital invested.
- They should determine the payment system for operating costs, so that incentives are given for efficient management and enhanced productivity.
- They should not produce any distortions between the system of supplies under tariffs and the non-tariff system.

Another concern of this Act is the introduction of environmental protection criteria that are present right from the planning stage in the activities it covers. Thus, it aims to reflect the need for environmental conservation and restoration as a condition for improving the quality of life.

The consumer protection measures specified in Annex A of Directive 2003/55/CE are not regulated in Spanish gas sector. Moreover, unlike in the electricity sector, there is no legislative reform regarding the consumer protection measures, although some of these measures are already included in current gas regulations. According to the Royal Decree-Law 5/2005, all gas consumers are qualified consumers, regardless of the level of consumption.

The Royal Decree 1434/2002 regulates all matters relating to switching suppliers in the natural gas industry:

1. The switching of the supplier may be requested by any consumer with a natural gas supply who has a qualified status, either themselves or through a supplier.
2. The switching from the regulated to the deregulated market may be requested by any consumer whose natural gas supply is provided at set rates and who has a qualified status. They may request it either themselves or through their new supplier.
3. Supplier switching in the deregulated market: any consumer whose supply is provided in the deregulated market may request, either themselves or through their new supplier, that the distributor who has the supply point makes the supplier switching.
4. Conditions for switching from the deregulated to the regulated market are listed below:
 - a) Consumers with an annual consumption equal to or more than 100 million kWh shall remain in the deregulated market for a minimum period of three years from the date on which this Royal Decree enters into force or from the switch date to the deregulated market if it takes place afterwards.
 - b) Consumers connected to a gas pipeline with a design pressure between 4 and 60 bars and whose annual consumption is less than 100 million kW will have to make the application of change at least six months in advance.
 - c) For other consumers there are no conditions.

Claims or disagreements caused by the fixed-rate supply contract or the resulting bills are settled through administrative procedures by the competent energy authority of the Autonomous Region, regardless of the jurisdictional actions that may occur at the request of any of the parties.

The Royal Decree 949/2001 regulates the way in which the gas system works with regard to third party access to installations. It is issued to develop the provisions of the Hydrocarbons Act 34/1998 and aims to guarantee the continuity, quality and security of the supply of natural gas, by coordinating the activity of all the agents operating in the system and abiding by the principles of objectivity, transparency and non-discrimination. It does so by deciding on the general criteria that should govern the technical functioning of the system, the remuneration for regulated activities, the system of tariffs, tolls and fees and the settlement procedures. Within the scope of this Royal Decree, there are included the re-gasification, transportation, storage and distribution activities, which are regulated activities. The owners of these facilities must allow them to be used by the qualified consumers, traders and transporters on the basis of the principles of non-discrimination, transparency and objectivity. The price for using transportation networks shall be determined by the rates approved in regulations. On the other hand, according to the Royal Decree Law 5/2005, some new installations or such installations involving a significant increase of the capacity of the existing infrastructures can be excluded from this obligation.

3.2.3. Summary

The Directive 2003/55/EC is not yet transposed into Spanish legislation, but, when the directive is implemented, this transposition will help to modify somehow the legislation, contributing to a better operation of the gas sector.

The National Energy Commission (Comisión Nacional de Energía or CNE) is the regulatory body for electricity and gas sectors. The functions assigned will ensure the existence of effective competition in the Spanish energy systems, benefiting all agents operating in those systems, paying a special attention to end consumers. The National Energy Commission also acts as an advisory body on energy matters to the Central State Administration and the Governments in the Autonomous Regions.

Regarding the public service obligations, several aspects must be taken into account, as listed below:

- Security of the supply: all agents feeding gas into the system must maintain minimum security stocks.
- Quality of supply: the supplies must be done by the companies holding the appropriate authorisations and the supply must be continuous. Companies must monitor the quality of their gas supply.
- Prices: the criteria for determining tariffs, rates (tolls) and fees are established in the Hydrocarbons Act.
- Environmental protection criteria have been introduced.
- Consumer protection measures described in the directive are not regulated but some of these measures are already included in current regulations.
- Third party access: the owners of the facilities must allow qualified consumers, traders and transporters to use them on the basis of the principles of non-discrimination, transparency and objectivity.

3.3. Directive 2001/77/EC

Directive 2001/77/EC of the European Parliament and Council is currently being implemented into Spanish legislation, but it is mentioned and taken into account in the latest Spanish Renewable Energy Plan. The main pieces of regulation related to renewable energy sources are the following:

1. Special Production Regime: This legal framework was developed in different steps:
 - a) The Royal Decree 2366/1994, on the generation of electricity by hydroelectric, cogeneration and other facilities supplied by renewable energy sources, defined the Special Production Regime. Power plants who used cogeneration or renewable energy sources and whose capacity was lower than 100 MVA could apply to be included in the Special Regime.
 - b) The Law 54/1997, on the electric power sector, established the general rules for the liberalisation of the electrical sector and established a new upper capacity limit for an installation to be included in the Special Regime in 50 MW.
 - c) The Royal Decree 2818/1998, on the generation of electricity by facilities supplied by renewable energy resources, waste or cogeneration, created a new framework for Special Regime, based on the Law 54/97, and established registration requirements and procedures, energy delivery conditions and the economic regime. Under this economic regime, Special Regime producers could sell their electricity to the distribution company or in the market. If they sold electricity to the distribution company, they could ask for a fixed payment or for the average market price plus a bonus; if the sold electricity in the market, they would receive a bonus on top of the hourly market price.
2. Increase of competition and liberalisation: The Royal Decree 2820/1998 setting network access rates, the Royal Decree-Law 6/1999 on urgent measures for liberalisation and increased competition and the Royal Decree-Law 6/2000 on urgent actions to intensify competition were issued to promote competition in the Spanish electricity market. The inclusion of the Special Regime electrical installations in the wholesale market was also promoted. Special Regime installations ruled by the Royal Decree 2366/1994 and whose capacity was above 50 MW were forced to enter the market. Besides, more ways of bilateral contracting are allowed, such as the use of aggregators. On the other hand, the deadlines for the liberalisation of the electricity market were defined:
 - Since 1 January 2003: All consumers are qualified and they can buy in the market
 - From 1 January 2007: High Voltage tariffs will disappear.

In February 2006, a new Royal Decree-Law 3/2006, modifying the mechanism of matching sale and purchase bids which are simultaneously presented in the daily and intra-day markets by market participants belonging to the same business group, was approved. From this moment, new producers, including the ones in the special regime, are expected to have an easier access to the wholesale market.

3. The Royal Decree 1955/2000, regulating transmission, distribution, trading and supply activities and authorisation procedures for electric power installations and the changes inserted by the Royal Decree 1454/2005, that adapts all the regulations regarding the electricity sector to the provisions of the Royal Decree-Law 5/2005.

4. The Royal Decree 841/2002, regulating the incentives for electric power installations in the special regime to participate in the production market, certain reporting obligations for their production forecasts and the acquisition by supply sales companies of their electricity production, defined the procedure of participation in the market for RES plants with a capacity over 1 MW, including a subsidy in concept of power guarantee (0.009015 €/kWh).
5. The electricity tariffs were established through Royal Decrees on an annual basis. The extra payment for wind plants in 2003 was 0.026640 €/kWh (0.062145 €/kWh, if sold to the distribution company), 0.028829 €/kWh in 2004 (0.064865 €/kWh when sold to the distribution company), 0.029322 €/kWh in 2005 (0.065974 €/kWh if sold to the DSO) and 0.030635 €/kWh in 2006 (0.0689292 €/kWh when sold to the distribution company).
6. The Royal Decree 436/2004 (further explained in a next subsection) establishes a new legal and financial framework for renewable energy sources and combined heat and power included in the special regime. It was approved with the aim of unifying all the rules developing the Law 54/1997 in all these topics. It repeals the Royal Decrees 2818/1998 and 841/2002 and tries to promote investments in more efficient generation technologies and in renewable energy sources.
7. The Royal Decree 2351/2004, which modifies the procedure for the solution of technical constraints and other electricity market rules, changed some rules related to the solution of technical constraints and modifies some other articles of the Royal Decree 436/2004.
8. The White Book published by the Ministry of Industry, Tourism and Trade in 2005 is a proposal of reform of the regulated framework for the generation of electricity. It promotes the electricity from renewable energies, cogeneration and waste treatment.
9. The Royal Decree 1556/2005, which establishes the electricity tariffs for 2006.

3.3.1. PER 2005-2010

The Spanish Renewable Energy Plan (Plan de Energías Renovables en España, PER) for 2005-2010 was approved on the 26th of August of 2005 and represents a review of the Spanish Plan for the Promotion of Renewable Energy 2000-2010 (Plan de Fomento de las Energías Renovables en España) in force until now.

As is stated in the “Balance sheet for the Plan for the Promotion of RES in Spain over the period 1999-2004”, prepared by IDAE, from the time the Plan was approved until the end of 2004, overall consumption of energy from renewable sources in Spain grew by 2 700 000 toe a year. This is a significant growth but is not enough to achieve the targets set. At the end of 2004 (almost half the period covered by the plan), only 28.4% of the overall target for an increase in the use of renewable energy sources had been met. The renewable energy sources that have made the most important progress to date are wind energy, bio-fuels and biogas.

After the publication of this Promotion Plan in 1999, two new indicative targets were established related to the generation of electricity from renewable energy sources – Directive 2001/77/EC – and to the use of bio-fuels – Directive 2003/30/EC.

This review keeps the commitment to meet at least 12% of total energy use from renewable sources by 2010, while incorporates the other indicative targets: 29.4% of electricity generated from renewable sources and 5.75% of transport fuel needs to be met from bio-fuels by 2010.

Wind power is the area with the fastest development and is supported by a range of business initiatives. Over the last three years, there has been an average growth in installed generating capacity of 1 600 MW a year. This rapid growth is due to several factors:

- Existence of considerable unexploited wind potential.
- Legislative framework and regulations are favourable to increased uptake of wind power, increasing the interests and confidence of the developers.
- Plans drawn up by regional governments supporting the targets of the Plan.
- Spanish technology (development and manufacturing capacity).

Therefore, the new target for the wind energy sector, in line with the general targets of the Plan, is an increase in capacity of 12 000 MW over the period 2005-2010, reaching a total installed capacity of 20 155 MW. The Royal Decree 436/2004 and the Royal Decree 2351/2004 are expected to have a positive effect on the implementation of new wind energy facilities. The new method makes prices more predictable, thus boosting confidence and encouraging private investment. Furthermore, some measures will contribute to ensuring greater stability of wind energy in the electricity system: establishment of incentives for the participation in the market and new price supplements for power guarantees, reactive energy and continuity through gaps.

The incentives for electricity generation from renewable energy sources through the system of bonuses and regulated fixed prices constitute the main mechanism supporting the development of these sources. The current bonus for wind power, according to the Royal Decree 1556/2005, is 2.6548 c€/kWh and it is considered to be sufficient to ensure a reasonable return on the investment and, thereby, contributes to achieving the targets set in the Plan. The Plan proposes also the monitoring and supervision of all the actions carried out with the aim of:

- evaluating (in a regular and systematic way) how the various renewable energy sources are progressing in relation to the targets set for them,
- analysing the remaining barriers and
- making proposals to help overcome them.

3.3.2. Royal Decree 436/2004

The Royal Decree 436/2004 was approved on 12 March 2004 to establish a new legal and financial framework for renewable energy sources and cogeneration included in the Special Regime. This Decree repeals the Royal Decree 2818/1998 and the Royal Decree 841/2002, and establishes two temporary economic regimes for the installations ruled by those Royal Decrees. It also unifies the regulations for enacting Law 54/1997 on the Electrical Sector, providing the Special Regime with a new regulatory framework.

This Royal Decree establishes the methodology for updating and systematising the legal and financial regime of electrical energy production. The objective of this new system is to promote investments, reaching the 30% of electricity production fuelled by renewable energy sources by 2010 (installed power of 26 000 MW).

It defined a system based on the free will of the owner of the installation, who can opt to sell the production or surplus of electrical energy to the distributor or directly in the market:

- If the electricity is sold to the distributor, the owner of the installation receives a fixed payment in the form of a regulated tariff, which is unique for all the programming periods and which is defined as a percentage of the average or reference electrical tariff, regulated in the Royal Decree 1436/2002, which is therefore indirectly based on the wholesale market price.

- In case the owner of the installation which uses renewable energy sources decides to sell his production directly in the market, he will receive the negotiated market price, and an incentive for participating in the market and a bonus on top of it. This incentive and the complementary bonus are defined as percentages of the average or reference electrical tariff, although, in the enactment of the Royal Decree, this percentage is established on a case by case basis. This Royal Decree increases the payment for electricity produced to the grid for small wind plants (power < 5 MW).

Most relevant articles for DESIRE project are:

1. Chapter I – Purpose and scope:
 - a) Object:
 - i. The updating and systematization of the Electricity Act 54/1997, focusing on the Special Regime.
 - ii. The establishment of a durable economic regime based on a methodology compatible with the average or reference electrical tariff.
 - iii. The establishment of two temporary economic regimes for installations under the Royal Decree 2818/1998 and under the Royal Decree 2366/1994.
 - iv. The setting of a complementary bonus for installations over 50 MW using the same primary energies as used in the Special Regime.
 - b) Application field: this Royal Decree is applicable to plants up to 50 MW using cogeneration, solar, wind, geothermal, hydro, biomass and other waste.
2. Chapter II – Procedure to include an electric power generating facility in the Special Regime: The owners or operators of any facility wishing to be covered by the Special Regime must request the inclusion of that facility to the competent Administration. The owner or operator of the installation must submit an application form for the inclusion in the Special Regime, then a previous registration and the definitive registration, all of which has some deadlines for submitting the documentation.
3. Chapter III – Delivery conditions for electricity generated under the Special Regime:
 - a) Rights of the producers in the Special Regime:
 - i. Connect their installations in parallel to the grid.
 - ii. Transfer their production or surplus when it is technically possible. Installations using renewable energy sources (solar, wind, geothermal, hydro and biomass) are allowed to sell all their production. This electricity must be given to the nearest distribution company.
 - iii. Receive the established payment (see Chapter IV).
 - b) Obligations:
 - i. Deliver and receive the energy in adequate technical conditions.
 - ii. Only use bilateral contracts for selling electricity to final customers.
 - iii. Pay the costs for accessing to the grid.
 - iv. Facilitate a production forecast if the installed capacity is greater than 10 MW.
4. Chapter IV – Economic arrangements:
 - a) Payment mechanism for electricity produced in Special Regime: the owners of the installations can choose the way of selling their electricity:
 - i. selling the production or surplus of electrical energy to the distribution company (regulated tariff) or
 - ii. selling directly in the market (negotiated market price + incentive + bonus).
 - b) The regulated tariff, the bonus and the incentive for participating in the market are defined as percentages of the average or reference electrical tariff of each year. All of them depend on the type of installation and on the installed power.

- c) Every installation in the Special Regime gets a “reactive complement”, which is also defined as a percentage of the average or reference electrical tariff of each year. This complement pays for reactive power feed-in when it is beneficial for the grid, and punishes the integration of reactive power when it is harmful for the system.
 - d) Participation in the market:
 - i. The producer must get the market agent certificate from the market operator or, otherwise, sell the electricity through a market agent, who acts as a middleman.
 - ii. Producers participating in the market can also participate in the process of solving technical constraints.
 - iii. Installations whose capacity is over 50 MW must sell their electricity in the market.
 - iv. They have the right to be paid for the power guarantee.
 - e) Imbalances:
 - i. Installations in the market must pay for imbalances as any other market actor.
 - ii. Wind power installations selling to the distribution company will pay for imbalances, as long as their capacity is above 10 MW and their imbalance is higher than the 5% of their forecast. The cost of these imbalances is the 10% of the average or reference electrical tariff. This provision was not enacted in this Royal Decree, but it will be in force since the 1st of January of 2007.
5. Transient periods:
- a) Installations under the Royal Decree 2366/1994 can stay under that regime until the Costs for Transition to Competition (CTC) are fully recovered, which is expected to happen in 2010. Capacity enlargements will be ruled by this Royal Decree 436/2004.
 - b) Installations ruled by the Royal Decree 2818/1998 can stay under that regime until January 1, 2007, but capacity enlargements will be ruled by the Royal Decree 436/2004.

3.3.3. Payments

The Royal Decree 436/2004 was issued to promote the entry of Special Regime producers in the market, giving them an incentive to go to the market, and abolishing the option of selling electricity to distribution companies at average market price plus a bonus.

Producers with power plants with a capacity below 50 MW, which use cogeneration or renewable energy sources, such as sun, wind, hydro, biomass, or waste, can be included in this Special Regime. Power plants not included in this regime MUST send generation offers to the market operator for every programming period of the market, unless they are linked to a bilateral contract. Special regime producers are not forced to do it. Besides, they do not have to enter the market (although they can), and they can sell their electricity output to the distribution system operator, at a government-fixed price. Cogeneration producers can sell only their surplus electricity, but RES producers can sell the whole electricity output.

Nowadays, most installations that were ruled by the Royal Decree 2818 changed to the Royal Decree 436, and the remaining will be forced to do so the 1st of January of 2007. Installations ruled by the Royal Decree 2366 can stay in that regime until 2010, but capacity increases will be ruled by the Royal Decree 436.

The main advantage of this Royal Decree for investors is that the bonus is related to the Reference or Average Tariff (TMR – Tarifa Media o de Referencia), so that payments to Special Regime producers ruled by this Royal Decree increase or decrease with electricity price, so that they can compete with big central power plants.

Special Regime producers can choose between selling electricity to distribution companies at a fixed price, or entering the market and selling electricity at market price plus a bonus and an incentive. The payment for each kWh produced from wind power and sold to the grid or in the market can be found in Table 1, as percentages of TMR. The value for TMR in 2006 is 7.6588 Eurocent/kWh.

Table 1. Payments for wind power

Onshore/Offshore wind	Capacity	Payment (%TMR)
Fixed Price – Selling to the DSO	≤ 5 MW	90% (15 years), 80% (after)
	≤ 50 MW	90% (5 years), 85% (10 years), 80% (after)
Bonus – Selling to the market	≤ 50 MW	40%
	> 50 MW	30% (15 years)
Incentive – Selling to the market	≤ 50 MW	10%

The period of time in which payments are higher starts when the plant was put in operation. Consequently, a 10 MW wind farm which is in operation since 1999, and in 2005 decides to accept this Royal Decree will only receive the 85% of TMR, not the 90%.

Payments summarised in Table 1 will be updated in 2006 and every four years subsequently. When wind power capacity reaches 13 000 MW, payments will also be updated.

Besides, they receive a complement for reactive energy, either they sell to the Distribution System Operator or to the market. This complement depends on the period of production and power factor, and it is summarised in Table 2.

Table 2. Payments for reactive energy

Fixed Price – Selling to the DSO	Power factor	Payment (% TMR)		
		Peak	Flat	Valley
Inductive	< 0.95	-4	-4	8
	0.95-0.96	-3	0	6
	0.96-0.97	-2	0	4
	0.97-0.98	-1	0	2
	0.98-1	0	2	0
	1	0	4	0
Capacitive	0.98-1	0	2	0
	0.97-0.98	2	0	-1
	0.96-0.97	4	0	-2
	0.95-0.96	6	0	-3
	< 0.95	8	-4	-4

The Royal Decree 436/2004 repealed the Royal Decree 841/2002 and established a transient period for installations ruled by the Royal Decrees 2366/1994 and 2818/1998. Installations ruled by the Royal Decree 2366/1994 can keep on being ruled by that Royal Decree until CTC are fully paid, which is expected to happen in 2010, and installations ruled by the Royal Decree 2818/1998 until the January 1, 2007. In both cases, capacity increases will be ruled by the Royal Decree 436/2004. Nevertheless, they can ask for being ruled by the Royal Decree 436/2004. As a result, there are three Royal Decrees in force at present: the Royal Decree 2366/1994 (until 2010), the Royal Decree 2818/1998 (until 2007) and the Royal Decree 436/2004.

The owners of installations which produce electricity from renewable energy sources and which sell their electricity output in the market will also receive the payment for the power guarantee. This payment was set by the Royal Decree 841/2002 and it is 0.009015 €/kWh.

Wind farms which are able to stay connected to the grid when a voltage sag happens in the system will also receive an special payment for four years since the installation of the required equipment. This payment is set up at the 5% of the TMR.

3.3.4. Summary

Directive 2001/77/EC on the promotion of the electricity from renewable energy sources, is not yet translated into Spanish legislation but it is currently being translated and it is mentioned and taken into account in the Spanish Renewable Energy Plan PER 2005-2010, which is the latest report published. The PER also establishes the latest national targets for each renewable energy source.

There is no piece of legislation where the guarantees of origin are ensured but it is going to be included in the Royal Decree that is under preparation, facilitating the trade of renewable energy and increasing the transparency in the free choice of consumers.

Regarding national administrative procedures, they are not a barrier for wind power. There are also some support schemes which are established by the Royal Decree 436/2004:

- Producers who use renewable energy sources for electricity generation can sell all the electricity generated to the grid (not only the surplus, as cogeneration producers).
- Distribution System Operators must buy all the electricity produced from renewable energy sources by producers who do not want to enter the wholesale market. The market operator must give priority to the offers made by producers who generate electricity from renewable energy sources, when matching offers and bids in the wholesale market.
- There are regulated tariffs, incentives and bonuses depending on the plant capacity.
- There is also a complement for wind installations with the necessary equipment for contributing to the improvement of the continuity of supply when a voltage sag occurs. This includes a specific complement (5% TMR) for four years since the installation of the equipment.

The situation of wind power in Spain has been published in several reports, such as:

- One specific for wind energy developed by “SdeO comunicación. Consultores en Energías Renovables” which is a consultancy on renewable energies (www.sdeocom.com/articulos/informeEolico2005.pdf).
- “La Energía en España 2004” (“The Energy in Spain”), of the Ministry of Industry, Tourism and Trade.

Regarding grid reinforcement costs, the Royal Decree 1955/2000 (Article 32) establishes the requirements for grid connection. When the connection gives rise to the division of an existing or planned line with input and output in a new substation, the equipment and facilities required for such a connection (new input and output line, new substation, the possible reinforcement of the existing or planned line, etc.) shall be paid for by the promoter or promoters of the connection. However, if another consumer and/or generator wants to use the equipment or facilities installed, the new user shall contribute for the proportional part of the use of the installation capacity to the investments made by first user. That obligation shall only be valid during the five-year period starting from the commissioning of the connection.

3.4. Directive 2004/8/EC

This directive is not officially translated into Spanish legislation yet, but the guidelines of this directive were followed to promote investments in cogeneration as the Parliament approved the Royal Decree 436/2004. In fact, this Royal Decree includes a reference to the directive. Other important pieces of legislation related to cogeneration are summarised below.

1. Special Production Regime: Described in Section 2.3
2. The Law 66/1997, on fiscal and administrative measures defined an electricity tax to compensate some system costs (coal subsidy, etc) and it was only applicable for cogeneration plants with a capacity over 100 kW.
3. The Royal Decree 841/2002, regulating the incentives for electric power installations in the special regime to participate in the production market, certain reporting obligations for their production forecasts and the acquisition by supply sales companies of their electricity production, defined the procedure of participation in the market for cogeneration plants, including a subsidy in concept of power guarantee (0.009015 €/kWh). This was only applicable for cogeneration plants over 1 MW. Cogeneration plants above 10 MW must forecast their production and they were fined if there was any deviation. If natural gas price was higher than 0.01202 €/kWh_{th} (Higher Heating Value), there would be an incentive.
4. The electricity tariffs were established in the Royal Decree 1436/2002 (for 2003), the Royal Decree 1802/2003 (for 2004), the Royal Decree 2392/2004 (for 2005) and the Royal Decree 1556/2005 (for 2006). The payment for cogeneration plants in 2003 and 2004 was 0.021276 €/kWh, in 2005 was 0.014100 €/kWh and in 2006 is 0.024349 €/kWh.
5. The Royal Decree 2351/2004, which modifies the procedure for the solution of technical constraints and other electricity market rules, changed some rules related to the solution of technical constraints and modifies some other articles of the Royal Decree 436/2004. For cogeneration installations, bonuses are modified when the plant is used for the treatment and reduction of waste or when they use fuel-oil as fuel.
6. The White Book published by the Ministry of Industry, Tourism and Trade in 2005, is a proposal of reform of the regulated framework for the generation of electricity. It promotes the electricity from renewable energy sources, cogeneration and waste treatment.
7. The Royal Decree-Law 3/2006, modifying the mechanism of matching sale and purchase bids simultaneously presented in the daily and intra-day markets by market participants belonging to the same business group. This decree is expected to benefit new producers, including special regime producers, favouring their access to the wholesale market.

3.4.1. Royal Decree 436/2004

Section “3.3.2. Royal Decree 436/2004” has thoroughly explained this Royal Decree, so only specific provisions related to CHP will be described here. It explicitly implements the Directive 2004/8/EC. Although the directive was not published when the procedure of this Royal Decree started, and taking into account that this directive needed to be implemented in the Spanish legislation, the decree tried to be compatible with the rules pointed out in the EC Directive.

This Royal Decree increases an 11% the payment for provision of electricity to the grid for small cogeneration plants (power < 1 MW) and the requirement of electricity self-consumption is reduced to a 10 % for high efficiency cogeneration plants.

Most relevant articles for DESIRE project and related to cogeneration are (general provisions described in Section “3.3.2. Royal Decree 436/2004” also apply to cogeneration):

1. Chapter I – Purpose and scope: this Royal Decree is applicable to plants up to 50 MW using cogeneration, solar, wind, geothermal, hydro, biomass and other waste. In case of autoproducers using cogeneration or other ways of producing electricity related to non-electrical activities, this Royal Decree applies when they involve high energy-performance and consumption of, at least, 30% of the production for installed capacity up to 25 MW, and 50% when the installed capacity is equal or higher than 25 MW. If the installation uses high energy-efficiency cogeneration, self consumption must be, at least, 10% for any capacity.
2. Chapter II – Procedure to include an electric power generating facility in the Special Regime: In case of cogeneration facilities, any surpluses of electric power transferred to the network must be justified in line with their structure and output level and their consumption. Some capacity characteristics must also be certified.
3. Chapter III – Delivery conditions for electricity generated under the Special Regime:
 - a) Rights of the producers in the Special Regime: Cogeneration installations in Special Regime can only sell the surplus of electricity; installations using renewable energy sources (solar, wind, geothermal, hydro and biomass) are allowed to sell all their production. This electricity must be given to the nearest distribution company.
4. Chapter IV – Economic arrangements: Cogeneration installations selling to the distribution company will pay for imbalances, as long as their capacity is above 10 MW and their imbalance is higher than the 5% of their forecast. The cost of these imbalances is the 10% of the average or reference electrical tariff. These provisions were expected to enter in force in 2005, after in 2006, and now, they have been again postponed until the 1st of January of 2007.

3.4.2. Payments

As in the case of other provisions from the Royal Decree 436/2004, in this section only specific conditions for payments for cogeneration will be described.

One of the main differences between the payments for combined heat and power and renewable energy sources is that producers who use combined heat and power can sell only their surplus electricity.

The Royal Decree fosters bigger cogeneration plants, since they will receive the bonus for 20 years, while plants below 10 MW will receive the bonus only for 10 years. On the other hand, cogeneration producers with a capacity above 10 MW must go to the market, which might be a problem for them. Nevertheless, the option of going to the market is expected to be the option for cogeneration plants above 15 MW (see Figure 1).

Payments to cogeneration under this law depend on the capacity, the efficiency and the fuel used. Power plants which use cogeneration must consume a minimum percentage of the electricity generated and must have a minimum Equivalent Electric Efficiency (EEE), as Table 3 below shows.

Table 3. Conditions for CHP to receive a bonus

Capacity limit	Consumption	Fuel	EEE
Capacity <25 MW	30%	Liquid fuels for boiler / Solid fuels	49%
Capacity > 25 MW, < 50 MW	50%	Liquid fuels for thermal engine	56%
High efficiency, < 50 MW	10%	Natural gas and oil-liquefied gas for thermal engine	55%
		Natural gas and oil-liquefied gas for gas turbine / Other technologies or fuels	59%

Equivalent Electric Efficiency (EEE) is defined as:

$$EEE = E / [Q - (V / 0.9)]$$

E = Produced electric energy, given as thermal energy, where 1 kWh = 860 kcal.

Q = Primary energy consumption, measured as the Lower Heating Value of the fuel(s) used.

V = Usable heat production, i.e. the heat demanded by the process linked to the CHP plant.

Special Regime producers can choose between selling electricity to distribution companies at a fixed price, or entering the market and selling electricity at market price plus a bonus and an incentive. The payment for each surplus kWh sold to the grid or in the market can be found in Table 4, as percentages of TMR, which is 7.6588 Eurocent/kWh in 2006.

Table 4. Payments for CHP

Fixed Price – Selling to the Distribution company	Capacity	Payment (%TMR)
Cogeneration for autoproducers	< 1 MW	90% (10 years, 50% after)
	1-10 MW	80% (10 years, 50% after)
	10-25 MW	55% (2010*, 50% after)
	25-50 MW	50%
Installations using waste heat from a process other than electricity generation	< 10 MW	60% (10 years, 50% after)
	10-25 MW	55% (2010*, 50% after)
	25-50 MW	50%
Installations using CHP for pig manure or mud reduction	< 25 MW	70% (15 years, 50% after)
Installations using CHP for reduction of other waste	< 25 MW	60% (15 years, 50% after)
Bonus – Selling to the market	Capacity	Payment (%TMR)
Cogeneration for autoproducers	1-10 MW	30% (10 years)
	10-25 MW	5% (2010*)
Installations using waste heat from a process other than electricity generation	< 10 MW	10% (10 years)
	10-25 MW	5% (2010*)
Installations using CHP for pig manure or mud reduction	< 25 MW	20% (15 years, 10% after)
Installations using CHP for reduction of other waste	< 25 MW	10%
Incentive – Selling to the market	Capacity	Payment (%TMR)
Cogeneration for autoproducers***	1-10 MW	10% (10 years, 20% after)
	10-25 MW	20% (15 years, 15% after)
	> 25 MW**	25% (20 years, 15% after)
Installations using waste heat from a process other than electricity generation	< 50 MW	5% (10 years, 10% after)
Installations using cogeneration for waste reduction	< 25 MW	10%

*) Until Costs for Transition to Competition are fully paid, which is expected to happen in 2010.

***) Autoproducers with capacities above 50 MW are allowed to receive the incentive if they fulfil the rest of conditions to receive the bonus, and if they consume 95% of natural gas (measured in Lower Heating Value).

****) Autoproducers using Combined Heat and Power without burning a minimum 95% of natural gas only receive a 10% incentive for the whole lifetime of the installation.

The period of time in which payments are higher starts when the plant was put in operation. Consequently, a 1 MW Combined Heat and Power plant which is in operation since 2000, and in 2005 decides to accept this Royal Decree will only receive the 90% of TMR until 2010, not until 2015.

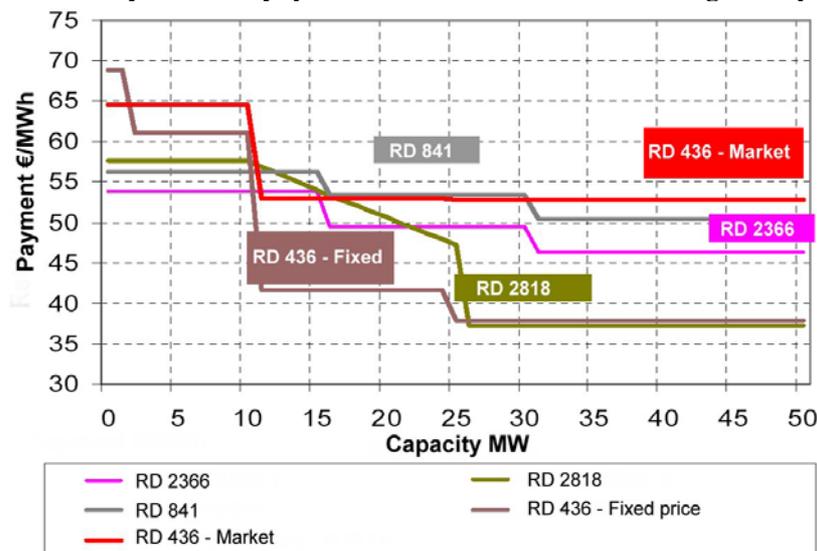
When capacity from Combined Heat and Power for autoproducers and installations which use waste heat from a process other than for electricity generation reaches 7 100 MW, payments will be updated. When capacity from installations using Combined Heat and Power for waste reduction reaches 750 MW, payments will be updated. Payments will also be updated in 2006, and every four years, afterwards.

Besides, they receive a complement for reactive energy, either they sell to the distribution company or to the market (See Table 2).

The Royal Decree 436/2004 repealed the Royal Decree 841/2002 and established a transient period for installations ruled by the Royal Decrees (RD) 2366/1994 and 2818/1998. Installations ruled by the Royal Decree 2366/1994 can keep on being ruled by that Royal Decree until Costs for Transition to Competition are fully paid, which is expected to happen in 2010. Installations ruled by the Royal Decree 2818/1998 can stay under that Royal Decree until January 1, 2007. In both cases, capacity increases will be ruled by the Royal Decree 436/2004. Nevertheless, they can ask for being ruled by the Royal Decree 436/2004. As a result, there are three Royal Decrees in force: RD 2366/1994 (until 2010), RD 2818/1998 (until 2007) and RD 436/2004.

A comparison of payments from different regulatory regimes by plant capacity can be found in Figure 1 (COGEN 2004).

Figure 1. Comparison of payments to CHP from different regulatory regimes



The Royal Decree 2366/1994 established three payment steps, as a function of installed capacity (below 15 MW, between 15 and 30 MW and between 30 MW and 100 MVA). The Royal Decree 2818/1998 increased the payment to small plants, but reduced the bonus for large plants. The Royal Decree 841/2002 established the same steps as in the Royal Decree 2366/1994 and improved payments. The Royal Decree 436/2004 improved payments for small-scale plants and reduced drastically payments to medium-sized and big Combined Heat and Power plants, but it included the possibility of going to the market, instead of selling electricity to the Distribution System Operator at a fixed price.

The option of selling electricity in the market is the best option for cogeneration plants above 15 MW, although plants between 15 and 30 MW receive the same payment in the Royal Decree 841.

3.4.3. Summary

The Directive 2004/8/EC is not yet officially translated into the Spanish legislation but some of the requirements of this directive are already implemented and the directive was taken into account when the Royal Decree 436/2004 was approved.

1. There is no piece of legislation which ensures the guarantees of origin.
2. Payments:
 - a) There are regulated feed-in tariffs for electricity produced by Combined Heat and Power.
 - b) The payment for provision of electricity to the grid is especially attractive for small cogeneration plants (power < 1 MW).
 - c) If the Combined Heat and Power plant is lower than 100 kW, it is exempted from the electricity tax.
 - d) There are incentives for cogeneration plants who participate in the market (especially if the installed capacity is below 10 MW).
3. The administrative procedures are not exactly a barrier for cogeneration as they are for small hydroelectric plants. However, they can be a problem in some cases, because the procedures necessary for providing technical authorisations are usually time-consuming and complicated.
4. Some reports have been published studying the situation of Combined Heat and Power in Spain:
 - a) “La Energía en España 2004” (“The Energy in Spain”), by the Ministry of Industry, Tourism and Trade.
 - b) “National report on state of SSCHP policy and sector situation. Spain”, by the Basque Energy Agency (EVE).
 - c) “Spanish Regulator’s Annual Report to the European Commission”, by the National Energy Commission (Comisión Nacional de Energía or CNE), which is the Spanish regulator.
 - d) Cogen Spain has also published a lot of reports, where proposals are made about how to promote high-efficiency Combined Heat and Power, by changing present legislation.

3.5. Directive 2003/87/EC

3.5.1. Law 1/2005

The Law 1/2005, regulating the scheme for greenhouse gas emission allowances trading and partially modified by the Royal Decree-Law 5/2005, was issued to implement into Spanish legislation the Directives 2003/87/EC and 2004/101/EC, establishing a scheme for the greenhouse gas emission allowances trading and promoting the reduction of the emissions in an efficient and economic manner. The objective is to form an international market for emission allowances in which the interests of all EU countries are taken into account and all of them participate in the same conditions. It is necessary to put into operation a “National Allocation Plan” for the assignment of emission allowances. This mechanism is necessary for avoiding situations against the Common Right of competition, in particular, relating to State aids.

In order to coordinate all the actions to be carried out in this field by the Government and Autonomous Regions, a Commission for the Coordination of the Climate Change Policy was created. This authority is in charge of facilitating the coordination of policies for the application of this scheme for allowances trading and ensuring the fulfilment of climate change obligations.

The “National Registry of Emission Allowances” is also created, where all operations related to emission allowances (issuing, transfer, cancellation, etc.) are registered. Thereby, permanent publicity and updating of the ownership and control of allowances are ensured.

The Law 1/2005 tries to let the companies affected know their obligations and the necessary investments from 1 January 2005 and it applies to every installation listed in Annex I, which include:

- Energy related activities: Electricity generation (thermal nominal power over 20 MW), hydrocarbon refineries and coke industry.
- Ferrous metal production and transformation.
- Mineral industries (cement (clinker), lime, glass, ceramic products).
- Other manufacture activities (paper pulp, paper and cardboard).

The Law defines the “emission allowance” as an allowance (subjective) to emit one tonne of carbon dioxide equivalent during a specified period. These allowances will be only valid during the relevant period specified by the “National Allocation Plan”, and can be transferred between:

- persons within the Community;
- persons within the Community and persons in third countries.

With the aim of controlling all the installations included in Annex I, it will be necessary to hold a permit for emitting greenhouse gases, issued by the competent authority of the region where the installation is located. This permit will be cancelled if:

- The installation is closed.
- The installation is not put into operation in three months after the predicted date.
- The installation is penalised.
- The activity is cancelled for a period higher than a year.

Every resolution enacted by Autonomous Regions about granting, modifying or cancelling an emission permit must be communicated to the “National Registry of Emission Allowances”.

It is also possible to create a pool of installations from the same activity when the following requirements are fulfilled:

- The installations must be included in the same group of Annex I.
- All the installations must have the authorisation for emitting greenhouse gases.
- An administrator (trustee) must be designed.
- The pool must have the corresponding authorization.

The “National Allocation Plan”, passed by the Government through a Royal Decree, must be based on objective and transparent criteria and must establish:

- The total quantity of emission allowances that it intends to allocate for that period.
- The allocation procedure.
- The quantity of certified reductions of emission and emissions’ reduction units that are going to be used.
- The percentage of allocation for each installation.

The first National Plan will be in force for three years (since the 1st of January of 2005) and, the subsequent plans (from the 1st of January of 2008), five years each. The first National Allocation Plan 2005-2007 was approved by the Royal Decree 1866/2004 and modified by the Royal Decree 60/2005. For the first National Plan, the allocation of emission allowances was free and some of them must be kept back for new entrants. For the following Plans, the 90% of the allowances will be free and the remaining 10% will be assigned taking into account the National Plan and competitiveness criteria.

Regarding these payments, a new Royal Decree-Law 3/2006 was approved in February 2006. In this Decree, it is stated that the value of the emission allowances must be internalised when the prices in the wholesale market are formed. This way, the payment to the affected generation units is reduced by the amount equivalent to the assigned emission allowances.

The total quantity of emission allowances will depend on the international obligations of Spain, the contribution of the installations to national emissions, emission forecasts and the possibility of opening new installations or enlarge the existing ones.

For the quantification of the emission allowances, the owner of the installation must submit (before the 28th of February) a verified report about all the emissions of the previous year. The verification must be done by the accredited bodies. If the report is accepted by the competent authority, the information about the emissions will be registered in the table of emissions of the “National Registry of Emission Allowances”.

The Law 1/2005 also lays down the rules related to penalties applicable for the different infringement types:

- Very serious infringements: as operating without an authorization, not submitting the emissions report or deliberately hiding or changing the information given when all this implies important changes in the data. The penalty can even include the total or partial closure of the installations for a maximum period of two years, as well as the corresponding fine (from 50 001 to 2 million euros).
- Serious infringements: they are more or less the same infringements but when the changes are not so important. In this case, the penalty may include, as well as the fine (from 10 001 to 50 000 euros), the cancellation of the authorization for a maximum period of one year.
- Slight infringements: in this case the infringements do not imply a change in the given data. The penalty consists only of a fine (up to 10 000 euros).

For imposing the penalty, there is a system (graduation system) that will operate in accordance with some criteria: intentionality, relapse, benefit obtained and difference between real and notified emissions. These criteria will be taken into account to regulate the type of penalty. If the benefit obtained committing the infringement is bigger than the fine, the fine could be increased up to the double of the benefit.

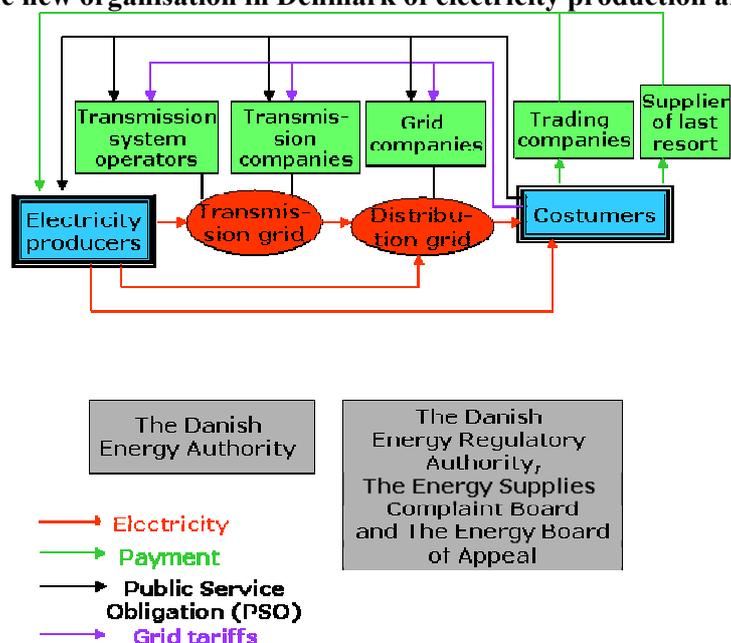
4. DENMARK

4.1. Directive 2003/54/EC

One of the most important decisions in the electricity directive concerning the possibility of small and medium sized CHP-plants to partly balance the fluctuating output of wind power plants are the considerations related to ensuring that balancing mechanisms are transparent, non-discriminatory and, if possible, market-based. The electricity directive has been implemented in Danish legislation mainly in the Danish electricity law. In this law, it is not to be explicitly found that balancing mechanisms shall be achieved by establishing transparent market-based mechanisms, but this is the way in which balancing services (Regulating Power, Upward Regulating reserves and Downward Regulating reserves) are expected to be done in Denmark

Another important decision in the Electricity directive is that the TSO shall be independent from other activities not relating to transmission, and that Member States shall designate one or more competent bodies with the function of regulatory authorities. These authorities must be wholly independent from the interests of the electricity industry and must be responsible for ensuring non-discrimination, effective competition and the efficient functioning of the market. Regulatory authorities may also be responsible for fixing or approving, prior to their entry into force, at least, the methodologies used to calculate or establish the terms and conditions for connection and access to national networks, including transmission and distribution tariffs and the provision of balancing services. These decisions in the electricity directive have been fully implemented in Denmark. Figure 2 shows the new organisation within electricity in Denmark.

Figure 2. The new organisation in Denmark of electricity production and transmission.



The new transmission system operator is a state-owned company, Energinet.dk (www.energinet.dk). As established in the directive, the Danish transmission system operator is independent from other activities within the electricity sector not relating to transmission.

There are some different regulatory authorities in Denmark. The Danish Energy Authority (www.energistyrelsen.dk) lays down rules, provides grants and approvals for generating and transmission plants and systems etc, according to the provisions of the directive. The Danish Energy Regulatory Authority (<http://energitilsynet.dk/english/>) monitors prices and terms for the collective supply companies and handles complaints against them, in line with the directive. The Energy Supplies Complaint Board (<http://www.energianke.dk/>) handles civil legal complaints between private consumers and the energy companies, considers cases concerning consumer agreements for the purchase and supply of electricity, gas and heat, and cases related to other related goods or services. The Energy Board of Appeal (<http://www.ekn.dk/>) is the body that addresses appeals resulting from decisions passed by Danish Energy Regulatory Authority and the Danish Energy Authority.

Regarding Public Service Obligations, there are compulsory services delivered by the TSO and the grid companies, which are designed to satisfy public interests in the electricity sector. They include services such as security of supply and subsidies for environmentally-friendly electricity. The collective supply companies (TSO, transmission companies and grid companies) have to fulfil these obligations and the costs are passed on to the consumer.

Electricity production and trading is subject to competition, and the electricity grid and its operation are subject to public price regulation. All electricity consumers may make use of this infrastructure, purchase electricity in the open market and choose the supplier they prefer, since the 1st of January of 2003. Consumers who do not wish to exercise their free choice are assured electricity supplies by special supply obligation companies (suppliers of last resort), which offer electricity to all consumers at publicly controlled prices. The demarcation between monopoly and areas of competition is clearly defined in the Danish Electricity law.

4.2. Directive 2003/55/EC

The Danish Natural Gas Supply Act (“Bekendtgørelse af lov om naturgasforsyning LBK nr 287 af 20/04/2005”) implements the gas directive and regulates the natural gas industry, except the production of natural gas. Thus, it applies to transmission, distribution, supply and storage of natural gas, including liquefied natural gas (LNG). The objective of the Act is to ensure that national natural gas supply is organised and implemented in accordance with consideration for security of supply, the national economy, the environment and consumer protection.

The directive sets up conditions to ensure effective market access for all market players, including new entrants, by establishing that balancing mechanisms must be non-discriminatory and cost-reflective and, when possible, market-based. Besides it forces TSOs and distribution system operators to include objective, transparent and non-discriminatory rules for balancing the gas transmission and distribution systems, including rules for the charging of system users of their networks for energy imbalance. In the Danish Natural Gas Supply Act, it is not explicitly mentioned which balancing mechanism should be used, but it is expected that the mechanisms described in the gas directive are the ones to be used in Denmark.

The natural gas authorities are the same as the authorities within the electricity sector. The Danish Energy Regulatory Authority, the Energy Supplies Complaint Board and the Energy Board of Appeal are independent, and it is expected that they will protect the rights that small and medium sized CHP-plants obtain through the above mentioned articles in the gas directive.

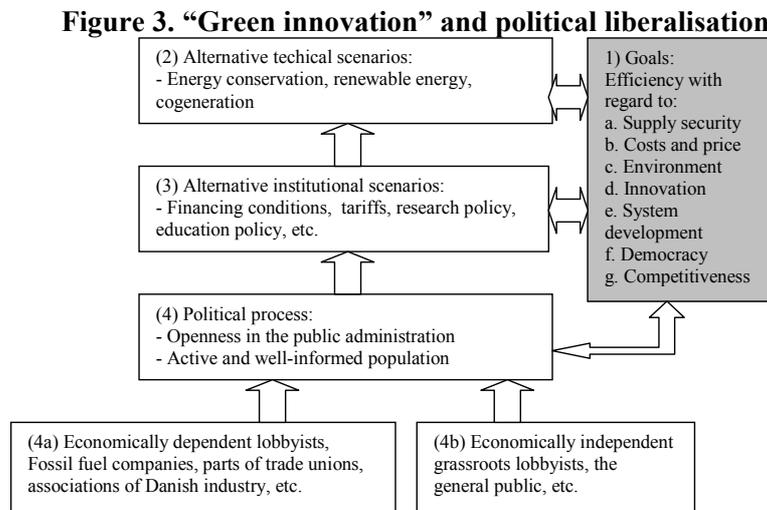
The natural gas transmission system operator is also the state-owned company, Energinet.dk. This company is not totally independent from other activities within the gas sector not relating to transmission, since the Danish state owns the gas company DONG (www.dong.dk).

4.3. Directive 2001/77/EC

In the official Danish energy policy and statistics, renewable energy is defined as energy coming from sources that can be and are regenerated: wind, sun, waves, hydro, geothermal and biomass-based energy production. The historical development of renewable energy sources in Denmark is characterised by an increase in the use of biomass, waste, and wind power, but now, it has reached a point in which biomass and waste have only relatively limited resources left, so the future growth potential for RES is wind power and the new not yet statistically significant technologies, such as photovoltaic and wave power plants, but, so far, no wave power plant has been established, and in 2002 the Government removed any support for this technology. In November 2001 a right-wing Government was elected, and it was not willing, nor able to pursue the goal of a 20% reduction in CO₂ emissions before 2005, by means of RES and energy savings. Instead, a strategy of buying CO₂ quotas outside Denmark was set up, and the policy of supporting energy conservation and renewable energy was abolished almost 100%. But in the spring 2004, a new agreement between the Government and the opposition changed this policy, and it was decided to establish 400 MW offshore- and 350 MW onshore wind power capacity before 2010, so that wind supplies 25% of total Danish electricity consumption in 2010.

4.3.1. Instruments for promoting renewable energy sources

When discussing the instruments for promoting RES, these instruments must be placed in the relevant context, with its different “battlefields” of technological transformation (See Figure 3).



- Box (1): goals and norms discussion (Directive 2001/77/EC).
- Box (2): realistic technical scenarios discussion (the new 2005 Danish Energy Plan).
- Box (3): second order institutional reforms discussion. “Second order” reforms are those directly influencing the development and implementation of RES technologies.
- Box (4), first order (political) institutional reforms discussion. “First order” reforms are those influencing the political process, making it possible to develop and implement the second order reforms.
- Boxes (4a and 4b): the design of the information and resource balance between lobbyists linked to the old uranium and fossil fuel interests (4a), and the lobbyists who are economically independent from those “traditional” interests are developed.

It is important to note that the Danish development between 1975 and 2001 was influenced at each of the levels in Figure 3, from box (1) to box (4a) and (4b). Therefore, it is in general not sufficient to look only at box (3), which we here call the second order institutional reforms. The “instrument” components, therefore, should be described within the following categories:

1. The discourse level: In box (1) and (2) a systematic discussion of goals, norms and realistic technical scenarios were performed during the period 1976-2001. In this period, the Ministry of Energy organised conferences, symposia, one-day meetings, etc. in order to foster the public debate. These activities were slowed down after 2001, but in 2005 a new energy plan was introduced. This plan was mainly a scenario description where it was discussed what would happen under different assumptions, with regard to the development in prices upon fossil fuels. There were no systematic policies for the further implementation of renewable energy technologies. At the discourse level, therefore, the activities have been slowed down since the introduction of the Directive 2001/77/EC.
2. The second order of institutional reforms (before the Directive 2001/77/EC): Until 2001, box (3) has been developed in very concrete Governmental and independent reports, and in an often harsh public debate with the old fossil fuel companies resisting the introduction of new renewable energy support structures. The reforms were amongst others:
 - a) Oil for heating purposes has the highest taxation in Europe (taxation upon one kg oil, including VAT is € 390 per tonne). This taxation was and is of great importance for the development of biomass-based heating systems, as they do not pay any fuel tax.
 - b) Until 2001, electricity from RES was secured at a fixed price and sold to the grid for around 7.9 Eurocent/kWh. This payment was politically ensured for, at least, 6-8 years, in order to establish a secure situation for investors. Until the 1999 electricity reform, the payment was financed via the state budget and thereafter by electricity consumers via electricity prices. There are fixed rules regarding payments for grid connection. This system was applied to biomass-, as well as wind-power-based electricity, and was of great importance for the establishment of locally owned RES systems. The fixed price system made allowed local investors and neighbours to invest in RES systems, which had a decisive influence upon the political acceptance of these technologies.
 - c) There were 20 – 50% investment subsidies for solar and biomass plants.
 - d) A minor grant of around 1 million € annually was given to a network of decentralised energy offices (21 offices).
 - e) A rather large amount of independent energy research was funded (7 million €/year).
 - f) Different institutions, such as the Nordvestjysk Folkecenter for Renewable Energy were funded with minor grants.
3. The second order of institutional reforms (after the Directive 2001/77/EC): Out of the above mentioned second order institutional measures, measures (a), (b), (c), (d), (e) and (f), amounting to 45 million € annually, were totally removed by the new right wing Government in January/February 2002. Consequently the activities linked to the establishment of new pilot plants, for instance within wave power, were brought to a stop, and subsidies to any renewable energy technology decreased considerably. Thus, Denmark has some of the least supportive conditions for renewable energy in the EU after 2002. The political quota/certificate governance model was introduced in the 1999 Electricity law, but never implemented. Instead a system with a fixed CO₂ payment in combination with the (fluctuating) prices at the Nordpool market is implemented for onshore wind power, and a sort of fixed price (feed-in) model is being used for the coming offshore wind power projects. Small wind turbines and biomass plants are still having the fixed price system. Biomass plants get a fixed price of 7.9 Eurocent/kWh for electricity sold to the grid, but this system has not been successful, as it still gives a better economy to use all the biomass production for heat production. Conditions for wind power are listed in Table 5:

Table 5. Conditions for inland wind power 1999-2005.

(1) Turbines built before 1999	a) 7.92 Eurocent/kWh in 12 000 hours full capacity production ⁴ . b) Thereafter as (3) until the wind turbine is 20 years old.
(2) Turbines built 2000-2002	a) 5.67 Eurocent/kWh in 22 000 full capacity hours. b) Thereafter as (3) until the wind turbine is 20 years old.
(3) Turbines built 2003-2004	a) Market price plus 1.32 Eurocent/kWh in 20 years. (Max. price 4.75 Eurocent/kWh). b) Payment for regulation costs 0.3 Eurocent/kWh.
(4) Turbines built 2005	a) Market price plus 1.32 Eurocent/kWh in 20 years. b) Payment for regulation costs 0.3 Eurocent/kWh.
(5) Turbines having “scrap certificates” ⁵	As (4) plus: c) 1.58 Eurocent/kWh in 12 000 full capacity production. (Max. price 6.33 Eurocent/kWh).
Small turbines (below 25 kW)	7.9 Eurocent/kWh during its technical lifetime

As it can be seen from Table 5, the conditions for inland wind power are both complex and representing very low prices, so no new wind power capacity has been build onshore under these conditions in the years 2003-2005. A new agreement between the Government and the opposition, signed in spring 2004, included the establishment of 400 MW offshore wind power capacity before 2010. A tendering procedure is under establishment (See Energistyrelsen 2005 b) and the companies submitting a tender should give a bid consisting of a fixed electricity price for 50.000 hours full capacity production or for a period of 12-15 years. When a wind power project has used up these 50.000 hours, its electricity should be sold to prices at the electricity market. The tendering companies do not have to pay for the electricity grid system from the offshore location to the grid on land. This grid system is established and being paid for by the high voltage governmentally-owned grid company.

4. First order institutional reforms: These political reforms (box 3) have not historically been developed in Denmark to the same extent as the second order reforms. Examples of these are establishing increased openness in the administration and within the energy companies, a balanced representation of Non-Governmental Organisations and industry representatives in public committees, etc. Since 2001, openness in the administration and in the large energy companies has been hampered by the introduction of the so-called liberalisation. As a consequence, a considerable amount of information is now being regarded as business secrets and no longer is accessible to the public as it was in the 1980s and the 1990s.

4.3.2. Perspectives and success conditions

Until 2001, there was a rather successful development of Renewable Energy in Denmark, but, after the change of Government in the autumn of 2001, the policies behind this success were abolished in general. The present conservative Minister of transportation and Energy seems to believe that the market, with its present power structure, will automatically solve the transformation to renewable energy technologies on its own. At the same time, Denmark has reaped a large share of its renewable energy resource potential within biomass and waste and, for further development, has to mainly rely upon wind power, wave power and solar energy. In 2004, around 14% of the total energy supply came from renewable energy and the present policies does not give any indication of reaching the 29% goal of the 2001/77/EC directive.

⁴ 1 MW producing 8.760 MWh in one year is = one years full capacity. 12.000 hours of full capacity therefore equals 5-6 years of production on a good inland site.

⁵ “Scrapcertificates” ensure that a certain amount of small wind turbines have been scrapped.

4.4. Directive 2004/8/EC

4.4.1. Development of district heating and cogeneration

This section describes the development of district heating (DH) and CHP in Denmark.

1. CHP Planning phases: A new public planning era within the energy sector started with a law from 1979, which contained regulations on the form and contents of heat planning in Denmark. The planning was divided into three phases:
 - a) Phase 1: Local authorities reported heat requirements, the heating methods used, the amounts of energy consumed and an assessment of heating needs and possibilities. County councils used these data to prepare regional heat supply summaries.
 - b) Phase 2: Local authorities prepared a draft of future heat supply, while the county councils prepared “regional summaries”.
 - c) Phase 3: The county councils prepared a definitive regional heat plan, which became the overall heat planning. The regional plans showed the areas where different forms of heat supply should be prioritised and where future heat supply installations and pipelines should be located. The possibilities for co-generation of heat and electricity were also examined in this period. Decentralised co-generated heat and electricity became a major energy policy priority when the government and utilities signed the 1986 Co-generated Heat and Electricity Agreement, which forced utilities to arrive at a capacity of a total of 450 MW electricity decentralised cogeneration. Furthermore, it was emphasised that research and demonstration projects should be extended to various types of installations, such as those processing biomass and waste.
2. Obligatory connection: The first law on heat supply also gave local authorities the possibility to require new and existing buildings to connect to public supply of individual natural gas or district heating systems, until 1982, when an executive order finalised the obligation to connect. In 1988 a ban on installation of electric heating in new buildings came into force (still in effect), with the objective of preventing the installation of domestic electric heating in areas with public supply or zoned for such supply. In practice, the ban and enforced connection made it possible for local authorities to ensure energy supply companies’ earnings and investments. The district heating phase of Danish heat planning was to a large extent implemented at the end of the 1980s. Areas covered by the expansion plans were zoned for public heat supply as part of heat supply plans. Besides, there was widespread conversion from heat production using oil and coal to natural gas based co-generated heat and electricity and biomass-based heat production in the 1990s.
3. Planning directives: In 1990, a new planning system was introduced with an amendment to the law on heat supply. A so-called “project system” was developed to adapt policies to future heat supply requirements. The objective of the agreement was to promote the expansion of decentralised cogeneration through conversion of existing installations to co-generated heat and electricity supply, increased use of natural gas, increased use of environmentally friendly fuels and electricity growth. The conversion of district heating to cogeneration took place in three phases, which are listed below. For the most part, these conversion phases were successfully completed, which is why Denmark has the most extensive cogeneration of heat and electricity in Europe.
 - a) 1990-1994: Large coal-fired district heating plants with access to a natural gas supply and large natural gas-fired DH plants were to convert to natural gas-fired decentralised cogeneration. Waste installations were to be implemented as well.

- b) 1994-1996: Remaining coal-fired district heating plants with access to natural gas supply and medium-sized natural gas-fired district heating plants were to convert to natural gas-fired decentralised cogeneration. The majority of district heating plants outside the public systems were to convert to straw, wood chips or other bio-fuels.
 - c) 1996-1998: Smaller natural gas-fired district heating plants were to convert to natural gas-fired, decentralised cogeneration. Remaining DH plants outside the public natural gas systems were to convert to straw, wood chips or other bio-fuels.
4. Open-field plants: An open-field plant (or local CHP, as they are referred to by natural gas companies) is a small, public supply heat installation – cogeneration or district heating plant – set up at the same time as the DH grid. Today, there are approximately 80 such plants in Denmark. Most of them are natural gas-fired and some are biomass-fuelled. An open-field plant has an average of 250 consumers (18 000 consumers connected in Denmark, 1-2% of the country's total DH consumption). At the end of the 1990s, a number of open-field plants encountered financial difficulties, partly due to higher natural gas prices. In many cases, the government and natural gas companies came to their aid: open-field plants received DKK 370 million (about 50 million euros) for debt rescheduling in 2000 and additional DKK 85 million (about 11 million euros) in 2003. Taxation of co-generated heat and electricity was also amended in favour of open-field plants and other decentralised cogeneration.
5. Subsidies to favour decentralised CHP: In 1984, a subsidy for RES electricity generation (0.23 DKK/kWh or 3.08 Eurocent/kWh) was established under the Ministry of Taxation. In 1992, an additional subsidy for electricity production was introduced in order to promote decentralised cogeneration with natural gas, RES, and industrial CHP (0.10 DKK/kWh or 1.34 Eurocent/kWh). A further subsidy of 0.17 DKK/kWh (2.28 Eurocent/kWh) was given for electricity produced with wind power, hydropower, biogas, straw or wood chips. In 1997, the electricity production subsidy was reduced to 0.07 DKK/kWh (1 Eurocent/kWh), although not for smaller decentralised cogeneration and open-field plants. This reduction created financial difficulties for a number of natural gas-based, decentralised cogeneration, which had invested in installations, in the hope of receiving a subsidy of 0.10 DKK/kWh, so so-called “aid pool” was established to compensate the reduced subsidy. In 2003, new regulations were established for electricity production subsidies, setting lower tax rates for decentralised and industrial cogeneration. New plants and plants over 25 MW are not eligible for the subsidy. At the same time, the electricity production subsidy for existing decentralised plants was set at 0.08 DKK/kWh (1.07 Eurocent/kWh) for a specific amount of electricity. The subsidy rates were not changed for industrial plants. Financial conditions of decentralised and industrial cogeneration are expected to remain essentially unchanged.
6. Market conditions: Until 1989 the price for electricity was unique, so electricity was generated automatically when heat was needed, but not necessarily in periods when the market price for electricity was best. In 1989, the triple tariff was introduced to encourage cogeneration plants to produce electricity in periods of high demand. However, production of heat-connected electricity gradually increased to such an extent that, during some periods, it had to be sold to surrounding countries for less than it costs to produce. Therefore, as of 1 July 2003, cogeneration was exempt from the obligation to produce electricity and heat continually in order to qualify for electricity production subsidies. Now, plants are motivated to produce electricity when there is demand and when the price is thus favourable, and to produce heat when there is demand. Further initiatives to encourage more economic CHP were introduced with an energy agreement in March 2004. Sale on the spot-market became mandatory for plants larger than 10 MW_{el} and voluntary for smaller plants, by 1 January 2005 but from 1 January 2007 plants from 5 to 10 MW are also obliged to sell on the spot market and must leave the triple tariff. Plants receive a subsidy independent of the electricity production, taking into account the actual earnings on the spot market.

4.4.2. Implementation of the directive

Denmark has a high share of cogeneration. However, more cogeneration could be implemented, as can be seen below. This is in accordance with Article 1 of the directive, where the need to create a framework of promotion and development of high efficiency cogeneration is stated.

Already in the 80's, the local authorities prepared different plans to point out the possibilities for district heating. As a result, much of the potential for cogeneration was utilized in the 90's.

In June 2005, the Danish Energy Agency published a report "Scenarios for Development of New Electricity and Cogeneration Capacity" so the possibilities for installing new Combined Heat and Power plants have already been assessed. The conclusion was that developments are highly dependent on the future price of oil and the future price for CO₂-quotas. At the moment, the price for electricity on the spot market is too low to promote erection of new cogeneration plants.

Another potential for the Danish cogeneration plants to produce more environmentally friendly is the possibility to substitute the natural gas with renewable energy. This would mean a reduction in the Danish CO₂-emissions. This possibility, however, is hindered by the legislation.

Another investigation finds that there is still a substantial potential for more cogeneration in Denmark in industrial plants and micro-cogeneration in buildings.

Regarding the efficiency criteria (Article 4 of the directive), the Danish decentralized cogeneration plants have efficiencies of average 38/51 electricity/heat, which represents a total of 89%.

The Guarantees of origin (Article 5 of the directive) are a way to demonstrate that the CHP used is really a high-efficiency cogeneration. For certain electricity consumers, it might be a decision criterion when choosing electricity supplier, so this kind of electricity generation can have better economics.

In Denmark, it is possible to obtain a guarantee of origin for electricity produced on renewable energy, but not yet for electricity produced on cogeneration.

There are also many support schemes for subsidies in effect (Article 7 of the directive). However, the schemes are effective only for plants that are already built. These support schemes are regulated by Announcement on subsidies for electricity production and Announcement on price supplement for electricity produced by decentralised cogeneration. New plants over 10 MW (and plants over 5 MW from January 1, 2007) must sell the electricity on the market. There are no subsidies for new production.

Procedures (Article 9 of the directive) for new production capacity are regulated by the Law of Electricity Supply and by Announcement on Access to the Electricity Grid. New production facilities must have a permit given by the Transport and Energy Minister. In order to leave the triple tariff and become a market player the system operator has certain procedures to follow.

A report (Article 10 of the directive) on the situation of cogeneration in the country should be finished by February 21, 2006.

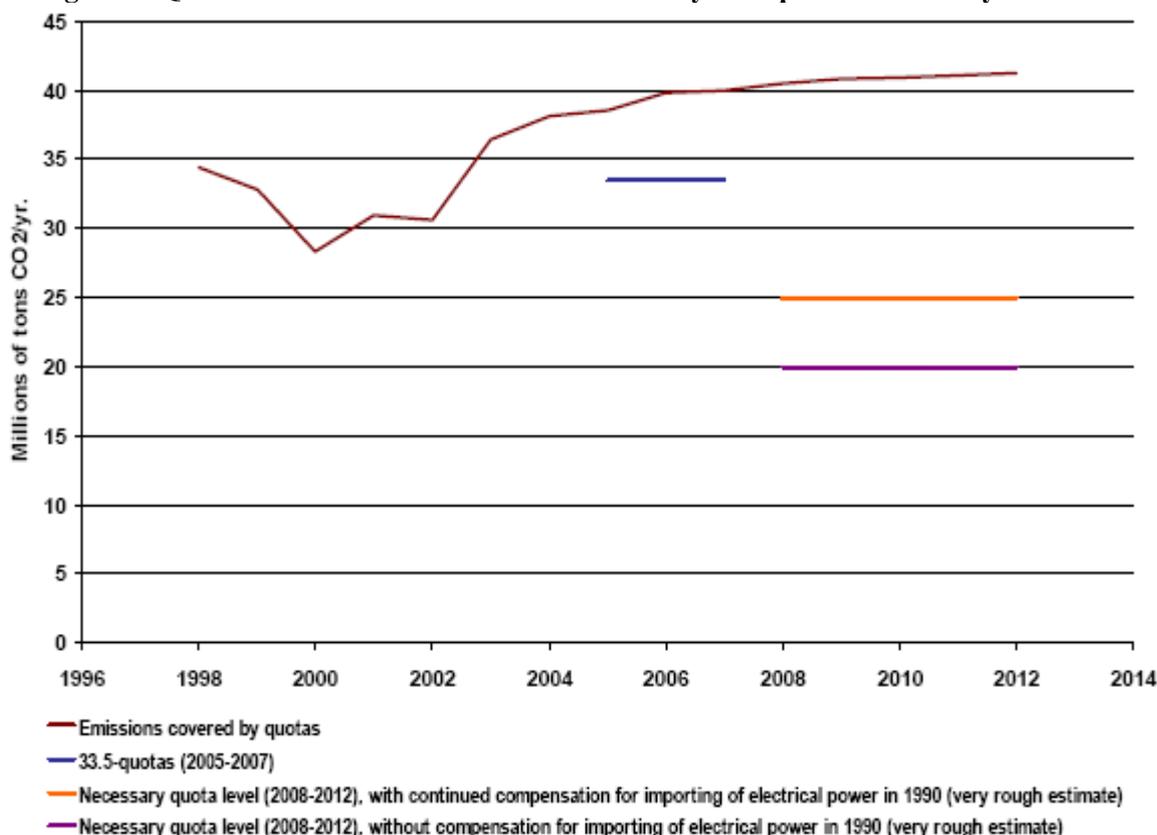
4.5. Directive 2003/87/EC

The 1997 Kyoto Protocol established a ceiling for the emission of greenhouse gases by industrialised countries. According to the Protocol, Denmark has a commitment to reduce the average annual emission of greenhouse gases by 21% in relation to the 1990 emission before 2012.

In relation to the above EU Directive, Denmark passed in 2004 new quota legislation, the Law no.493 of 9 June 2004. In this law, the government allocates emission quotas of 33.5 million tonnes early by 2005-2007, decreasing the emissions by approximately 6 million tons per year, compared with a reference development.

In Figure 4 below [57], the difference between the short (blue) horizontal line corresponding to the emission allowances and the upper brown reference line indicates the reduction element of 6 million tonnes yearly for the period 2005-2007. The two horizontal lines for the period 2008-2012 indicate the CO₂ emission goals for these years under two different conditions.

Figure 4. Quota allocation and estimated emission by enterprises covered by the law.



In Table 6 [57], the quota-regulated sectors are compared with the sectors outside the quota regulation. These sectors which are outside the quota regulation should be regulated with other energy policy tools than direct quota regulation. Except the number of installations, all the remaining figures are given in million tonnes of CO₂ per year.

Table 6. Main numbers in the Danish CO₂ allocation plan.

	Number of installations	2002 emissions	2003 emissions	Projected emissions 2005-2007	Allowance allocation emissions in ETS and non-ETS covered sectors	Reduction in relation to projection	Targets relative to 2002/358/EC
1.ETS-covered sectors, total:	357	30.9	36.6 ⁽²⁾	39.3	33.5	14.8%	
1.a. Electricity and heat production.	234	22.6	28.1	29.4	21.7	26.2%	
1.b. Additional ETS-covered industries, including offshore.	123	8.3	8.5	9.9	9.2	7.1%	
1.c. Auction.					1.7		
1.d. New entrants.					1,0		
2.Non-ETS sectors		37.6 ⁽¹⁾	37.8 ⁽¹⁾	39.0	39.0		
Total:		68.5 ⁽²⁾	74.4 ⁽²⁾	78.3	72.5	7.4%	
Emission target 2008-2012, with full compensation for base-year issue.							59.7
Emission target 2008-2012, without compensation for base-year issue.							54.9

(1) Based on the EU Commission's broad definition of covered enterprises

(2) Provisional statistics for allowance-covered, calculated values for the majority of non-ETS

Table 7. Other main characteristics of the Danish CO₂ quota allocation plan.

Factor	Description
Installations covered	Denmark has chosen to use the EU Commission's interpretation for installations covered by the allowance regulation.
Allocation principles	Allocation of allowances according to historical electricity production for electricity production, heat and other industries
Reduction potential	Future reductions prioritised according to the least-cost principle (generally expected to occur in ETS-sectors), since inexpensive potential is almost exhausted in the non-ETS sectors due to significant economic and administrative burdens on emissions in past years. Historically, emissions from ETS-covered sectors were subjected to considerably less pressure and therefore offer greater and less expensive reduction potential – including access to cheaper international allowances and CO ₂ credits.
Previous reduction efforts	Taken into account in general for electricity production, by allocation according to historical production and in other sectors by the use of a long base-period.
Cleaner technology	Taken into account in general for electricity production, by allocation according to historical production and in other sectors by the use of a long base-period.
New entrants	A pool is set aside for new installations and increased output at existing installations.
Auctioning	5% of the total number of allowances is auctioned off.
Pooling	No applications have yet been received.
Closure	No new allowances allocated after closure. Allowances set aside to installations that shut down are transferred to new entrants' pool.
Opt-in/-out	Not used in 2005-2007.
Annual allowance allocation	2005-2007 allocation: 40%, 30% and 30% in 2005, 2006 and 2007, respectively.
Changes in taxes and levies	CO ₂ taxes on fuels used in ETS-covered industrial enterprises are revoked.

Figure 5. Estimated emissions and quotas for sectors covered.

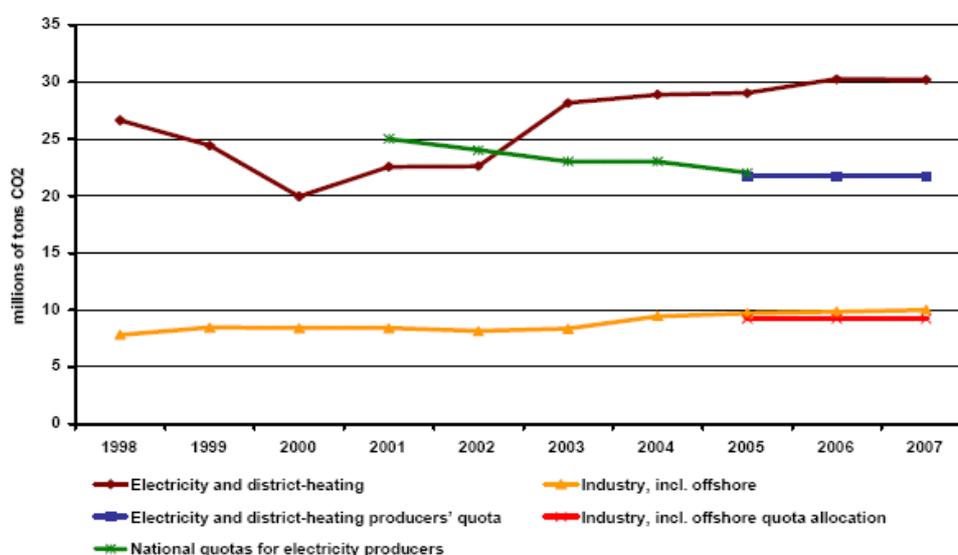


Figure 5 shows that the main contributions to the CO₂ reduction has to be implemented by electricity and district-heating producers, whereas industry (including offshore) has a quota allocation which is almost the same as the reference CO₂ emission estimates for 2005-2007.

4.5.1. Summary

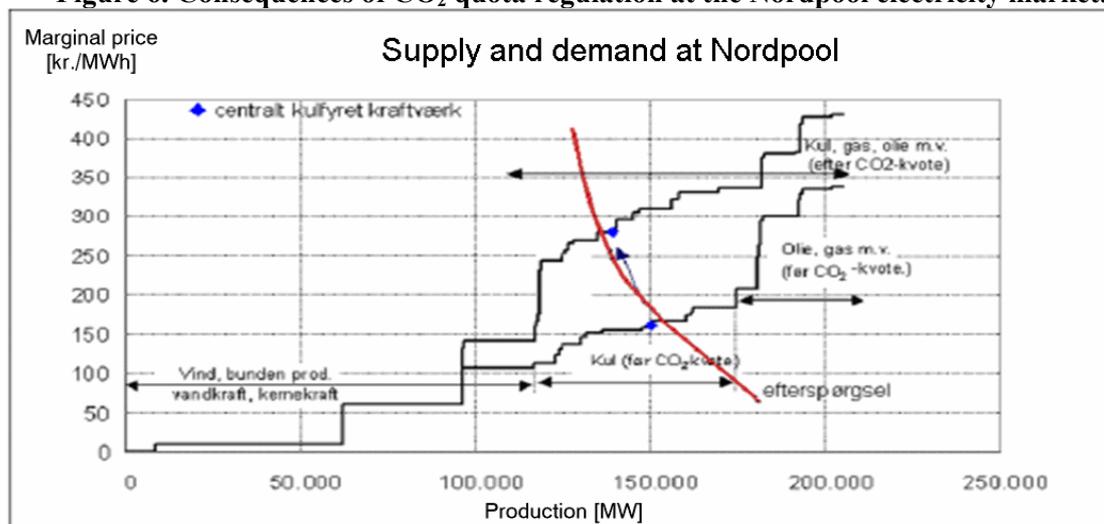
- Allowances correspond to an annual emission of 33.5 million tonnes in the 2005-2007 period.
- As 5% is reserved for state auctions of quotas, around 32 million tonnes of CO₂ will be available free of charges to enterprises covered by the quota regulation.
- Out of these 32 million tonnes, electricity and heat producers are allocated approximately 21.7 million tonnes.
- 120 other enterprises are allocated around 9.2 million tonnes.
- An annual pool of 0.9 million tonnes is set aside to promote production growth, and operation of new enterprises.
- 5% of the 33.5 million tonnes are sold at state auctions. The money from this sale is used to adjust CO₂ taxes and to purchase Joint Implementation and CDM credits.

4.5.2. Effects upon the technologies proposed in the Desire project

First of all, the consequences which energy policy may have on the increase of electricity prices at the Nordpool market must be assessed.

In Figure 6 below [72], the consequences of the CO₂ quota regulation upon supply and demand at the Nordpool electricity market, if the CO₂ quota price is 150 DKK, are presented. The red curve shows the estimated demand; the upper black curve the supply at the Scandinavian Nordpool market after the introduction of a CO₂ quota system; and the lower black curve the supply without any CO₂ quota system. The price at the Nordpool market is determined by the marginal price of the last unit and, as it can be seen from the figure, the price here is estimated to increase from around 16 øre (0.16 DKK) per kWh to 27 øre per kWh at a CO₂ price of 150 DKK per tonne (from 2.1 Eurocent per kWh to 3.55 Eurocent per kWh at a CO₂ price of 20 Euro per tonne).

Figure 6. Consequences of CO₂ quota regulation at the Nordpool electricity market.



It can also be seen from the figure that the production costs increase resulting from the CO₂ quota system is only linked to the part of production which exceeds the hydro, nuclear and wind power production. As only around 25% of the total sale at the Nordpool market has a CO₂ emission, the average cost for the power producers is only increasing by around 2.5 øre per kWh, or 0.33 Eurocent per kWh. With the effects upon costs and prices showed in Figure 6, the average costs for the Scandinavian power producers is increasing by 0.33 Eurocent per kWh, and the average price by 1.4 Eurocent per kWh. The large gainers are the companies owning hydro, nuclear wind power plants. These plants are mainly owned by the large Norwegian, Finnish and Swedish power companies. Vattenfall, which now owns around 20% of the Danish power capacity, is one of the large gainers at the Scandinavian market, annually gaining more than 1 billion euros due to the CO₂ quota market. Seen in relation to the other Scandinavian power companies, the Danish companies are relative losers – but not absolute losers. As the Danish producers are getting a free CO₂ quota of around 75% of their expected emission, they are also getting considerable gains within the period 2005-2007. A way of understanding what happens is to say that the Danish power producers are treated as if 75% of their production was hydro power or wind power. Nevertheless the prices are increasing according to the marginal costs at Figure 6.

The Danish Ministry of Environment estimates that if the quota price is 50 DKK per tonne (about 6.7 Euro per tonne), the cost of electricity at the Nordpool market will increase by 2 øre/kWh (about 0.27 Eurocent per kWh). According to the Danish Ministry of Environment, this means that the Danish electricity producers are gaining more than they lose due to the cost of quota purchase. The Ministry estimates a net profit for the electricity producers of around 400 million DKK per year for the period 2005-2007 at a CO₂ quota price of 50 DKK per tonne (about 6.6 Euro per tonne CO₂).

At present, the quota price is around 150 DKK per tonne (about 20 Euro per tonne), which could indicate a price increase at the Nordpool market of around 6 øre per kWh (about 0.8 Eurocent/kWh), and an annual gain for all Danish electricity producers of more than 1.2 billion DKK (about 160 million euros) for the period 2005-2007. But if we use the numbers in Figure 6, the increase in electricity price will be around 11 øre per kWh (about 1.44 Eurocent per kWh), or an annual gain for electricity producers in Denmark of around 2.2 billion DKK (about 295 million euros). Existing Danish power producers are, therefore, gaining between 1 and 2 billion DKK (between about 135 and 270 million euros) per year, at a CO₂ price of 150 DKK per tonne for the period 2005-2007. The companies gaining the most are ELSAM, which is owned by the Danish Government via DONG (assuming that the sale of ELSAM A/S to DONG is accepted by the EU), and the Swedish state owned power company Vattenfall. ELSAM will produce around 60% of the total Danish electricity, and Vattenfall around 20%. If the CO₂ price is 150 DKK per tonne, the annual price increase for the consumers, and gain for the companies at the Danish electricity will be between 600 million and 1.2 billion DKK (between 80 and 160 million euros) for ELSAM/DONG and between 220 and 440 million DKK (between 30 and 60 million euros) for Vattenfall.

When trying to estimate the effects of CO₂ quotas upon the new distributed and flexible technologies included in the DESIRE project, these effects must be divided into two main categories:

- the effects due to changing market prices
- the effects due to capital accumulation and market power.

Therefore, these two main effects that CO₂ quotas have upon combined heat and power and wind turbines are summarised below:

1. Effects upon decentralised cogeneration:
 - a) Effects due to changing the market prices:
 - i. Effects on small cogeneration units: these units have a gas input capacity below 20 MW, which, in general, means an electricity capacity below 4 MW. These units will not get a CO₂ quota, but they will be able to sell their electricity at a higher price at the Nordpool market. If we assume prices as shown in Figure 6, the price increase will be around 11 øre per kWh (1.4 Eurocent per kWh). As they have no CO₂ quotas to sell, they will bid at the Nordpool market at a price which does not include any CO₂ costs. This altogether means that the CO₂ quota system will motivate these units to sell more at the Nordpool market than without the CO₂ quota system.
 - ii. Effects on larger cogeneration units (above 20 MW gas input capacity): These units will get a CO₂ quota, based upon historical consumption. This means that they will include the CO₂ costs in their bidding prices at the Nordpool market. Consequently they might tend to have a higher bidding price than the small cogeneration units discussed above. Compared with coal-fired plants, the CO₂ quota system will increase the competitiveness at the Nordpool market. But compared with hydro power and nuclear power, their competitiveness will decrease. The exact effects of the CO₂ quota system upon the bidding price and, consequently, the amount of cogeneration produced from these units will have to be analysed further.
 - b) Effects due to capital accumulation and market power: Vattenfall and DONG are gaining considerable wealth, by means of the marginal pricing principle (See Figure 6). The annual gain is around 9 billion DKK (1.2 billion euros) for the Vattenfall group, including their gains in Sweden, but excluding potential gains in Germany. In the case of ELSAM/DONG, the annual gain is between 0.6 and 1.2 billion DKK (80 and 160 million euros). These gains mean that the Vattenfall gain in one year is enough to buy up around 20% of the Danish power capacity, as they did in 2005. These capital gains may be used to buy electricity distribution companies and decentralised CHP plants. Consequently, there is a risk that the windfall profits from the CO₂ quota system will be used for further open or hidden concentration of market power in the electricity sector.
2. Effects upon wind turbines:
 - a) Effects due to changing the market prices: The price increase at the Nordpool market may be as high as 11 øre per kWh (1.47 Eurocent/kWh). When this is combined with the present fixed payment of 10 øre per kWh (1.34 Eurocent/kWh) to wind power, it is foreseeable that the prices for wind power electricity will increase to the present cap of 37 øre per kWh (See Table 5), especially when combined with high coal prices.
 - b) Effects due to capital accumulation and market power: The present capital accumulation as described above might support a process where large actors buy wind capacity from present owners: Vattenfall bought the 500 MW ELSAM's wind power capacity in 2005.

4.5.3. Market cost structure, market prices and market power.

Figure 6 shows that coal-fired plants whose marginal costs are above around 270 DKK per MWh (36 Euro/MWh) will be closed down (30-40% of the present coal based electricity capacity), which might be a problem for Vattenfall and ELSAM, as these plants set the marginal price and, thus, are the reason for their high profits. Nevertheless, the modern coal-fired plants, with marginal costs of between 270 and 250 DKK per MWh (36 and 33.4 Euro/MWh), which are about 15 GW on the Scandinavian market, will continue producing and being price leaders for a period. Therefore, they have a very important role of keeping the prices and profits high.

If electricity consumption decreased by exactly this capacity, existing plants with a marginal cost of only around 150 DKK per MWh (20 Euro/MWh) would become price setters. These plants might be, for instance, existing nuclear and hydro power plants. This change of cost structure also could happen if there was enough new wind power and hydro power to replace the coal-fired plants. In the Figure 6 contexts, this would result in a fall in electricity prices at the Nordpool market of around 11 øre per kWh (1.47 Eurocent/kWh), and the profit of Vattenfall would decrease by more than 1 billion euros per year.

So, if it is possible for Vattenfall, in combination with other actors at the Nordpool market, to make sure that there will always be a certain amount of coal-fired plants producing at the market, this will increase the income of Vattenfall and these other Scandinavian actors considerably. That is why the CO₂ quota system seems to be a sort of life insurance for, at least, a certain number of coal-fired plants for a period. At Figure 6, the remaining amount of coal-fired plants is around 15 000 MW. Later on, natural gas-based power plants can replace the coal-fired plants as the units keeping the price and profits high.

The consequences of the link between market price, marginal price structure and market power could be described by the following preliminary thoughts, although further analysis should be performed:

- The large power companies at the Nordpool market might reduce hydro and nuclear power production in certain periods, in order to ensure the price-leader role of the coal-fired plants at the Nordpool market. Clearly, this would be illegal behaviour, but it would be extremely difficult to control for the monopoly authorities.
- Wind power might also be a threat against the Figure 6 marginal cost profile. If wind power capacity increases considerably, the periods of time where coal power is determining the Nordpool market price will decrease, and the profit of the large Scandinavian actors will also go down.
- Consequently, there is a big gap between the amount of wind power capacity which is beneficial for the society and the amount of wind power capacity which is profitable for the large power companies at the Nordpool market. Wind power scenarios which might be profitable from a societal point of view could generate considerable losses for the large power companies at the Nordpool market. Strategically, this could generate strong resistance against further wind power from the large power companies at the Scandinavian electricity market.
- Small natural gas-based cogeneration plants might be able to bid at lower prices than the large modern coal fired plants, when the price per CO₂ tonne is 150 DKK (20 Euro/MWh). If this is the case, also these plants might decrease the Nordpool marginal costs in certain periods and, in that way, lower the profits of the large power companies at the Nordpool market.

4.5.4. Concluding remarks

In general, there is a need for further analysis, especially regarding the link between the marginal costs of different technologies and the price at the Nordpool market: Will new modern gas-fired power plants have lower marginal costs than modern coal-fired plants? To which degree is it possible to expand wind power, and in which way will this influence the price level at the Nordpool market? At which price levels at the Nordpool market will natural gas-fired decentralised cogeneration survive? To which degree is it possible to use market power to keep the prices high? etc. But some main conclusions can be summarised:

1. In a situation without market power: There will be price increases at the Nordpool market for some years. This has the following consequences:
 - a) The least-efficient coal-fired plants will close down.
 - b) The price increase will allocate considerable extra incomes especially to the large power companies at the market. The already established technologies like nuclear and hydro power plants will get the extra profit generated by the CO₂ quota system. In a similar way, the Danish ELSAM and E2 power companies are gaining considerable profits due to their free quota. So as a public regulation tool, the CO₂ quota system is expensive, as it is giving huge profits to existing technologies as a side-effect of motivating to close down some inefficient coal-fired plants and the implementation of CO₂-free renewable energy technologies, such as wind power and biomass-based heat and electricity generation.
 - c) The above price increase results in a massive capital accumulation in the large power companies in these years and might be used in a fusion process, where the large actors are buying the smaller companies by means of the accumulated profits. This has already happened to some extent, with Vattenfall buying around 20% of the Danish power capacity. But can this situation with windfall profits to the largest power companies persist over a longer period of time? This depends upon whether these companies can maintain both day-to-day and strategic market power.
 - d) The small cogeneration units may have a better situation than in a situation without CO₂ quotas.
 - e) The cogeneration units above 20 MW fuel-use-capacity might also have an improved ability to compete with large coal-fired plants. But due to the present very high prices on natural gas, this will not – in longer periods – be enough to make them produce electricity.
 - f) Wind power has a better situation than in a situation without quotas.
2. A situation with market power: In this situation, the large actors are able to exercise market power. Here, it is important to distinguish between day-to-day market power and strategic market power:
 - a) Day-to-day market power: this might be used to keep the price high, by means of withdrawing hydro and nuclear power from the market in certain periods, with a view to keep the coal-fired plants as price leaders. From the point of view of new technologies, such as wind power and decentralised cogeneration, the direct effect of this type of market power is beneficial, as it keeps the price high. But the indirect effect, the capital accumulation in the largest power companies, might result in fusions which can threaten the independence of the decentralised energy production sector.
 - b) Strategic market power: this has to do with the power exercised upon the design of future technological systems at the energy scene. Here, there could be, as argued above, resistance against further renewable energy capacity, as this could change the cost curve (Figure 6), lowering the marginal costs and consequently the electricity prices, by making, for instance, hydro power the price leader. Whether this could happen or not is difficult to say, and requires further analysis both of the possibilities of exercising strategic market power and of the effects of this type of market power.

5. UK

5.1. Directive 2003/54/EC

The Directive 2003/54/EC was mostly aimed at other members of the EU rather than the UK, where markets are not yet fully liberalised or competitive. The UK's market was already competitive. As a consequence of this, as well as the UK regulatory regime, UK is broadly compliant with the requirements of this directive.

This chapter refers to the UK legislation that implements the requirements of the directive related with the DESIRE project.

5.1.1. Public service obligation

1. Electricity Act 1989 and Supply and Distribution Licences: A number of public service obligations are imposed on electricity undertakings by the Electricity Act 1989 and the supply and distribution licences granted thereafter. These include obligations on undertakings to meet set standards of performance, establish customer complaints procedures and provide special services for elderly or disabled customers. Therefore, present arrangements meet the requirements of Article 3(2) of the directive.
2. Supply Licence and Distribution Licence: Under the Supply Licence, the licensee has a duty to supply electricity to domestic customers and under the Distribution Licence, it has a duty to offer terms and charges for connection to the grid, with the methodologies subject to approval by the regulatory authority. Therefore the present arrangements meet the requirements of Article 3(3) of the directive.
3. Supply Licence: The Supply Licence contains specific duties as regards the protection of vulnerable customers (i.e. those who are blind, deaf, of pensionable age, disabled or chronically sick). In addition, the combined energy regulatory authority known as the Gas and Electricity Markets Authority (GEMA), more commonly known as Office of Gas and Electricity Markets (Ofgem), publishes and updates social and environmental objectives that focus on reducing fuel poverty and improving energy efficiency through promotion of research and innovation, and best practice guidance for industry. It also requires the licensee to ensure that contractual terms are transparent and clear and that customers may not be charged for the termination of contracts on notice although reasonable charges may be imposed when a fixed-term contract has been terminated, which might create cost not related to the change of supplier. Therefore, the present arrangements meet the requirements of Article 3(5). There is currently no requirement for electricity suppliers to specify their fuel mix to customers nor is there a requirement for electricity suppliers to publish specific information on the environmental impact of the fuel mix. Therefore, there is no compliance with article 3(6).
4. Monitoring and security of supply: UK is broadly compliant with Article 4 as the monitoring of security of supply (including the specific areas outlined in detail in Article 4) is already carried out via regular reports produced by the Joint Energy Security of Supply Working Group, National Grid Transco, the Gas and Electricity Markets Authority (the "Authority") and the Department of Trade and Industry (DTI).

5.1.2. Provision of energy through a tendering procedure

The provision of energy through a tendering procedure is regulated by the Utilities Act 2002 and Energy Act 2004 and Transmission licence, Condition AA4.

The New Electricity Trading Arrangements (NETA) in England and Wales, being introduced with the Utilities Act 2002, and the wider trading of electricity in the wholesale markets between generators and suppliers form the primary mechanism for providing both for new capacity and the participation of the demand side, through the operation of the pricing mechanism. Forward prices for example presently exist out three years, and help provide a stable investment climate for new generation projects. With the Introduction of British Electricity Trading and Transmission Arrangements (BETTA) with the Energy Act 2004, the NETA applies to the whole Great Britain.

All licensed transmission companies are obliged to publish a Seven-Year Statement, which includes scenarios for potential demand and generation growth. Such information provides a set of transparent and non-discriminatory information against which generators and investors in generation can choose to enter the generation market.

Special Licence Condition AA4 of the National Grid Company's electricity transmission licence places a duty on National Grid Company (NGC) to operate the transmission system in an efficient, economic and co-ordinated manner. Further, it requires NGC not to discriminate in the procurement or use of balancing services. In addition, NGC is responsible for ensuring that demand and supply are balanced on a moment to moment basis.

NGC therefore procures, among other things, Standing Reserve services in the form of either generation or demand reduction. This enables NGC to access additional power at short-notice in order to meet unexpected changes in generation or demand. Although such services are used at short-notice, NGC tenders for them on an annual basis up to 12 months before they are needed. NGC can therefore take a longer term view of the demand and generation balance in assessing the need for Standing Reserve in enabling supply to match demand in real time and so preserve security of supply.

Ofgem has the power under statute to introduce and modify the licences of British generation, supply, distribution and transmission companies. The statutory and licence requirements on these regulated companies give them a number of obligations, one of which is to develop "codes", including the Balancing and Settlement Code (BSC). The BSC sets the rules for the balancing mechanism and imbalance settlement process and is maintained by the National Grid Company, the system operator. All licensed electricity companies are required to sign the code, other parties may choose to. Any party to the BSC, Energywatch, any other body representative of interested third parties designated by the Authority and in limited circumstances the BSC Panel can propose a modification to the BSC. Changes to the BSC may be approved by the authority the same day. Changes to the licence obligations require at least 28 days and changes to statute several months. Regarding the energy efficiency measures, suppliers are for example obliged by licence to achieve improvements in domestic energy efficiency. This obligation is set by the government and is administered by Ofgem. The last Energy Efficiency Commitment programme ran from 1 April 2002 to 31 March 2005.

The above describe how the UK implements Article 7 of the directive regarding the provision of energy through a tendering procedure.

5.1.3. Duties and independence of the Transmission System Operator, dispatching and balancing

1. Electricity Act 1989 and Transmission Licence- Condition 7: The Electricity Act 1989 establishes transmission as a licensed activity. The tasks of transmission system operators, as outlined in Article 9 of the directive, are all imposed on TSOs via Condition 7 of the Transmission Licence, and licensing requirements are themselves given by statute.
2. Transmission Licence-Condition D3A: In England and Wales, National Grid Transco is an independent company which is not part of a vertically integrated undertaking and which has no generation, distribution or supply interests. In Scotland, where the transmission system is owned by two vertically integrated electricity companies, the operation of the transmission system is independent in legal and management terms and the operator meets all of the conditions outlined in Article 10 via Condition D3A of the Transmission Licence.

5.1.4. Duties and independence of Distribution System Operator

1. Electricity Act and Distribution Licence-Condition 9: The Electricity Act establishes distribution as a licensed activity. Where relevant in the British system, the required tasks of distribution system operators (as outlined in Article 14) are mainly imposed on distribution system operators via Condition 9 (the Distribution Code) of the Distribution Licence. As regards the planning of the distribution network, distribution system operators have a licence obligation to plan their networks in accordance with the Engineering Recommendation P2/5 (this recognises contributions that can be provided from distributed generation).
2. Electricity Act, Section 6 and Distribution Licence-Conditions 39, 40, 41, 43: Section 6 of the Electricity Act requires that the same person may not be the holder of both a distribution and a supply licence. Condition 39 of the Distribution Licence makes clear that the licensee shall maintain the full managerial and operational independence of the distribution business and also restricts the disclosure of confidential information outside the distribution business. Condition 40 outlines the terms of the appointment of a compliance officer. Condition 41 prohibits cross-subsides to and from any other business or undertaking outside the distribution business. Finally Condition 43 sets out terms for the financial ring-fencing of the distribution business.

5.1.5. Summary

The UK's market was already competitive when the EU directive was published. As a consequence of this, as well as the UK regulatory regime, the UK is broadly compliant with the requirements of this directive.

Electricity undertakings have a public service obligation but there is currently no requirement for electricity suppliers to specify their fuel mix and its environmental impact. In the UK, the Transmission System Operator's and Distribution System Operator's national duties and independence requirements are also in-line with the directive.

UK legislation guarantees the monitoring and security of supply as required by the directive.

5.2. Directive 2003/55/EC

As in the case with the Directive 2003/54/EC, the Directive 2003/55/EC is mostly aimed at other members of the EU rather than the UK. In the majority of EU-countries, electricity markets are not yet fully liberalised or competitive, unlike the UK market. The UK is broadly compliant with the requirements of this directive. This chapter presents the UK legislation which implements the points of the directive 2003/55/EC related with the DESIRE project.

5.2.1. Main provisions of UK regulation

1. **Public service obligations:** A number of public service obligations are imposed on natural gas undertakings under the Gas Act 1986, which include obligations to meet set standards of performance, establish customer complaints procedures and provide special services for elderly or disabled customers. Besides, Conditions 37 & 38 of the Supply Licence contain specific duties for the protection of vulnerable customers (i.e. those who are blind, deaf, of pensionable age, disabled or chronically sick). In addition, Ofgem publishes and updates social and environmental objectives that focus on reducing fuel poverty and improving energy efficiency through promotion of research and innovation, and best practice guidance for industry. The Licence also requires the licensee to ensure that contractual terms are transparent and clear and that customers are not charged for the termination of contracts on notice, although reasonable charges may be imposed when a fixed-term contract has been terminated, which might create cost not related to the change of supplier. As regards compliance with security of supply aspects of Article 3(4), there is a requirement on the National Grid Transco to ensure necessary network investment and there is also an incentives scheme to encourage National Grid Transco to build pipeline capacity.
2. **Penalties for imbalances and peaks in gas consumption:** The Network Code meets the requirements of the directive for transparent and objective rules for balancing and the procurement of energy. Transporters Licence conditions 7A & B are in line with the directive, as it requires ex-ante approval of, at least, the methodologies used to calculate connection and access tariffs to T&D and the provision of balancing services. Article 12 of the directive does not apply in the UK as distribution is covered by the Transporters licence.
3. **Natural Gas regulatory authority:** The Utilities Act 2000 established a combined energy regulatory authority, GEMA, more commonly known as Ofgem, and defined its duties for gas regulation. Ofgem is an independent body and its duty is to protect the interests of consumers in relation to gas conveyed through pipes and promote effective competition and ensure efficient and non-discriminatory functioning of the market.

5.2.2. Summary

Legislation compliant with the main directive requirements already existed in UK, because UK gas market was fully liberalised and competitive. Therefore:

- In the UK, gas undertakings have a public service obligation.
- UK legislation regarding penalties for imbalances and peaks in gas consumption is in line with the directive requirements.
- The Gas and Electricity Markets Authority (GEMA), more commonly known as Ofgem, is the natural gas regulatory authority in the UK and its functions are in accordance with the directive requirements.

5.3. Directive 2001/77/EC

5.3.1. National renewable energy targets

The UK indicative target under the article 3 of the directive is set at 10% gross electricity consumption by 2010. For the achievement of this target, the renewable energy obligation, mentioned below, came into force, which require electricity suppliers in Great Britain to supply an increasing amount of their electricity, year on year, from renewable energy sources reaching 10.4% in 2010/11 and remaining constant thereafter until 2027. Statutory instrument 2002 No 914 (The Renewables Obligation - Order 2002) sets the targets to 2010, and Statutory instrument 2004 No. 924 (The Renewables Obligation - Amendment - Order 2004) sets the targets to 2015. The renewable energy targets are also published in the Energy White Paper “Our energy future – creating a low carbon economy”, launched by the government on 24 February 2003.

5.3.2. Guarantees of Origin

The Statutory Instrument 2003 No. 2562 (Electricity Queen's Printer of Acts of Parliament) establishes that one guarantee of origin – a certificate issued by the GEMA certifying that the electricity in respect of which the certificate is issued was electricity produced from renewable energy sources – shall be issued in respect of each kilowatt hour of electricity produced from renewable energy sources. Electricity produced from renewable energy sources means either electricity produced by a plant which produces electricity derived only from renewable energy sources, or, in the case of a plant which produces electricity derived from both renewable and other energy sources, the proportion of electricity derived from renewable energy sources.

The Electricity Regulations 2005 (Modification of electricity supply licences, condition 30A) states that the licensee of electricity supply must provide information regarding a contribution of each energy source, to the total amount of electricity purchased for supply by the licensee, holding, in the case of renewable, a guarantee of origin relating to generation in the disclosure period. The licensee shall only rely on a guarantee of origin issued outside Great Britain under certain conditions which ensure the avoidance of double accounting.

5.3.3. Support Schemes for wind

1. Renewable energy obligation: under the Utilities Act 2000, each designated electricity supplier shall, before each specified day, produce to GEMA evidence showing that, either by himself or through another supplier, or between both, has supplied to customers in Great Britain during the obligation period to which the specified day relates such amount of electricity generated by using renewable sources as is specified in relation to such a supplier. Statutory Instrument 2005, No.926 also references this obligation.
2. Climate Change Levy (CCL): CCL is a tax on the use of energy in industry, commerce and the public sector, introduced by Finance Act 2000, Chapter 17, Schedule 6 and 7. Electricity generated from new renewable energy (e.g. solar and wind power) is exempted from CCL.
3. Contribution to the achievement of sustainable development: It is included in the principal objective and general duties of the Secretary of State and the Authority

4. Offshore production of energy: The Offshore Production of Energy part of the Energy Act 2004 puts in place a comprehensive legal framework for offshore RES projects – wind, wave and tidal – beyond the UK’s territorial waters. The Act establishes a Renewable Energy Zone (REZ), adjacent to the UK’s territorial waters, within which RES installations can be established. The Act enables the Crown Estate to award licences for wind farm sites in the REZ on much the same basis as it currently leases sites within territorial waters. The Act facilitates streamlining the consents process for projects within the REZ and in inshore waters. The legislation introduces a safety zone scheme and a statutory scheme for the decommissioning of offshore renewable energy installations and related electricity lines.
5. Wind power integration: The Energy Act 2004 implemented the requirement of the directive regarding the priority of the integration of renewable energy sources into the grid.

5.3.4. Report on the implementation of the directive

A Report to the European Commission on the UK's compliance with the renewable energy directive 2001/77/EC has been published in 2002 (“Report to the European Commission on the UK’s compliance with the renewable energy Directive 2001/77/EC”).

5.3.5. Grid reinforcement costs

Grid reinforcement costs are regulated by the “Modification to the National Grid Company’s Transmission Licence: Consequential changes following a possible change to its transmission charging methodology Consultation under section 11(2) of the Electricity Act 1989 in November 2003”. Under the current methodologies, NGC has two main types of charge: connection and use of system charges. Connection charges are designed to reflect the costs of connecting particular users (such as a generator) to the existing transmission system. Use of system charges vary by location and are designed to reflect the different costs of providing the transmission system at different locations. These costs vary depending on the balance of generation and demand at different points on the system. The National Grid Company’s methodology is based on a “shallow connection” approach. Under this approach any transmission system reinforcement costs that result from new connections are recovered through use of system charges and not from new people getting connected through connection charges.

5.3.6. Summary

- The national targets have been set out in the renewable energy obligation orders
- The guarantees of origin are ensured for renewable energy sources
- The renewable energy obligation promotes the use of RES (including wind) and the legislation regarding offshore installations encourages the development of offshore wind projects. In addition, the sustainability criterion is introduced by law.
- National administrative procedures are not a barrier for wind energy
- There is no report on the national situation of wind
- The directive was implemented into UK law and a report was submitted to the EU.
- The article 7 of the directive regarding the priority of the integration of renewable energy sources into the grid is implemented with the Energy Act 2004.
- The transmission system reinforcement costs that result from new connections are recovered through use of system charges and not from new people getting connected through connection charges.

5.4. Directive 2004/8/EC

The directive is not yet officially translated into the UK legislation. However, there is some relevant legislation in the UK for the promotion of Combined Heat and Power. The UK legislation regarding implementation of the EU directive is presented in this chapter.

5.4.1. National targets

The Sustainable Energy Act 2003, chapter 30, sets the cogeneration targets. The cogeneration targets in the UK are also mentioned in the Energy White Paper published in 2003.

5.4.2. Guarantees of origin

Guarantees of origin are regulated by the Statutory Instrument 2005 “The Electricity (Fuel Mix Disclosure) Regulations 2005”, in section “Modification of electricity supply licences”, condition 30A, as described in 5.3.2. Guarantees of Origin, means a certificate issued by the Authority (GEMA) or issued by another competent body and recognised by the Authority. The guarantee of origin may be a requirement only in case of a renewable energy source. The licensee of electricity supply shall provide information regarding a contribution of each energy source, to the total amount of electricity purchased for supply by the licensee, holding in case of coal, natural gas, nuclear or other, a generator declaration relating to that period indicating the particular energy source.

5.4.3. Support schemes for CHP

1. Enhanced Capital Allowances for Energy-Saving Investments: According to Capital Allowances Act 2001, a business can claim 100% first-year allowances if it incurs qualifying expenditure on designated energy-saving plant and machinery. Qualifying expenditure is capital expenditure incurred on new energy-saving plant or machinery for business purposes. The scheme originally included eight technology classes, including Combined Heat and Power. The scheme was expanded in 2002, 2003 and 2004 to include further technologies. There are currently sixteen qualifying technologies. The most recent list was published on 14 July 2005 and came into effect on 22 September 2005. This list did not include any further technologies but did update the qualification criteria of some of the pre-existing technology categories to reflect technological advancements and market changes. The lists are given statutory force by the Capital Allowances (Energy-saving Plant and Machinery) (Amendment) Order 2004, SI.2004 No.2093. Combined Heat and Power equipment can be used to recycle what would otherwise be waste heat to provide hot water and/or generate electricity and, therefore, qualifies as energy-saving plant and machinery if it is certified as “Good Quality CHP” under the Quality Assurance for Combined Heat and Power (CHPQA), and has been granted a “certificate of energy efficiency”. The CHPQA administrators are responsible for assessing whether CHP is “good quality” and issuing the certificates of energy efficiency. The Energy Technology Criteria List lists the plant and machinery making up a CHP installation that can qualify for 100% first-year allowances. The expenditure that qualifies for first-year allowances under the scheme is restricted if the scheme fails to meet the Threshold Quality Index Criterion for Combined Heat and Power. The certificate of energy efficiency specifies the amount of the restriction, based as a percentage of the costs of the equipment.

2. The Climate Change Levy (See section 5.3.3. Support Schemes for wind): Ofgem issues CHP Levy Exemption Certificates (LECs) to stations which hold a valid Secretary of State Combined Heat and Power Exemption Certificate (SoS Certificate) and a CHPQA Certificate, and submit a monthly electricity production figure. Cogeneration stations that only supply their electricity directly to consumers, or consume it themselves, are no longer required to provide monthly output data to Ofgem. Cogeneration stations fuelled by eligible renewable energy sources may be accredited as being capable of generating RES electricity and, thus, be entitled to two types of Certificates – Renewables LECs and CHP LECs. The CHP exemption from the CCL came into force with the Finance Act 2002.

5.4.3. National administrative procedures

The Utilities Act in 2000 introduced the New Electricity Trading Agreement (NETA) and the Energy Act 2004 the British Electricity Trading and Transmission Arrangement (BETTA). The grid code has been introduced under BETTA, and the Balancing and Settlement Code (BSC) arrangements are a component of BETTA which specify the systems and methods of sale, purchase and transmission of wholesale electricity.

The change from the pool system to (NETA)/(BETTA) system, involved the introduction of a physical notification procedure. This means that from the day-ahead stage, generators, suppliers and large customers are required to give notification to the NGC of their intended physical positions for the relevant half-hourly trading periods ahead. The notification procedure requires a constant administrative workload. This requires extra staff resources which is a heavy burden for a plant consisting of a few megawatts. Plants under 50 MW do not have to make physical notification returns, but if they do not, then they have to sell their power to another party.

5.4.4. Report on the national Combined Heat and Power situation

There is no special report published on the cogeneration situation in the UK. The report that describes the cogeneration situation in the UK sets the framework for cogeneration development and contains references to the EU directive 2004/8/EC is “The Government’s Strategy for Combined Heat and Power to 2010”. In addition, the Energy White Paper “Our energy future – creating a low carbon economy”, launched by the government on 24 February 2003, includes the governments targets regarding the promotion of Combined Heat and Power.

5.4.5. Summary

The directive 2004/8/EC has not yet been officially translated into the UK legislation, but some of the requirements are implemented through relevant legislation regarding cogeneration.

- The guarantee of origin is not ensured for CHP although it is for renewable energy.
- The support schemes for cogeneration are the LECs and the Enhanced Capital Allowances.
- Under the BETTA system, cogeneration units, in order to guarantee getting 100% money from exported electricity, have to undertake an administrative burden which is uneconomic for units less than 50 MW.
- There are reports which describe the cogeneration situation in the UK and set the framework for cogeneration and to include the Government’s targets regarding the promotion of cogeneration.

5.5. Directive 2003/87/EC

The 2003 Greenhouse Gas Emissions Trading Scheme (ETS) Regulations came into force on the 31st of December of 2003 and transposed the EU Emissions Trading Directive 2003/87/EC into UK law (Statutory Instrument 2003 No. 3311). Accordingly, the Regulations transposed the mandatory requirements in the EU Directive.

The Greenhouse Gas Emissions Trading Scheme Regulations 2005 (Statutory Instrument 2005 No. 925) entered into force on the 21st of April of 2005. The 2005 Emissions Trading Scheme Regulations revoked and replaced the Greenhouse Gas Emissions Trading Scheme Regulations 2003 and the Greenhouse Gas Emissions Trading Scheme (Amendment) Regulations 2004.

Amendments to the 2003 Emissions Trading Scheme Regulations were required to enable the implementation of various further policy decisions that had already been made public as part of the preparation of the National Allocation Plan (NAP) following previous work and consultation with respect to the UK implementation of the EU Emissions Trading Scheme and to take account of further EU implementing legislation.

Amendments were also necessary to enable Regulators to recover costs incurred when exercising their functions under the Scheme.

Draft amending Regulations to give effect to these policy decisions were consulted on in late 2004 and these amendments have subsequently been incorporated into the 2005 Emissions Trading Scheme Regulations.

For ease of reference, a single consolidated 2005 version of the Regulations has been created (rather than retaining the 2003 Emissions Trading Scheme Regulations and introducing separate amending Regulations). However, the key articles of the EU directive related with the DESIRE project, which are implemented in the 2003 Emissions Trading Scheme regulations, remain the same in the 2005 Emissions Trading Scheme regulations.

The Emissions Trading Scheme Regulations 2003 also imposed a duty on the Secretary of State and the Devolved Administrations to develop a National Allocation Plan. In May 2005, the UK approved the National Allocation Plan. These regulations came into force in June 2005.

The National Allocation Plan sets out the total quantity of allowances that it intends to allocate for the period in question. The National Allocation Plan also lists each installation covered by the EU Emissions Trading Scheme and how UK proposes to allocate allowances to those installations (Article 9 of the directive).

The Government is currently considering its approach to the development of the EU Emissions Trading Scheme Phase II (NAP). The second phase of the Scheme covers the Kyoto commitment period 2008 to 2012. The Phase II of the National Allocation Plan is due to be submitted to the European Commission in June 2006.

The 2003 Emissions Trading Scheme regulations which implement the articles of the 2003/87/EC related with the DESIRE project are analysed in the following section.

5.5.1. 2003 Emissions Trading Scheme Regulations

1. PART 2 – Greenhouse gas emissions permits:
 - a) Regulation 7 – Requirement for greenhouse gas emissions permit to carry out Schedule 1 activities: No person shall operate an installation resulting in specified emissions after the 1st of January of 2005, except under and to the extent authorised by a greenhouse gas emissions permit. Only installations that have obtained permits prior to the submission of the National Allocation Plan in the 31st of March of 2004 to the European Commission (Article 3 of the directive) will be given an allocation of allowances in that plan. The directive requires any installations that do not hold permits by that time to be treated as ‘new entrants’. No final decision has been taken on how the UK Government will treat new entrants under the EU Emissions Trading Scheme. Since any installation which has not obtained a permit will not be given an allocation in the National Allocation Plan and will need to be treated as a new entrant, it is intended to issue permits to all existing installations affected by the EU Emissions Trading Scheme before the 31st of March of 2004.
 - b) Regulation 8 – Applications for greenhouse gas emissions permits: This regulation describes the process of applying for a greenhouse gas emissions permit, implementing Article 5 of the directive. The application shall be accompanied by a fee (regulation 8(1)). The permit is, in effect, a licence to operate and will contain conditions on the operation of the installation as required by Article 6 of the directive, such as the monitoring and reporting requirements for that installation and an obligation to surrender a number of allowances each year equal to its annual emissions. The conditions which regulators shall impose are set out in regulation 10.
 - c) Regulation 11 (1) – Excluded installations: Where the European Commission has provided for the temporary exclusion of an installation under Article 27(2) of the directive, the operator of the installation may apply to the responsible authority for a certificate stating that the installation is an excluded installation.
2. PART 3 – Allowances:
 - a) Regulation 18 – National Allocation Plans:
 - i. (1) In respect of each period-phase (the three year period beginning on the 1st of January of 2005 and the three year period beginning on the 1st of January of 2008), the Secretary of State shall develop a plan in accordance with Articles 9(1) and 10 and Annex III of the directive (a “National Allocation Plan”). In the approved 2005-2007 National Allocation Plan, it is mentioned that the UK plans to allocate 93.7% of the total quantity to existing installations, which will be issued for free in three equal instalments. The remaining 6.3% will form a new entrant reserve of 46.8m allowances, which will be made available to new installations and certain existing installations. If there are any allowances remaining in the new entrant reserve in Phase I, these will be auctioned.
 - ii. (4) The Secretary of State shall publish in England the national allocation plan developed for the first phase by the 31st of March of 2004; and the national allocation plans developed for the second and subsequent phases, at least 18 months before the beginning of the relevant phase.
 - b) Regulation 19 – Allocation and issue of allowances:
 - i. (2) Based upon the National Allocation Plan for the relevant phase as accepted by the European Commission under Article 9 of the directive; and taking due account of comments from the public in accordance with the provisions of the National Allocation Plan, the Secretary of State shall decide upon the total quantity of allowances to be allocated for that phase and the allocation of allowances to each installation. The way of allocation is also specified.

- ii. (8) Where the European Commission has provided for additional allowances to be allocated in respect of an installation, or installations of any description, under Article 29(1) of the directive, the Secretary of State may issue such additional allowances as have been authorised by the European Commission to the holder of the greenhouse gas emissions permit in respect of that installation or of each installation falling within that description.
 - c) Regulation 20 (1) – Registry: The Secretary of State shall establish and maintain a registry in accordance with the requirements of Article 19 of the directive.
 - d) Regulation 21 – Pooling:
 - i. (1) One or more operators of installations to which this regulation applies may make a joint application to the appropriate authority to form a pool for the first phase (the three-year period beginning on the 1st of January of 2005) or second phase (the five-year period beginning on 1st of January of 2008), or both. This regulation applies to installations which carry out activities which fall within the description in Schedule 1; but do not fall within any description in Annex I of Directive 96/61/EC concerning integrated pollution prevention and control.
 - ii. (3) The operators' application to form a pool for either the first or the second phase, shall be made at least 6 months before the start of the phase in which the operators wish to form a pool, shall (d) nominate a person to act as pool administrator and shall contain a declaration from that person that he is willing to act as pool administrator.
 - iii. (12)b The pool administrator shall surrender allowances equal to the annual reportable emissions from all the installations within the pool for which he is acting as pool administrator.
3. PART 7 – Offences and Civil Penalties:
- a) Regulation 33 – Civil penalties excess emissions⁶: This regulation implements Article 16 of the directive, which concerns excess emissions penalties. Any operator who fails to surrender allowances equal to the annual reportable emissions from the installation within four months of the end of the scheme year during which those emissions arose shall be liable to a penalty. The amount of the penalty shall be the excess emissions of the installation multiplied by the excess emissions penalty. This penalty is the sterling equivalent of the number of Euro mentioned in the directive (Art 16(1) and Art 16(4)), converted by reference to the rate of conversion published in the C series of the Official Journal of the European Communities in September of the scheme year preceding that in which the liability for the penalty arose. Thus, “excess emissions penalty” means:
 - i. in respect of excess emissions which relate to reportable emissions which were released between January 1, 2005 and the December 31, 2007, 40 Euro; and
 - ii. in respect of excess emissions which relate to reportable emissions which were released on or after the 1st of January of 2008, 100 Euro.

5.5.2. Summary

The 2003/87/EC Directive has been implemented in the UK law, through the 2003 Emissions Trading Scheme Regulations. After amending Regulations have been introduced, a single consolidated 2005 version of the Regulations has been created. In May 2005, the UK approved the National Allocation Plan. The Phase II is due to be submitted to the European Commission in June 2006. According to the UK legislation:

⁶ “Excess emissions” means, in respect of an installation, the amount in tonnes of carbon dioxide equivalent by which the annual reportable emissions from the installation exceeded the number of allowances surrendered for that installation

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- No person shall operate an installation resulting in specified emissions after the 1st of January of 2005, except under and to the extent authorised by a greenhouse gas emissions permit.
 - The temporary exclusion of an installation is in accordance with the European Commission's provision for the temporary exclusion.
 - The Secretary of State shall decide upon the total quantity of allowances to be allocated for that phase and the allocation of allowances to each installation, and the way of allocation, according to the directive.
 - According to the 2005-2007 National Allocation Plan, the UK will allocate 93.7% of the total quantity to existing installations, which will be issued for free in three equal instalments. The remaining 6.3% will form a new entrant reserve.
 - The Secretary of State shall establish and maintain a registry in accordance with the requirements of Article 19 of the directive.
 - One or more operators of installations to which this regulation applies may make a joint application to the appropriate authority to form a pool for the first or second phase, or both.
 - Any operator who fails to surrender allowances equal to the annual reportable emissions from the installation within four months of the end of the scheme year during which those emissions arose shall be liable to the excess emissions penalty as specified by the directive (Art 16(1) and Art 16(4)).

6. GERMANY

6.1. Directives 2003/54/EC; 2003/55/EC

The implementation of these guidelines from Directives 2003/54 and 2003/55 by the Federal Government of Germany (“Bundesregierung”) took place delayed. Therefore, an effective competition of the energy suppliers in Germany was prevented over a long time due to the lack of an effective adjustment of the fee for using the network.

Now, both directives are officially translated into the German statute “Zweites Gesetz zur Neuregelung des Energiewirtschaftsrechts – Gesetz über die Elektrizitäts- und Gasversorgung (Energiewirtschaftsgesetz – EnWG)”. The amendment of the previous EnWG was directly based on both directives. The new statute came into force in July 2005.

Apart from the realization of the EC directive, it is stated that the purpose of this law is to guarantee a preferably safe, low-priced, consumer-friendly, efficient and environmentally-friendly power supply. Hereby, the adjustment of the grids should guarantee an effective and straight competition concerning the power supply. The substantial reorganizations affect, in conformity with the mentioned goals, the obligation for the decartelization of grid operation, the adjustment of grid access and grid fees, as well as the set-up of a regulation agency.

Further regulations of special importance, regarding environmental and consumer concerns, relate to the standardisation of the tasks and responsibilities of network owners and operators, the authorization of an special regulation for the feed-in of biogas in the gas supply grid, the obligation for current marking, as well as the liberalisation of measurement and counting activities.

During the set-up of the government draft, together with the Federal Ministry dealing with consumer protection (“Bundesverbraucherschutzministerium“), the Federal Ministry of Environment (“Bundesumweltministerium”) took care of considering environmental aspects – in particular regarding renewable energies – and aspects of consumer protection to the law beyond the European legal defaults.

Based on the EnWG (2005), some pieces of regulation were enacted by the Federal Government of Germany in July 2005, dealing with the access to- and the payment for the accesses to gas and electricity supply grids. Most important pieces of regulation are listed below:

- Verordnung über die Entgelte für den Zugang zu Gasversorgungsnetzen (Gasnetzentgeltverordnung – GasNEV)
- Verordnung über den Zugang zu Gasversorgungsnetzen (Gasnetzzugangsverordnung – GasNZV)
- Verordnung über die Entgelte für den Zugang zu Elektrizitätsversorgungsnetzen (Stromnetzentgeltverordnung – StromNEV)
- Verordnung über den Zugang zu Elektrizitätsversorgungsnetzen (Stromnetzzugangsverordnung – StromNZV)

Based on these regulations, there are several documents about terms and conditions from energy utilities based on the gas (AVB Gas) or electricity supply (AVBELtV) to their customers.

6.2. Directive 2001/77/EC

The directive led to a modification of the previously valid renewable energy law “Erneuerbare-Energien-Gesetz” (EEG), which ranked among the central elements of the energy-political measures of the Federal Government. The German Bundestag passed this law on the 29th of March of 2000 and it entered into force on the 1st of April of 2000. With the EEG, the feed-in and payment system based on the “Stromeinspeisungsgesetz” introduced in 1991 was adapted to the conditions of the liberalised energy market, reaching a substantial improvement.

In spite of the success of the EEG, the experience report, dated 2002, showed the need for modifications. Also, further development of renewable energy sources still required support to reach a competitive position, in order to meet medium- and long-term goals of the Federal Government in the foreseeable future. Different investigations, performed on behalf of the Federal Ministry for environment, nature protection and reactor safety, determined possibilities for improvements and developed recommended actions, on which the law is based. Furthermore, the results of research and development projects, investigations and realisations of federations, enterprises, different social groups and individuals had been considered.

Besides, the directive, as well as other international obligations of the Federal Republic of Germany, set up the need for concrete modifications. Main modifications resulting from the Directive 2001/77/EC relate to the term “renewable energy sources”, since the directive defines it more comprehensively than the EEG. In addition, any restriction of power output had to be dropped out and the exclusivity principle (“Ausschliesslichkeitsprinzip”) partly broken. The regulation of the certificates of origin is also based on the directive.

In order to be able to distinguish between the obligations of the directive and the regulation related to payments, the previous regulation of § 3 was divided into § 4 and 5. The obligation of connection of plants for energy production using RES to the grid and the acceptance and transmission, including the distribution, of the energy they produce is regulated in § 4, while § 5 establishes the obligation of payment for the energy. § 4 covers RES in terms of the guideline, but the payment obligation is in line with the exclusivity principle as it was before.

6.3. Directive 2004/8/EC

The main topics of this directive were implemented into national legislation in 2002 by the existing law for the preservation, modernisation and expansion of small CHP with less than 2 MW electrical power (Kraft-Wärme-Kopplungsgesetz KWK-Gesetz 2002). The law regulated the duty of connection, transfer and payment for electricity of CHP-systems. The law did not fix the tariff as the old law (KWK-Vorschaltgesetz) or the renewable Energy law (EEG): they give a bonus depending on the size, age, type and the differentiation between new or upgraded plant. The second part for the payment for CHP plants is the negotiated price with the purchaser.

For the additional promotion of CHP and to avoid the shut-down of plants, the costs for the avoided power network use will be paid to the CHP-operator. The price for the avoided power network costs is regulated, since July 15, 2005, by the regulation concerning Use of System charges (“Stromnetzentgeltverordnung StromNEV”). Payments include a negotiated price with the TSO or DSO, the payment for the avoided network costs and the bonus of the CHP law.

The development of CHP is disappointing, which reflects that the law and the regulations are not successful enough. Nevertheless, the German association of cogeneration (Bundesverband Kraftwärmekopplung BKWK) sees a big potential for cogeneration at the existing conditions.

6.4. Directive 2003/87/EC

The law for the trade of greenhouse gases emissions “Gesetz zur Umsetzung der Richtlinie 2003/87/EG über ein System für den Handel mit Treibhausgasemissionszertifikaten in der Gemeinschaft (TEHG)” entered into force on 15 July 2004 and implements the EC directive into the German legislation.

The EU directive prescribes the creation of national allocation plans, which include a description of the assigned total quantity at CO₂-emission allowances, as well as concrete rules and quantities for the allocation. The German allocation plan was decided within the prescribed period, on 31 March 2004, by the Federal Cabinet and submitted to the European Union Commission for notification. It forms the basis for the emission trade in Germany. The National Allocation Plan 2005-2007 consists of two components:

- The macro plan determines, how much CO₂ can the power production sector emit, which is known as the "emissions cap". Additionally, the macro plan contains the maximum total quantity of CO₂ emissions for the remaining sectors (transportation, services, other industries and households) and the emission quantity for the other greenhouse gases, documented by the Kyoto protocol, such as methane or nitrous oxide. For the first allocation period (2005 to 2007), a total number of allocations are assigned to existing plants which must participate in the emission trade (annually 495 million tonnes of CO₂). Besides, an annual reserve of 3 million tonnes is available for new installations.
- The micro plan regulates the concrete allocation of emission allowances on the individual plants. The amount of emissions to be reduced by each power plant, which is assigned according to special rules, is represented as a fulfilment factor. The fulfilment factor is determined for the first dispatching period at 0.9709.

Substantial contents of the national allocation plan embodied the German Bundestag in the “Zuteilungsgesetz 2007 (ZuG 2007)”, which entered into force on the 31st of August of 2004. The main basic rules for the allocation are:

- for existing plants on the basis of historical emissions;
- for existing plants on the basis of announced emissions: no fulfilment factor for 12 years starting from the year of start-up. Allocating decision takes place with effect for the past;
- for new plants as replacements: for 14 years authorizations without application of a fulfilment factor
- for additional new installations: it includes cogeneration plants regarding the expected amount of producible power

The special basic rules for the allocation are:

- Consideration of early emission reduction, i.e. of modernization measures, which took place after the 1st of June of 1994, with a progressive rate from 7 to 15 % emission reduction, which must be proven accordingly.
- Extra share for cogeneration plants

Important concretions to the allocation law were made by the Federal Government in the “Zuteilungsverordnung 2007 (ZuV 2007)”, which, together with the “Emissionshandelskostenverordnung (EHKostV 2007)”, entered into force on the 1st of September of 2004.

7. POLAND

7.1. Directive 2003/54/EC and 2003/55/EC

An amendment to the “Energy Law” came into force the 3rd of May of 2005. The main reason for amendments was the implementation of Directives 2003/54/EC and 2003/55/EC into national regulation and the modification of the Act 1228/2003. In the new version of the Energy Law, there are regulations connected to:

- company activity separation (generation, transmission and distribution of fuels and energy),
- qualification and extension of the tasks of the Transmission System Operator and Distribution System Operators,
- possibility to pass tenders for new capacity by Energy Regulator Office,
- public service obligations,
- direct lines, and
- principles and time schedules for reports to the European Commission.

The Polish Energy Law, established in 1997, stated that the owner of the electric grid is forced to connect new users which want to access to the electric grid. For the connection to the electrical grid at voltages between 1 kV and 110 kV, excluding the connection of new sources, 25% connection costs are paid by the consumer and 75% by the grid owner. For new power plants, connection costs must be paid by the producer. For renewable energy sources or cogeneration with an average efficiency above 70% and a plant capacity under 5 MW, 50% the connection costs are paid by the producer and 50% by the grid owner. Under any other conditions, all costs for the connection to the electric grid are paid by the producer.

There are long-term contracts in Poland (see [6]), which are not against the provisions of the Directive 2003/54/EC, but which are not in line with the spirit of the Directive. Some years ago, Poland has a high inflation rate and the currency exchange rate was very fluctuating, so, through these long-term contracts, the required return on the investment on new power plants or on major upgrades was guaranteed. These contracts hinder competition and, besides, do not offer incentives to invest in flexible generation, as they pay the same price for every hour of the day.

7.2. Directive 2001/77/EC

The first regulation promoting renewable energy sources came into force in 1999. This act was established by the Ministry of Economy, dated on the 2nd of February of 1999, regarding the obligation of purchasing electricity produced by unconventional sources. It was a detailed description of the regulations from the “Energy Law”. There are two more regulations from the 15th of December of 2000 and the 30th of May of 2003, established by the Ministry of Economy and they force to purchase 7% of renewable energy. In December 2004 and a year later, the Ministry of Economy established two new decrees that obligate to purchase a 9% of the electricity from renewable sources. The act from the 9th of December of 2004, regarding detailed obligation of purchasing electricity and heat produced from renewable energy sources, implemented the Directive 2001/77/EC in Polish legislation. Nowadays, the act from the 19th of December of 2005 is in force. Its main amendments to the one from 2004 are shown in Table 8:

Table 8. Percent of compulsory purchase of electricity from renewable energy sources

Year	Acts	
	09.12.2004	19.12.2005
2005	3.1 %	3.1 %
2006	3.6 %	3.6 %
2007	4.3 %	4.8 %
2008	5.4 %	6.0 %
2009	7.0 %	7.5 %
2010	9.0 %	9.0 %
2011	9.0 %	9.0 %
2012	9.0 %	9.0 %
2013	9.0 %	9.0 %
2014	9.0 %	9.0 %

The foregoing regulations include electricity delivered from:

- hydro power,
- wind power,
- biomass and biogas,
- photovoltaic cells and
- geothermal sources (heat).

Requirements connected to guarantees of origin for electricity are described in this act. This act should promote electricity production from renewable energy sources. The important idea of electricity promotion was not a preferential treatment and an incentive system, but the obligation on electric companies to purchase electricity produced by renewable energy sources. Realisation of this duty generates additional costs and an aversion to fulfil the obligation of purchasing electricity. On the other hand, the legislator provides fines for companies that do not fulfil this obligation.

This activity of promoting electricity produced from renewable energy sources has not been proved effective. In the years 2001-2004, this obligation of electricity purchase was not fulfilled in the required quantity. The Act from the 9th of December of 2004 extended the obligation to buy a 9% to the years 2010-2014.

The following table summarizes the evolution of the percentages of compulsory purchase of electricity produced from renewable energies in Poland, depending on the decree which was in force:

Table 9. Percentages of compulsory purchase of electricity from renewable energy sources

Decree Date	Percent of compulsory purchase of electricity from renewable	Validity
02.02.1999	-	cancelled
15.12.2000	7.5 %	cancelled
30.05.2003	7.5 %	cancelled
09.12.2004	9 %	cancelled
19.12.2005	9 %	valid

7.3. Directive 2004/8/EC

The Directive 2004/8/EC is expected to be fully implemented into the Polish national regulation in 2006. In fact, the draft is already made, so the final Act will be released at any moment. At present, few national acts are linked to the directive and the ones in place are related to it at a limited range. In the act from the 29th of December of 2004 (No. 256 clause 2657), established by the Ministry of Economy, regarding detailed obligation of purchasing electricity produced in cogeneration, detailed conditions of obligatory purchasing electricity were presented. The main requirement is that the value of efficiency should not be below 70%.

At the moment, there is an act under preparation with procedures for ensuring guarantees of electricity origin.

At the same time, some clauses from the Energy Law are connected with the directive with respect to the support schemes: Distribution System Operators and the Transmission System Operator must ensure priority of access to the grid for transmission of electricity produced in cogeneration by ensuring receipt of electricity produced in cogeneration.

The price for the electricity generated according to the act was regulated by the Chairmen of Energy Regulator Office until the end of 2004. From the 1st of January of 2005, this obligation was cancelled. The price for electricity from cogeneration is now established after negotiations between the producer and distributors. It has resulted in a decrease in the price of the electricity produced in cogeneration. For this reason, some high-efficiency cogeneration installations with gas turbines were switched off.

The main act which describes the situation of cogeneration in Poland is “Strategy of Poland balanced development to 2025 year” (“Strategia zrównoważonego rozwoju Polski do 2025 roku”). The situation of Polish cogeneration is described in the appendix “Strategy of development of CHP and heat engineering in part concerned heat and cogeneration produce and renewable energy sources” (“Strategia rozwoju elektroenergetyki i ciepłownictwa w części dotyczącej wytwarzania skojarzonego, ciepłownictwa oraz odnawialnych źródeł energii”).

7.4. Directive 2003/87/EC

According to the directive 2003/87/EC, a scheme for greenhouse gas emission allowances trading within the Community should be working from the 1st of January of 2005.

In Poland, the initiation basis for a system of greenhouse gas emission allowances trading is the act from the 22nd of December of 2004 (No 281.clause 2784) (in force since the 1st of January of 2005), about the trading of allowances on emissions of greenhouse gas and other substances to the air. According to this act, some instructions must be prepared, relating to:

- National Project of CO₂ Emission Rights Allocation for 2005–2007,
- National Plan for emissions reduction,
- administrative procedure for getting permission for participating in the emission trading system,
- emissions monitoring and reporting requirements.

At this moment, these acts are not prepared yet.

8. ESTONIA

8.1. Directive 2003/54/EC

The principles and provisions of the Directive 2003/54/EC are reflected in the Estonian Electricity Market Act:

1. Clause 60 settles the principles of the construction of network and provision of network services. It is established that:
 - (1) A network or a line may be constructed and/or network services may be provided in the service area indicated in the activity licence of a distribution network operator. The transmission network is constructed and network services are provided through this network by the transmission network operator". It is not contrary to this section if:
 - 1) an electrical installation which belongs to another distribution network operator is located in or crosses the service area indicated in the activity licence of a distribution network operator and network services are provided to the distribution network operator through the electrical installation;
 - 2) an electrical installation which belongs to another distribution network operator is located in or crosses the service area indicated in the activity licence of a distribution network operator, and network services are not provided to the customers located in the area through the electrical installation;
 - 3) another distribution network operator reconstructs an electrical installation belonging to the other operator in the service area indicated in the activity licence of a distribution network operator and network services are not provided to customers in the area through the electrical installation.
2. Clause 61 settles the terms of direct line and line crossing the state border and connection of new market participants. It states that:
 - (1) An eligible customer, a producer or a seller has the right to construct a direct line and use it for supplying electricity to itself or to an eligible customer or to an undertaking belonging to the same group as the producer or seller only if:
 - 1) the network operator has refused to connect the electrical installation of the eligible customer, producer or seller to the network or to provide other network services thereto on grounds other than those set out in clause 65 (3) 1) or 2) of this Act and if the eligible customer, producer or seller, in the event of turning to the Energy Market Inspectorate in accordance with Clause 99 of this Act, has not been offered a solution which would ensure the requested electricity supply;
 - 2) the network operator in whose service area the direct line is to be constructed grants its written consent to the construction and use of the direct line.
 - (2) Additional electrical installations of new market participants may be connected to a direct line and a direct line may be connected to the network only if the owner of the direct line transfers the direct line to the network operator in whose service area it is located and assigns the direct line to the network operator for use. If a direct line is acquired in accordance with subsection (2) of this section, the network operator shall connect the direct line to its network subject to the provisions of legislation.
 - (3) An alternating current line crossing the state border with a voltage exceeding 35 kV may be constructed and used only by a network operator holding an activity licence for the activity specified in clause 22 of this Act.

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3. The term of service area is handled in the Clause 62 of the Electricity Market Act:
 - (1) The service area of a distribution network operator is the area which is prescribed by the decision to issue an activity licence to the operator and determined by the state border and/or geographical coordinates.
 - (2) The service area of the transmission network operator is the territory of Estonia.
 - (3) Each grid operator has one service area consisting of one or more delimited areas.
 - (4) The service areas of distribution network operators shall not overlap.

 4. Clause 63 settles the procedure of changing the service area:
 - (1) Distribution network operators may mutually agree to change their service areas such that the entire territory covered by the service areas of such distribution network operators before the change would also be covered by their service areas after the change.
 - (2) Distribution network operators shall notify the Energy Market Inspectorate of any change to the service areas as specified in subsection (1) of this section and such notice shall include their mutual agreement on the changes to the service areas. The notice shall contain information that enables the distribution network operators and the new borders of their service areas to be identified in accordance with Clause 62 (1) of this Act.
 - (3) The distribution network operators shall also give notice of any changes to service areas to customers affected by the changes.
 - (4) Within thirty days as of receiving the notice specified in subsection (2) of this section, the Energy Market Inspectorate shall concurrently make the corresponding changes to the information concerning the service areas indicated in the decisions to issue activity licences to the distribution network operators.
 - (5) A change to a service area shall enter into force when the Energy Market Inspectorate has concurrently made the corresponding changes to the information concerning the service areas indicated in the decisions to issue activity licences to the distribution network operators and the customers affected by the changes have been notified of the changes.
 - (6) Distribution network operators shall notify customers of any changes to service areas in at least one daily national newspaper.

 5. Section 6 of the Electricity Market Act settles that electricity undertakings are producers, network operators, line owners and sellers. An electricity undertaking could be a public limited company or a private limited company which is entered in the commercial register or is being founded. All electricity undertakings have the obligation to maintain the general economic interest, provide public service obligations (security of supply, regularity, quality and price of supplies and environmental protection, including energy efficiency and climate protection).

 6. Subsection 4 of the subdivision 39 of the Electricity Market Act settles the duties of the Transmission System Operators, which in Estonia are in line with the ones established in the directive: “The system operator shall be independent in its activities. The system operator shall observe the principle of equal treatment with regard to all market participants with the aim of achieving the best economic results for the whole system within the framework of existing technical and security of supply requirements and other requirements arising from the applicable legislation”.

 7. Regarding the Distribution System Operators, their duties are specified in Subsection 2 of Clause 65 of the Electricity Market Act and are also in line with the directive: “A network operator shall observe the principle of equal treatment of market participants when providing network services”.
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8.2. Directive 2003/55/EC

Problems related to the Directive 2003/55/EC are regulated in Estonia by the Natural Gas Act adopted on the 29th of January of 2003, and amended in 2004 and 2005.

The scope of this Act is determined as:

- (1) This Act regulates the activities related to the import, distribution and sale of natural gas by way of gas networks and connection to networks.
- (2) The activities specified shall be co-ordinated and conform to the principles of objectivity, equal treatment and transparency in order to ensure a secure, reliable and effective gas supply at a justified price in compliance with environmental requirements and the needs of the final customer. Gas undertakings and final customers are the market participants.

A gas undertaking is an undertaking which operates in at least one of the areas of activity consisting of the import, transmission, distribution or sale of gas and which is responsible for attending to commercial, technical or maintenance issues related to such activities.

An eligible customer is a final customer or a gas undertaking through whose consumption installation more than 200 000 m³ of gas is consumed per calendar year. An eligible customer has the right to purchase gas from any balance provider within the technical limits of the network.

A non-eligible customer is a final customer through whose consumption installation up to 200 000 m³ (inclusive) of gas is consumed per calendar year.

8.2.1 Natural gas regulatory authority

According to the Natural Gas Act, the person responsible for the management of the system regulatory authority should not be a member of the management of another gas undertaking or, other way, responsible for the activities of other gas undertakings at the same time. The system regulator elaborates and implements measures for equal treatment of other gas undertakings.

8.2.2 Public service obligations

Subdivision 2 of the Natural Gas Act states that the network undertaker has the responsibility for the operation and reliability of the network possessed by him. Subdivision 3 settles that the network undertaker is obliged to develop the network in the way providing network connection to all customer installations in its service area. The network undertaker is responsible for providing security of supply. The access to the gas network is free for all customers and producers.

Biogas and other gases from renewable energy sources do not have special preferences in this Natural Gas Act. The regulations of third party access are to be updated in 2006 and the question of compensation of possible penalties for cogeneration plants should be handled in these regulations.

8.3. Directive 2001/77/EC

The Directive 2001/77/EC has been implemented in the national legislation, being a basis for the amendments of the Electricity Market Act. In this Act, problems and questions related to the use of renewable energy resources in Estonia are considered.

Estonian Electricity Market Act was passed the 11th of February of 2003, entered into force the 1st of July of 2003 and it was amended last by the Act Clauses 57, 58 and 59, settling problems related to the use of renewable energy sources.

The most important provisions of the Act clauses in relation with DESIRE project are summarised below.

1. Clause 57 “Renewable energy sources” establishes the list of renewable energy sources as follows:
 - (1) For the purposes of this Act, renewable energy sources are water, wind, solar, wave, tidal and geothermal energy sources, landfill gas, sewage treatment plant gas, biogases and biomass.
 - (2) For the purposes of this Act, biomass is the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.
2. Clause 58 “Generation from renewable energy sources” handles the regulations of generating and selling to the network and guaranteeing the origin of electricity generated from renewable energy sources. In particular, the text of the Act establishes the following provisions:
 - (1) Producers shall not subsidise generation from renewable energy sources at the expense of generation from other sources and vice versa. At the request of the Energy Market Inspectorate, a producer shall submit information on the allocation of revenue and expenses separately for generation from renewable energy sources and for generation from other sources.
 - (2) The amount of electricity sold in full or in part by way of exercising the purchase obligation specified in Clause 59 of this Act shall be determined using remote reading devices.
 - (3) By the third day of each calendar month, a producer shall submit information to the network operator specified in Clause 59 of this Act on the amount of electricity that it generated from renewable energy sources during the preceding month per generating installation and the amount of electricity so produced which was sold exercising the purchase obligation specified in Clause 59 of this Act.
 - (4) The Energy Market Inspectorate and the network operator specified in Clause 59 of this Act have the right to demand that a producer submit information necessary for verification of the information submitted pursuant to subsection (3) of this Clause.
 - (5) If the amount of electricity actually generated from renewable energy sources by means of a generating installation conforming to the requirements of the activity licence is less than the amount of electricity sold by the producer exercising the purchase obligation provided for in Clause 59 of this Act during at least two consecutive calendar months, the Energy Market Inspectorate has the right to revoke the activity licence or to amend its conditions such that electricity can no longer be sold by exercising the purchase obligation set out in Clause 59 of this Act.

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- (6) At the request of a producer, a guarantee of origin certifying that the producer generates electricity from renewable energy sources shall be issued to the producer by the competent authority.
- (6¹) A system operator shall develop and publish on its website the conditions and procedure for the issue of a guarantee of origin.
- (6²) A system operator shall create a database for the administration of guarantees of origin and shall publish information regarding the issued guarantees of origin on its webpage.
- (6³) A guarantee of origin shall set out the following:
- 1) the name, address of the seat and details of the producer;
 - 2) the name of the energy source used for the generation of electricity and the place of generation;
 - 3) the amount of electricity generated in megawatt-hours, the period of generation, the time for generation in hours and the date of issue of the guarantee of origin;
 - 4) the amount of electricity in megawatt-hours, which is sold during the period specified in clause 3) of this subsection exercising the purchase obligation provided for in Clause 59 of this Act;
 - 5) the capacity of generating installations if electricity is generated in a hydroelectric station;
 - 6) other information established by the system operator.
- (7) If electricity is generated from a combination of renewable energy sources and other sources, the producer may only sell such amounts of electricity as are generated from renewable energy sources by exercising the purchase obligation set out in Clause 59 of this Act. A producer shall maintain records on the use of energy sources and the amounts of electricity generated thereafter under the conditions and pursuant to the procedure established by the Minister of Economic Affairs and Communications. The conditions of and procedure for determining the proportion of amounts of electricity generated from renewable energy sources shall be established by the Minister of Economic Affairs and Communications.
3. Clause 59 “Purchase obligation” settles the obligations of network operators to purchase the electricity generated from the renewable sources and metering requirements for the producer of electricity from renewable sources. This Clause of the Act settles the following:
- (1) A network operator shall purchase electricity generated from renewable energy sources from a producer connected to the network of the network operator in an amount which does not exceed the network losses of the network operator during the trading period, provided that all the following conditions are met concurrently:
- 1) in accordance with the activity licence, the producer may sell electricity generated from a renewable energy source by exercising the purchase obligation specified in this section;
 - 2) the electricity has been generated from a renewable energy source by means of a generating installation conforming to the requirements of this Act and the activity licence of the producer;
 - 3) the producer performs the obligations provided for in Chapter 4 and 58 of this Act;
 - 4) it is possible to meter the electricity generated with a remote reading device.
- (2) A producer who wishes to sell electricity generated from a renewable energy source by exercising the purchase obligation specified in this section shall submit a corresponding application to the network operator. In the application, information shall be set out concerning the generating installations by means of which the electricity to be sold to the network operator is generated, along with any other details necessary for the sale of electricity.

(3) The network operator shall purchase the electricity specified in subsection (1) of this section at a price which is 0.81 Estonian kroon per kilowatt-hour (5.17 Eurocent/kWh).

(4) A distribution network operator has the right to demand compensation from the transmission network operator for the difference between the price prescribed in subsection (3) of this section and paid for electricity purchased for performance of the obligation specified in subsection (1) of this section and the price specified in subsection 75 (5) of this Act. The procedure for calculating the price difference, the information required for the payment of compensation and the time of and specific procedure for the payment of compensation shall be provided for in the grid code.

(5) Any expenses incurred in performing the obligation provided for in subsection (1) of this section or in paying compensation specified in subsection (4) of this section shall be deemed to be justified expenses of the transmission network operator and shall be added to the expenses which are the basis for the setting and approval of the charge collectable for the transmission of electricity.

National targets have been published in Chapter 2, titled “Strategic Objectives and Principles of Fuel and Energy Sector” of the Legal Act “Long-term Public Fuel and Energy Sector Development Plan until 2015”. It settles, as a strategic objective: “ensure that by 2010 renewable electricity forms 5.1 per cent of the gross consumption”.

The guarantees of origin are ensured through the Clause 58 of the Electricity Market act, which establishes that:

- The origin of the electricity produced can be verified by the Energy Market Inspectorate and the network operator, who can demand the producer the necessary information.
- Producers generating electricity from renewable energy sources can request the issue of a guarantee of origin.
- The conditions and procedure for the issue of guarantees of origin shall be developed by the system operator and shall be published on its website.

For wind power, there are support schemes. Clause 59 “Purchase obligations” of the Electricity Market Act settles, that “The network operator shall purchase the electricity specified in subsection (1) of this section (of that Act) at a price which is 0.81 EEK/kWh”. This equals 5.17 Eurocent/kWh and is twice as much as the price paid for electricity in the large oil-shale fired power plants.

With regard to the national situation of wind, it is a quite often publicly discussed matter in press. A number of conferences and seminars on the wind power application during last 15 years have been hold. Estonian Wind Power Association should publish its annual report in 2006.

National administrative procedures are, in some extent, a barrier, as much as it is concerned with land ownership and wind farm admission to the network. However, these barriers are not essentially disturbing the development of wind power application in Estonia.

This sort of power has the same priority as any other electricity generated from renewable energy sources but the electricity generated from renewable sources has always priority over electricity generated from non-renewable sources.

With regard to grid reinforcement costs, their division is established for every new admitting wind generator independently, depending on local network conditions, in the admission contract.

8.4. Directive 2004/8/EC

The energy-saving potential of cogeneration is underused in Estonia nowadays, as well as in the EU. So far, the problems of public heat supply and district heating are regulated in Estonia by the District Heating Act, adopted the 11th of February of 2003, which entered into force the 1st of July of 2003, and which was amended by the Act of the 10th of August of 2004. However, this Act does not handle the problem of cogeneration, except § 3 pointing to the Energy conservation programme: “In order to increase energy efficiency, preserve the quality of the environment and use natural resources rationally, the Government of the Republic shall approve an energy conservation programme and an operational programme for the conservation programme”. Therefore it has to be admitted, that the Directive 2004/8/EC is not reflected in Estonian legislation yet, although the work in this direction is in progress now.

The Ministry of Economic Affairs and Communication ordered a research project to the Tallinn University of Technology. “Reference values of efficient co-generation and potential of the efficient co-generation in Estonia”. In this study the adjustment of the Directive 2004/8/EC in Estonia was considered. In particular the objectives of this research work were:

- to elaborate fundamental reference values for assessment of cogeneration plants as “efficient cogeneration”;
- to make a survey of existing cogeneration plants in Estonia;
- to assess the potential of the suitable efficient heat load and accessibility of the energy sources;
- to investigate circumstances interfering build-up of efficient cogeneration.

The report on this research was submitted to the Ministry of Economic Affairs and Communication in December 2005 and, in 2006, based on this report, a working group will prepare a bill for the adjustment of the above mentioned directive in Estonia.

In Estonia, guarantees of origin for cogeneration will be ensured. For every cogeneration unit, the reference efficiency values for the separate production of heat and electricity will be determined. Based on this reference values, actually produced amounts of electricity and heat, as well as the primary energy used and the primary energy savings due to the use of cogeneration will be calculated. If savings are at least 10%, the electricity produced in this process will be considered as produced in “efficient cogeneration process”.

Regarding the support schemes, no direct price support schemes are applied in Estonian cogeneration pricing now. However, it is planned to introduce some kind of pricing supporting scheme in the cogeneration bill to be prepared in 2006. Details of possible schemes are not decided yet.

As the report of the above mentioned study has shown, there are some barriers for the development of cogeneration in Estonia. First of all, the legal limitations in selling produced electricity to the network. The network accession procedure and conditions are complicated and the principles of operating in the network and problems related to the balance responsibility are not sufficiently elaborated. All those problems should be considered in the new cogeneration bill.

Finally, the report on the national situation of cogeneration in Estonia is not published yet. However, the material to be published is almost ready now and some articles on it should be published in local press before discussions of the cogeneration bill in Parliament of Republic. A paper on this subject is also prepared to be published in the local technical journal.

8.5. Directive 2003/87/EC

Problems related to the Directive 2003/87/EC are handled in the Estonian Ambient Air Protection Act, passed the 5th of May of 2004 and entered into force the 30th of September of 2004.

Division 2 of Chapter 7 of the Ambient Air Protection Act is titled “Greenhouse Gas Emission Allowance Trading “. In this division the following is established:

1. List of areas of activity and procedure for greenhouse gas emission allowance trading (§ 120):
 - (1) The list of areas of activities for operators and the procedure for greenhouse gas emission allowance trading shall be established by a regulation of the Government of the Republic.
 - (2) The Ministry of the Environment shall issue an operator a licence for greenhouse gas emission allowance trading (hereinafter trading licence).
 - (3) The requirements for an application for trading licence, requirements for trading licences, the procedure for the issue of trading licences and for the submission of reports on trading of greenhouse gas emission allowances, and the procedure for supervision over and certification of trading of greenhouse gas emission allowances shall be established by a Decree of the Minister of the Environment.
2. Content of application for trading licence and content of trading licence (§ 121):
 - (1) An application for the trading licence shall, at least, contain the following data:
 - 1) the name, commercial registry code and address of the operator;
 - 2) a description of the technology used in the area of activity, and of the raw materials and additives the use of which is likely to cause the formation of greenhouse gases;
 - 3) emission levels of different greenhouse gases, set out separately for each source of pollution;
 - 4) planned methodology for pollution monitoring, including the methods and frequency of monitoring;
 - 5) permitted limit values of emissions of greenhouse gases for the trading of which the licence is applied.
 - (2) The trading licence shall contain the information set forth in subsection 819 of this section and in addition, the following data:
 - 1) the name of the issuer of the licence;
 - 2) the limit values of emissions of greenhouse gases which may be traded;
 - 3) requirement of monitoring;
 - 4) requirement of reporting;
 - 5) time of validity of the licence.
3. Reporting (§ 122): An operator is required to submit an annual report to the Ministry of the Environment concerning the trading of allowances of greenhouse gas emissions by which the operator declares that the emissions of greenhouse gases used for trading by the operator during the year conform to the limit values of emissions, expressed as carbon dioxide equivalent, permitted by the trading licence.
4. Greenhouse gas emission allowance trading (§ 150): Handlers who obtain a trading licence pursuant to subsection 120 (2) of this Act may commence trading greenhouse gas emission allowances after the 1st of January of 2005.

Based on this Act, a Decree of the Estonian Government No. 8 “The List of Areas of Activity and Procedure for Greenhouse Gas Emission Allowance Trading” was issued on the 18th of January of 2005. The Decree settles the procedure of trading in the licensed emission units and lists up the activities involving emission of greenhouse gases. Operators of those activities should have trading license. The article 6 of this Decree allows open an account and trade with acquired allowances to every person. According to the section 2 of the article, the person has to submit an application to the Ministry of Environment before opening of the account.

Another Decree of the Estonian Government “Requirements for the Application for Greenhouse Gas Emission Allowance Trading and for the Content of Application” was issued on the 23rd of February of 2005 and entered into force also on the basis of the Ambient Air Act. This Decree also details the procedures of reporting Inspection of the verification of the amounts of trading allowances is executed by the Environmental Inspectorate.

The level of penalties for exceeding the emission quota is stated in the Ambient Air Protection Act and reads as follows (§ 145): Failure to comply with requirements of environmental protection measures set by Environmental Inspectorate and Health Protection Inspectorate:

(1) In the event of failure to comply with the requirements of environmental protection measures set by the Environmental Inspectorate or the Health Protection Inspectorate, the administrative authority shall impose a penalty payment pursuant to the procedure provided for in the Substitutive Enforcement and Penalty Payment Act (RT I 2001, 50, 283; 94, 580).

(2) The upper limit of penalty payment specified in subsection (1) of this section is 10 000 kroons.

9. CONCLUSIONS

In principle, by looking at the EU-Directives that have been analysed in this document, legal framework should be very favourable for the implementation of the balancing techniques proposed in DESIRE. The aim of the directives is twofold: protecting the environment and increasing the benefits derived from well-functioning European energy markets. To that end, environmentally-friendly technologies are fostered, energy efficiency is promoted, polluting activities are penalised and competition in markets is boosted.

All these objectives should create a good environment for the use of renewable energy sources (such as wind), CHP and small-scale generation made by new entrants, but also for balancing techniques, as the increase of the share of intermittent renewable energy sources (such as wind) will increase the need for (local) balancing. The problem is that, so far, the degree of implementation of the directives is quite disappointing in the EU in general, but also in the countries analysed. Most of the provisions of the directives are implemented into national regulation, but there is not a clear commitment with the spirit of the directives.

Therefore, the directives are being implemented, but, most of the times, the implementation only reaches the extent to what it is written in the directives; there is not a further step to implement more ambitious measures, which would be in line with the spirit of the directives.

As a result, there is no legal barrier for the implementation of the balancing projects in the countries analysed, but some market barriers remain, which have not been removed, as described in D3.2 [6]. In order to overcome those market barriers, further steps in implementing the objectives of the directives must be taken.

The following sections summarise the barriers that have been identified in the different countries participating in the project.

9.1. Spain

There are three main barriers in Spain:

1. Minimum capacity to enter the market: power plants with a capacity below 1 MW cannot enter the market, even if they are aggregated. Therefore, small power plants can only sell their electricity output to the Distribution System Operator at a fixed price. As a result, balancing projects can only be carried out by medium-sized or big cogeneration plants or wind farms, which reduces the potential users of these balancing techniques. Besides, it prevents small units to benefit from the enhanced operation that can be obtained through the use of these balancing techniques.
2. High market concentration: the biggest two utilities control a high share of the market, which makes it more difficult for new entrants to be able to gain market share. Besides, Spanish utilities receive the CTCs (Costs for Transition to Competition), to pay for the assets that became stranded as a result of market opening. This may result in a price distortion, which may make it more difficult for new entrants to enter the Spanish market. Nevertheless, the government has taken steps to increase the competition in the Spanish market and to reduce price distortion and market power abuse, by releasing the Royal Decree-Law 3/2006.

3. Lack of flexible CHP: Present and past promotion schemes for cogeneration do not offer different prices at different hours, except under the option of going to the market. Most Spanish cogeneration capacity was installed in the nineties, where promotion schemes for distributed generation were in their early stage, and the electricity market was not in operation yet. At that time, the government wanted to promote cogeneration, so generous support schemes were used and, as a result, most industrial cogeneration potential was exploited. These promotion schemes offered a fixed price at any hour of the day. Together with the market opening, the support for cogeneration was reduced and, in general, support schemes for DG tend towards a more market-oriented approach. However, old cogeneration plants can stay in the previous fixed-price scheme, and present conditions are not good for installing new cogeneration capacity, so there is no incentive for flexible CHP operation. A good incentive might be the establishment of a scheme similar to the Danish “triple tariff”, to exploit the existing potential in commercial cogeneration, and promote the use of flexible CHP, but this should be further analysed, and possible recommendations proposed in WP6.

9.2. Denmark

Three barriers appear in Denmark:

1. Minimum capacity to enter the market: In Denmark, minimum capacity is even higher than in Spain (10 MW), but there is no minimum capacity requirement for aggregation. Therefore, plants with capacities below 10 MW can and must be aggregated to enter the market, so they will not obtain all the benefits from entering the market, as the aggregator will ask for a payment.
2. A very obvious requirement for allowing small cogeneration plants, with thermal stores to participate in the integration of fluctuating productions, is that these cogeneration plants in fact exist. The potential for these cogeneration plants is practically fully developed in Denmark, but the reason for this development must be found in the triple tariff paid for decentralised electricity production. Most of the Danish cogeneration plants are now instead selling electricity at the spot market (chosen to be the primary Danish market in DESIRE, see WP4). The present prices at the spot market would not justify building the existing cogeneration plants, with thermal stores. Therefore, it becomes interesting to see what will happen when the present Combined Heat and Power capacity is run-down. Will the district heating companies build new cogeneration capacity or will they build e.g. biomass boilers? This question is complicated to answer, because Danish legislation does certainly not automatically allow cogeneration plants to leave Combined Heat and Power production. In the demonstrations (simulations) in DESIRE to be held in Denmark, we are focusing on delivering Regulating Power directly to the System Operator. It is expected that the DESIRE-project will show considerable possibilities for cogeneration plants earning money in the Regulating Power market. This will help cogeneration plants investing in new Combined Heat and Power capacity and thermal stores. Also, the development in spot prices and gas prices will determine future investments in the cogeneration plants.
3. Insufficient promotion schemes for wind: Present promotion schemes for wind power are insufficient to pay for the costs of the new investment, so, in the last two years, installation of new wind power capacity has been almost negligible. Wind farms over 10 years have to negotiate their electricity in the market, which increases the uncertainty about future profitability. The incentive of selling in the market, but with a bonus on top of market price and with a stable framework (similar to the one in Spain) should be assessed in WP6.

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4. Insufficient incitement structures with regard to foster heat pumps, hot water storage systems and other techniques needed for a flexible operation of a cogeneration system.
 5. The implementation of CO₂ quotas may result in existing large coal-fired power plants closing down, which would result in large power companies losing profit. This might result in a resistance from these companies towards the expansion of the renewable energy and cogeneration capacity.

9.3. UK

Two main barriers affect the development of balancing techniques in the UK:

1. Lack of flexible Combined Heat and Power: As in the case of Spain, most British cogeneration plants are linked to industrial processes, and the regulatory framework does not give the appropriate incentives to install heat accumulators, so as to transform current installations into flexible.
2. Difficulties for small producers to enter the market: Small producers need a consolidator to enter the market, so they will not obtain all the benefits of entering the market. In other words, the consolidator will ask for a management and trading fee to the generator, which will depend on the ability of the generator to negotiate. The smaller the generator, the lesser the ability to negotiate, so smallest producers will get the worst prices from consolidators.

9.4. Germany

In Germany, two main barriers should be removed to implement DESIRE:

1. Minimum capacity to enter the market: In Germany, the minimum capacity to enter the spot market is 100 kW and 30 MW for the reserves market. Therefore, although requirements for entering the spot market are less restrictive than in Spain or in Denmark, these small plants will be in trouble when trying to enter the reserves market, unless they use an aggregator (the same problem as in the UK).
2. Insufficient schemes to promote market integration of wind power: the feed-in tariff system does not promote the integration of renewable energy sources in the market, as it offers a fixed payment for every hour. This system is good enough to promote the installation of wind power, but it does not facilitate the use of the balancing techniques proposed in this project. The reason is that, as long as the present support scheme is in force, wind producers will stay at the fixed price system, as the income offered is higher than in the market. Balancing of cogeneration plants and wind farms can only happen in a market environment, so there is no room for our project, as long as wind power is not integrated in the market.

9.5. Poland

There are four main barriers in Poland, but a big opportunity can be envisaged for next years:

1. The Polish market is in its early stage yet, so it is quite difficult to new entrant to access the market.

2. Existing long-term contracts can also hinder competition, which would make it more difficult the establishment of new entrants in the Polish market. These long-term contracts are not against the provisions of the Directive, but are not in line with its spirit, since, as long as the contracts are effective, there will not be a real competition in the market.
3. Wind capacity is not significant in this market yet, so balancing problems are not an issue. The development of the market must be monitored, in order to determine future possibilities of the balancing techniques proposed in DESIRE.
4. Lack of flexible CHP: Although district heating is widespread in Poland, the technology used does not offer a fast response (see WP2). Therefore, it is difficult for these plants to be able to balance wind power, or to react to price signals in real-time.

Regarding the opportunity, Poland is facing big demand increases, which is making the capacity reserve decrease from year to year. Therefore, new electric capacity will have to be installed in the next years. At the moment, there is a big debate on what solution should be best used. Amongst these solutions, a strong increase in wind power capacity, and a broad development of small-scale flexible CHP are two of the leading options (together with the installation of new nuclear power plants). If wind power and small-scale flexible CHP are developed, only market competition barriers will exist for the use of the balancing techniques proposed. This should also be monitored and any further proposals will be presented in WP6.

9.6. Estonia

The main barrier in Estonia is the lack of a competitive electricity market. There is no spot price for electricity and all transactions are made through long-time bilateral contracts. Estonia has good wind resources and potential for small-scale flexible CHP, as Poland does, but its electricity market must be much more developed than it is now to be able to use these balancing techniques. As a result, the evolution in Estonia must be monitored, both from a market perspective and from the perspective of the installed capacity of wind power and CHP, in order to propose recommendations in WP6.

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