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**DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

**on the promotion of cogeneration based on a useful heat demand in the internal  
energy market**

## EXPLANATORY MEMORANDUM

### 1. INTRODUCTION

This proposal, building on the dual objectives of contributing both to security of energy supply and to climate change policies, arises from the need for reinforced efforts to promote high-efficiency cogeneration<sup>1</sup> in the internal energy market.

In its Green Paper on security of energy supply<sup>2</sup>, the Commission highlighted the following points:

- the European Union is extremely dependent on its external energy supplies, with imports currently accounting for 50% of requirements. This figure is projected to rise to 70% by 2030 if current trends persist.
- at present greenhouse gas emissions in the European Union are on the rise making it difficult to respond to the challenge of climate change and to meet the commitments under the Kyoto Protocol.
- the European Union has relatively limited scope to influence energy supply conditions. Efforts will have to focus on orienting the demand for energy in a way that respects the EU's Kyoto commitments and is mindful of security of supply.

These observations provide strong arguments for developing new Community policies and measures aimed at curbing energy demand and reducing greenhouse gas emissions. Even the level of greenhouse gas emissions in EU in 1999 was the same or just below the level of 1990, it is still a great challenge to meet the Kyoto target. Due to the efficient use of the fuel, the simultaneous production of heat and power can offer energy savings and avoided CO<sub>2</sub> emissions compared with separate production of heat and power. This need for policy action on co-generation at EU level was reinforced in the Commissions Communication on the implementation of the European Climate Change Programme<sup>3</sup>.

Cogeneration is a highly efficient technique to provide electricity and heat for the European energy market. Promotion of cogeneration is a part of the strategy for efficient use of energy and supplementary to the strategy of increased use of renewables. However cogeneration is not a target in itself but can be an efficient tool to generate energy savings and to pursue the targets of reductions in CO<sub>2</sub> emissions by replacing separate production of heat and electricity.

As cogeneration is linking together the production of heat and electricity, it is important to ensure that the produced electricity and heat meet real demands. The electricity can be

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<sup>1</sup> The terms cogeneration and combined heat and power (CHP) have the same meaning  
<sup>2</sup> COM(2000) 769 "Towards a European Strategy for Energy Supply".  
<sup>3</sup> COM(2001) 580 final

transmitted into a market place and sold where it is needed, the heat however cannot easily be transported or stored, and therefore the cogeneration process must be based in time and place of a real need for heat. The real need for useful heat is the cornerstone of efficient cogeneration, because if the produced heat is not meeting a real demand the advantages of cogeneration disappear. Furthermore the promotion of cogeneration should not lead to encouragement of increased heat consumption.

In the Commission's cogeneration strategy<sup>4</sup> from 1997, an overall indicative Community target of doubling the share of electricity production from cogeneration in total EU electricity production from 9% in 1994 to 18% by 2010 was set. Nevertheless, despite the promising potential for cogeneration, no significant increase in the share of cogeneration has been seen in the past years. An overall indicative target of 18% provides a benchmark against which to measure progress. Once a stable framework has been established, based on common definitions and methodologies, and the potential of Member States assessed, the Commission could examine the possibility of indicative objectives for each Member State.

A stable framework based on common definitions and methodologies provides the best possible foundation for promotion of cogeneration based on an economically justified heat demand also taking into account the deep complexity of the matter.

## **2. OBJECTIVE AND SCOPE OF THE PROPOSED DIRECTIVE**

The overriding objective of this proposal is to create a framework, which can support and facilitate the installation and proper functioning of electrical cogeneration plants where a useful heat demand exists or is foreseen. This overall objective translates into two specific aims:

- In the short term, a cogeneration Directive should serve as an instrument to consolidate existing and, where feasible, promote new high-efficiency cogeneration installations in the internal energy market. In order to create a level playing field, regulatory certainty and in some cases financial support are vital for cogeneration. This applies to the current transitional phase of the liberalisation process, where the internal energy market is not fully completed and where internalisation of external costs is not reflected in energy prices.
- In the medium to long term, a cogeneration Directive should serve as a means to create the necessary framework that will ensure that high-efficiency cogeneration, alongside other environmentally friendly supply options, constitutes a key element when decisions on investment in new production capacity are made. By creating a supportive framework, such cogeneration can contribute to the establishment of more diversified and energy efficient supply systems in the Community.

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<sup>4</sup> COM(97) 514 final "A Community strategy to promote combined heat and power (CHP) and to dismantle barriers to its development".

In order to exploit the potential for cogeneration regulatory certainty and appropriate mechanisms that address the lack of internalisation of external costs are needed. The proposed Directive lays down a framework, which addresses these issues through a set of common principles for the promotion of cogeneration.

The practical application of the framework will to a large extent be the responsibility of the individual Member States, given the heterogeneous nature of the cogeneration sector across Europe and the need to take account of national and climatic circumstances. However the Commission could have an important role in facilitating that EU objectives on cogeneration are met.

It is necessary to stress the importance of the different climatic and industrial conditions in Member States for development of cogeneration providing different possibilities for using the produced heat, and taking into account the thermodynamic efficiency of the engines and systems employed. The consequences in practice of the thermodynamic efficiency for electricity production could be illustrated for a steam turbine. If the heat output is needed at a temperature of 200°C it is not possible to produce as much electricity in the turbine as if the heat output is needed at 60°C.

These considerations lead to creation of three classes of cogeneration reflecting thermodynamic considerations as well as a division of cogeneration into market segments facing different barriers to overcome:

- **Industrial applications** of heat, that usually require steam or hot water above 140° C;
- **Central Heating applications** that require warm water between 40°C and 140°C;
- **Agricultural applications:** for example in order to heat greenhouses, the temperature of the warm water could be below 40° C, but in the case of heating pools in aquaculture the need is only of 15-25°C. Justification of useful heat at this temperature level should be considered very careful in order not to increase fuel consumption.

The climatic differences among Member States is one of the most important factors explaining the huge differences of penetration of cogeneration and underline the relevance of the principle of subsidiarity. This proposal for Directive does not aim to ensure the same level of penetration of cogeneration in all Member States. The aim is to promote cogeneration wherever an economically justified potential is identified in order to save energy and reduce CO<sub>2</sub>-emission.

The proposed Directive builds in some respects on the recently adopted Directive 2001/77/EC on the promotion of electricity from renewable energy sources<sup>5</sup>. Renewables and cogeneration are in some areas faced with similar problems such as for example lack of internalisation of external costs, the need to provide regulatory certainty concerning grid issues and administrative procedures. However it has to be stressed that there are important differences between cogeneration and renewable energy. Cogeneration is not a source of energy, it is a highly efficient process to transform energy from one source usually fossil fuel but also renewables into electricity and heat.

The proposal covers the following main elements:

- Guarantee of origin of electricity produced from cogeneration following the “disclosure” requirements on Directives concerning common rules for the internal markets in electricity and natural gas;
- provisions obliging Member States to analyse national potentials for high-efficiency cogeneration and barriers to their realisation;
- provisions for evaluating the experiences gained with the application and coexistence of different support mechanisms for cogeneration used by Member States;
- provisions laying down the principles for the interaction between cogeneration producers and the electricity grid; furthermore to facilitate grid access for cogeneration units using renewable energy sources and microcogeneration plants below 1 MW
- provisions requiring Member States to evaluate current administrative procedures with a view to reducing the administrative barriers to the development of cogeneration.

### **3. CURRENT STATUS FOR COGENERATION IN THE EU**

#### **3.1 Problems to face**

In an open market to be developed in Europe, cogeneration has to face several problems in order to take advantage of the useful heat demands and propose the construction of new plants or carry on exploiting the existing ones. These are mainly the following:

1. High prices for fuels, usually due to the fact that they are smaller fuel users than the large traditional electricity producers.

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<sup>5</sup> 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. OJ L 283 of 27.10.2001, p. 33.

2. Problems linked to the access to the electricity market, especially if they are small producers.
3. The installation costs per kilowatt are usually higher than in a large electrical plant
4. The amount of operating hours of the installation will usually be lower than for larger baseload plants because it will be linked to the real use of heat in the associated installations. In an industrial cogeneration plant, the working hours will be the hours that the industrial associated process works, for example not at night hours or on weekends. In the case of cogeneration for central heating some facilities may have to stop during summer time.

### **3.2 Reasons for political support**

The following reasons justify a political support for high efficient cogeneration:

1. High efficiency means less fuel consumption and less CO<sub>2</sub> and other emissions and thereby a contribution to sustainable development.
2. Avoided losses on the electrical grid because these installations usually are close to the consumption point on the electrical grid. .
3. Increasing competition among electricity producers because cogeneration technology allows new actors to enter the market of electricity generation.
4. Opportunity to create new enterprises, notably SME's, joint ventures and other collaboration formulas among the stakeholders (industrial, electrical, technological and so on).
5. Facilitation of the link between the population and the territory, mainly in less favorised, isolated or ultraperipheral areas.

### **3.3 Statistic overview**

According to the latest cogeneration statistics from Eurostat<sup>6</sup> presented in Table 1, the overall share of cogeneration electricity in total EU electricity production was 11%<sup>7</sup> in 1998 compared with 9% in 1994.

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<sup>6</sup> "Combined Heat and Power production (CHP) in the EU – Summary of statistics 1994-1998", Eurostat 2001.

<sup>7</sup> There is discussion among experts as to whether the Eurostat cogeneration statistics overestimate the real share of cogeneration because electricity produced in non-cogeneration mode in some cases might be counted as cogeneration electricity. The actual cogeneration share at Community level may therefore be somewhat lower than 11%. Eurostat has for the next collection of cogeneration statistics adopted a new methodology designed to better identify real cogeneration production.

In the cogeneration statistics it is important to avoid counting in electricity, that has not been produced in cogeneration mode. For this purpose the cogeneration statistics are developing and new methodologies have to be adopted. This directive would establish a methodology, which only takes into account electricity gained from cogeneration, the residual heat of which has been used efficiently.

Taking into account the previous considerations, the available statistics show substantial differences across the EU. Denmark, Finland and the Netherlands are the countries with the highest market penetration with cogeneration accounting in some case for more than 50% of total electricity generation. In contrast, in countries like France, Greece and Ireland cogeneration only plays a marginal role with contributions around 2%. However, if the cogeneration share is related to the amount of thermal based electricity production, the market shares of cogeneration in some case change significantly. Then countries like Sweden, Austria and France report cogeneration shares of 96%, 76% and 23% respectively.

Roughly 40% of electricity from cogeneration is produced for public supply purposes, often in connection with district heating networks. The remaining 60% are generated by auto-producers, normally for industrial processes. In terms of installed capacity, the electrical capacity of cogeneration in the EU increased with 14% between 1994 and 1998 from 63 GW to 72 GW. In absolute terms, Germany was in 1998 with 22 GW cogeneration electrical capacity by far the country with most cogeneration capacity in the EU followed by Italy (9,5 GW), Netherlands (8,5 GW), Denmark (7 GW) and Finland (5 GW).

The development in the use of fuels for cogeneration shows a trend towards cleaner fuels thus enhancing the environmental benefits of cogeneration. Natural gas is the most used fuel in cogeneration production with a share of 45% in 1998 compared with 30% in 1994. In contrast, the use of hard coal and lignite has declined from 30% to 20% between 1994-1998. Renewables accounted for 13% in 1998. Within the Eurostat definition of renewables for cogeneration both biodegradable and non-biodegradable municipal solid waste have until now been included. However, in the light of the definition of waste for renewables in the Directive for the promotion of electricity from renewables, it would be coherent to establish data as well for the biodegradable part alone.

The absence of more recent figures means, however, that the above figures should be treated by some caution. Since 1998, the cogeneration sector has reported stagnating or even declining market trends in several EU countries. This lack of progress in promoting new cogeneration is to large extent results from the existence of a number of barriers, which hampers the development of cogeneration.

**Table 1 – Historical data on CHP in Member States and CHP as a percentage of thermal and total electricity generation.**

Member State	1994**			1996			1997			1998		
	CHP Electricity GWh	Portion of thermal electricity %	Portion of total electricity %	CHP Electricity GWh	Portion of thermal electricity %	Portion of total electricity %	CHP Electricity GWh	Portion of thermal electricity %	Portion of total electricity %	CHP Electricity GWh	Portion of thermal electricity %	Portion of total electricity %
Belgium	2448	8,0	3,4	3000	9,5	3,9	3069	10,2	3,9	3410	9,6	4,1
Denmark	21874	56,2	54,5	29260	55,9	54,6	26562	62,7	59,9	25591	66,9	62,3
Germany	47752	13,5	9,0	37817	10,3	6,8	36834	10,3	6,7	41770	11,3	7,5
Greece	819	2,2	2,0	886	2,3	2,1	968	2,5	2,2	981*	2,3	2,1
Spain	8537	11,1	5,3	13390	17,5	7,7	18567	18,9	9,8	21916	22,2	11,2
France	8506	24,5	1,8	9864	22,0	1,9	10663	26,2	2,1	12660	22,7	2,5
Ireland	259	1,6	1,5	357	2,0	1,9	457	2,4	2,3	404	2,0	1,9
Italy	26477	14,7	11,4	31383	16,2	12,9	40164	20,1	16,0	44856	21,6	17,3
Luxembourg							120	37,1	9,5	320	87,7	22,5
Netherlands	31543	41,7	39,5	36410	45,1	42,7	41502	49,6	47,9	47835	55,4	52,6
Austria	11721	66,0	21,4	13539	70,3	24,7	14025	71,7	24,7	14268	76,2	24,8
Portugal	3111	15,1	9,9	2845	14,5	8,2	2949	14,1	8,6	3288	12,8	8,4
Finland	20312	59,0	30,9	22536	59,3	32,5	23051	64,0	33,3	25128	75,6	35,8
Sweden	9257	85,0	6,4	10241	70,9	7,3	9301	91,4	6,2	9544	95,5	6,0
UK	11619	5,0	3,6	15108	6,1	4,3	16762	7,0	4,9	18644	7,4	5,2
<b>EU-15</b>	<b>204235</b>	<b>17,6</b>	<b>9,0</b>	<b>226336</b>	<b>18,3</b>	<b>9,4</b>	<b>244994</b>	<b>19,8</b>	<b>10,1</b>	<b>270615</b>	<b>21,0</b>	<b>10,9</b>

\* Eurostat estimation

\*\* The German figures are for 1995.

Source: “Combined Heat and Power production (CHP) in the EU – Summary of statistics 1994-1998”, Eurostat 2001

A study on the administrative obstacles to decentralised cogeneration<sup>8</sup> has analysed the situation in France, Netherlands and the United Kingdom. The study identifies economic barriers to decentralised cogeneration such as low prices for excess electricity sold to the grid, high connection costs, high costs of grid reinforcement charged on the cogeneration developer, high costs for use of the distribution system, complex and lengthy administrative procedures, lack of recognition of the benefits to the network of embedded generation etc. Another study<sup>9</sup> has evaluated the impact of the liberalisation of the electricity market on the cogeneration and district heating and cooling sector through analyses of the economic viability of such plants. The study concludes that new efficient gas fired cogeneration technologies in principle should be competitive to new efficient condensing power plants. However, if the electricity prices do not reflect real costs (including internalisation of external costs), only large gas fired cogeneration plants are competitive. If an assumed rate on environmental benefits of 10 EUR per saved ton CO<sub>2</sub> is included in the calculation some additional medium-sized gas fired cogeneration plants would be feasible. If the price on the Nordic power market from May 2000 of 15 EUR/MWh is applied none of the cogeneration plants analysed would be feasible on purely economic criteria<sup>10</sup>.

Due to its widespread use in cogeneration production, the price of natural gas is another important parameter influencing the economic viability of cogeneration. The opening of gas markets to competition should in principle lead to lower gas prices. However, many cogeneration producers have during the past years experienced fluctuating and often high gas prices due to i.a. gas prices being linked to the oil price. Moreover, Article 18(2) of Directive 98/30/EC<sup>11</sup>, which allows Member States to restrict the access of cogeneration producers to the internal gas market, is another potential barrier for cogeneration. However, the Commission's proposal for amendment of the gas Directive<sup>12</sup> envisages that this provision would disappear. Ensuring access to the gas market for all cogeneration producers is important as gas fired cogeneration allows for the highest possible fuel efficiency thus benefiting both the environment and the Community's energy balance. From an internal market point of view it is also important to create a level playing field where cogeneration producers and other power producers enjoy the same basic rights with regard to access to the gas market across the Community.

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<sup>8</sup> "The Administrative obstacles to the development of decentralised cogeneration", Cogen Europe et.al. SAVE programme 1999.

<sup>9</sup> "Evaluation of the impact of the European electricity market on the CHP, district heating and cooling sector", Cowi Consulting Engineers and Planners et.al., SAVE programme, 2000.

<sup>10</sup> It should be noted that these calculations are based on cogeneration plants with district heating with assumed operating hours of 4.500 per year. Industrial cogeneration plants with a more constant heat demand can have up to 8.000 operating hours per year, which normally makes them economically more viable.

<sup>11</sup> Directive 98/30/EC of the European parliament and of the Council of 22 June 1998 concerning common rules for the internal market in natural gas. OJ L 204 of 21.07.1998, p. 1.

<sup>12</sup> "Proposal for a Directive of the European Parliament and of the Council amending Directives 96/92/EC and 98/30/EC concerning common rules for the internal market in electricity and natural gas", COM(2001) 125 final.

As described above, barriers to cogeneration continue to exist both in the electricity and gas markets. Many cogeneration producers have experienced increasing gas input prices combined with decreasing electricity output prices thus putting the economic viability of cogeneration under threat. Both markets are still in a transitional phase with asymmetric market openings across the EU, increased market uncertainty, more focus on short-term decisions, and lack of internalisation of external costs. Such a market environment is generally detrimental to smaller and less competitive operators such as cogeneration producers. Altogether, the current market conditions have contributed to a situation where many existing cogeneration plants have come under pressure and where incentives to upgrade existing capacity or invest in new capacity are significantly reduced.

#### **4. FOCUSED PUBLIC SUPPORT OF COGENERATION BASED ON USEFUL HEAT DEMAND IN THE EUROPEAN INTERNAL MARKET.**

The purpose of this directive, according to the subsidiarity principle, is to introduce a common and transparent framework in order to focus Member States public support for cogeneration process based on useful heat demand according to the national circumstances and energy policies, in the framework of the European competition rules. This Directive sets up common definitions of electricity from cogeneration in order to develop the same methodological background for member state support schemes. The aim of this methodology is also to ensure impacts on the internal electricity market from support schemes are transparent.

As the large cogeneration installations have easier access to more favourable financing and fuel prices direct support for production of cogenerated electricity should be concentrated to electricity produced **either** in installations with a capacity below an indicative threshold value of 50 MW (e) **or** in larger installations but then only the amount of electricity produced by the capacity below such an indicative threshold. The reason for this is not to disqualify larger installations but to avoid overcompensation of the larger installations. Larger installation would still have support for the production based on the first 50 MW, but will not receive additional support for the rest of the production. If direct support to the production of cogenerated electricity is based on a fixed amount per MWh produced, the support should not be applied to production above the indicative threshold value. Member States should use the following considerations in design of support schemes:

1. Support schemes for production of cogenerated electricity should be limited to the electricity produced in one process together with a useful heat production.
2. The economic support to the electricity production should be focused to develop the necessary economic incentive to operate efficient cogeneration plants on the basis of economically justified heat demand.
3. Direct support for production should in principle be focused on the share of cogenerated electricity produced **either** in installations with a capacity below an indicative threshold value that should be set at 50 MW(e) or lower, **or** in larger

installations but then only the amount of electricity produced by the capacity below such a threshold value.

4. The cogeneration plants should be designed and sized for the actual heat demand present or foreseen with certainty.

## **5. ELEMENTS OF THE PROPOSED DIRECTIVE**

### **5.1 Definition of cogeneration**

Cogeneration is currently defined in different ways across the Community. Some definitions are only intended to identify and measure cogeneration for statistical purposes. Other definitions are related to the eligibility of cogeneration for national support schemes. Sometimes such eligibility criteria are linked with quantifications of the benefits of cogeneration measured in terms of energy savings or CO<sub>2</sub> savings. In addition, defining cogeneration is complicated by certain cogeneration technologies that allow cogeneration units to switch between cogeneration and generation of separate electricity or heat.

For the purpose of this Directive, it is necessary to create a common basis for the definition of cogeneration. In principle, it would be desirable to lay down a single harmonised definition of cogeneration to be used across the Community for all purposes. However, the Commission is mindful that most Member States have already adopted different national definitions of cogeneration developed for various purposes and often adapted to national circumstances. To take account of these two opposite concerns, this Directive introduces a two-step approach consisting of:

- (1) a harmonised basic definition of electricity from cogeneration (Annex II to the Directive)
- (2) a methodology to define high-efficiency cogeneration (Annex III to the Directive)

The basic definition will serve as a means to eliminate the current ambiguity resulting from the different definitions of cogeneration. This will create certainty that the basic concept of cogeneration is understood and measured in the same way across the Community. The basic definition will be used for cogeneration statistics and for monitoring purposes at Community level. As a second step, the Directive provides a methodology to be used to determine the quality<sup>13</sup> - expressed in terms of energy savings - of the cogeneration production identified under the basic definition in step 1. The latter will be applied to promotional aspects, notably certification of origin, identification of national cogeneration potentials and, where appropriate, eligibility for financial support.

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<sup>13</sup> The term “quality cogeneration” is sometimes used to describe cogeneration providing a high level of energy savings or CO<sub>2</sub> savings. For the purpose of this Directive the term “high-efficiency cogeneration” is considered to be a more precise indicator of what is meant when referring to the benefits of cogeneration.

## 5.2 Guarantee of the origin of electricity from cogeneration

In order to fulfil the obligations on information about the primary energy sources used on the production of the electricity, as set up on the “disclosure” provisions at the amending directives 96/92/EC and 98/30/EC concerning common rules for the internal markets in electricity and gas, this Directive sets up a mechanism, which will ensure that producers and others with an interest in cogeneration can request a guarantee of the origin of electricity from cogeneration.

Under the proposal the guarantee of origin must specify the fuel source used, the use of the heat generated together with the electricity and the dates and places of production. The guarantee of origin must also specify the national reference values used to define high-efficiency cogeneration.

It is not the aim at this stage of development of cogeneration and statistic knowledge to establish any other connection between the Guarantee of origin of electricity from cogeneration and the system of Guarantee of origin of electricity produced from renewable energy sources, than introducing the same procedures to be established by Member States. The high efficient cogeneration plants using fossil fuels produce at least 5-10% less CO<sub>2</sub> than in the situation of separate production, while electricity from renewables produce almost no CO<sub>2</sub>. It is therefore obvious that the ‘CO<sub>2</sub> reduction value’ of 1 kWh cogenerated electricity is much smaller than the ‘CO<sub>2</sub> reduction value’ of 1 kWh renewable electricity.

It is important for reasons of transparency and for monitoring purposes that cogeneration is defined and counted in the same way across the EU. This proposal therefore introduces in Annex II a harmonised methodology to be used for the basic definition of cogeneration. This methodology is largely based on a recently revised methodology used by Eurostat for collection of EU-wide cogeneration statistics<sup>14</sup>. The new Eurostat methodology essentially implies that in cogeneration units with annual overall efficiency higher or equal to 75%, the total electricity generation is considered to be cogeneration electricity. In cogeneration units with an annual overall efficiency below 75%, calculations must be made in order to subtract electricity that is not produced in a cogeneration process.

To address the concerns expressed by some experts that a 75% threshold in some cases may be too low, the methodology set out in Annex II adds a separate threshold of 85% to be applied to cogeneration units, which can switch to operation in non-cogeneration mode. Such units below an overall annual efficiency of 85% will be subjected to additional calculations to identify the actual cogeneration production. With this approach, the risk of certifying non-cogeneration as cogeneration electricity is judged to be minimal.

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<sup>14</sup> This revised methodology was adopted by Member States at the last meeting of the Eurostat Working Group on Combined Heat and Power Statistics on 2 April 2001.

### 5.3 Efficiency criteria

To secure that only cogeneration that offers actual benefits compared with separate production of heat and power is promoted under this Directive, it is essential that an appropriate mechanism to determine these benefits exists. The proposal therefore provides in Annex III a methodology for determining the benefits of cogeneration.

The benefits of cogeneration can be expressed in terms of energy savings or CO<sub>2</sub> savings. In most cases, a cogeneration installation that provides energy savings will also offer CO<sub>2</sub> savings. However, the choice of fuel for cogeneration will have an impact on the amount of CO<sub>2</sub> savings. The concept of cogeneration is basically about saving energy by using the fuel input in a highly efficiency manner to generate both electricity and heat. For the purpose of this Directive energy savings are therefore considered the most suitable indicator to express the benefits of cogeneration. By using this indicator, the Directive focuses on the energy efficiency characteristics of cogeneration and it remains fuel neutral thus allowing for a diversified mix of fuels in the cogeneration sector. However, under the reporting requirements the Commission could make an assessment of the environmental benefits, including the CO<sub>2</sub> emission savings.

To determine the energy savings from cogeneration, the basic definition of cogeneration as set out in Annex II cannot stand alone because it only identifies cogeneration without quantifying the potential energy savings. It is therefore necessary to develop additional criteria to determine the energy savings from cogeneration production as defined under the basic definition provided in Annex II. To define high-efficiency cogeneration the fuel used to produce a given amount of heat and power by cogeneration must be quantified and compared with the fuel that would have been necessary to produce the same amount of heat and power via separate generation. This implies that for the comparison assumptions must be made as to what kind of separate production cogeneration displaces.

One option would be to lay down in the Directive harmonised references for separate production of heat and power that any given cogeneration production should be compared with. However, defining such references is a highly complex exercise, especially for new production where empirical data is not available and assumptions must be made about the future fuels, technologies and expected efficiencies. In addition, the differences in the energy mix across the Community also make it difficult to establish a single harmonised reference, which can be applied to all Member States. This has led the Commission to conclude that at this stage it is necessary to provide a common methodology for calculating the energy savings from cogeneration. However, it will be up to Member States to define, on the basis of the framework provided in Annex III, the exact national efficiency reference values to be used in the calculation. Member States will be asked to present a well-documented analysis of the choice of reference values, which must be published and forwarded to the Commission. The Commission will evaluate the efficiency reference values adopted by Member States and on that basis consider the scope for further harmonisation.

For the application of the efficiency criteria, the proposal distinguishes between new and existing production. Electricity from new cogeneration production should – within the

same fuel category - be compared with the best new state-of-the-art power production technology that it is assumed to displace. By comparing efficiencies within similar fuel categories, the assessment of the benefits of cogeneration remains fuel neutral and focuses entirely on the energy efficiency characteristics of cogeneration. On the heat side, new cogeneration should normally be compared with an indicative heat efficiency reference value of 90% although lower efficiency references may be used for some fuels. Altogether, **new cogeneration production should provide energy savings of at least 10% to qualify as high-efficiency cogeneration.** Small-scale cogeneration and cogeneration based on renewable energy sources may qualify with a reduced level of energy savings. Electricity from existing cogeneration should be compared with the average efficiency of the existing national fossil-based electricity production. Nuclear and renewable electricity is excluded from the mix, as they in an actual market situation are normally not displaced by cogeneration electricity. On the heat side, existing cogeneration should be compared with the average efficiency of the existing national heat generation mix. **Existing cogeneration production should provide energy savings of at least 5% to qualify as high-efficiency cogeneration.**

#### **5.4 National potentials for high-efficiency cogeneration**

Setting targets helps to quantify and subsequently monitor what the Community and individual Member States wish to achieve in the field of cogeneration. The Commission has therefore considered whether indicative national targets for the market share of cogeneration should be set for all Member States at Community level. On the other hand, the national market frameworks for cogeneration across the EU are very disparate with regard to for instance market potential for cogeneration, national energy mix, availability of fuels, industrial structure, demand for heating and/or cooling etc. This means that the conditions for promoting a specific energy efficiency technology like cogeneration in the national heat and electricity markets are very different. At this stage the establishment of indicative targets for each Member State would be technically difficult. However, the Commission could examine the possibility and need for such targets on the basis of the first reporting from Member States on the national potentials for high efficiency cogeneration. The Commission considers that initially the focus should be on stimulating effective promotional policies and measures in favour of cogeneration. The Directive will therefore initiate a compulsory procedure aimed at activating the existing national potentials for high-efficiency cogeneration.

Member States will be obliged to carry out well-documented analyses of the national potentials for cogeneration. To ensure that the analyses are carried out in a systematic and comparable manner, which will allow the Commission and the general public to monitor the implementation of the Directive, Annex IV to the Directive sets out a number of criteria and elements that must be covered in the analyses. The criteria include inter alia a requirement to consider the likely fuels for cogeneration with special emphasis on the scope for promoting renewable energy sources in the national heat markets via cogeneration and an obligation to examine aspects relating to cogeneration technologies, cost effectiveness and timeframes.

Annex IV also requires a breakdown of the cogeneration potential into at least three main categories. The categories “Industrial cogeneration”, “Heating cogeneration” and “Agricultural cogeneration” refer to the different applications of the heat output. Member States will also be obliged to make a separate analysis of national barriers to cogeneration and to report regularly on progress towards realising national potentials and measures taken to promote cogeneration. To allow monitoring and assessment of progress at regular intervals reliable cogeneration statistics are necessary. The Directive therefore introduces an obligation for Member States to submit cogeneration statistics on an annual basis to the Commission. It is envisaged that this data collection in practice will be a continuation of the current practice where Member States submit national cogeneration statistics to Eurostat.

## **5.5 Support schemes**

A variety of different national support schemes for cogeneration are currently in operation or in the process of implementation. Such schemes include inter alia direct price support (feed-in tariffs), tax exemptions or reductions, green certificates and investment aid.

While the justification for financial support of cogeneration will disappear as the external costs are fully internalised in the market, support for cogeneration will in many cases be justifiable in the short to medium term. In order to reflect this aspect public support schemes should include the phase-out principle. In order to realise the potential benefits from the installation and proper functioning of electrical cogeneration plants where a heat demand exists or is foreseen, continuation and reinforcement of support schemes in favour of cogeneration will therefore often be necessary within the limits set by the EC Treaty and in particular its Articles 87 and 88. The Community has, however, a clear interest in ensuring that support is successful in promoting high-efficient cogeneration. Under the Directive, the Commission will therefore be obliged to evaluate the application of the different support schemes for cogeneration used in Member States and to present a report on the experiences gained with the application and coexistence of different support mechanisms.

## **5.6 Grid system issues**

To function properly, the internal electricity market has to provide a level playing field for all existing and potential new producers of electricity. In this context, objective, transparent and non-discriminatory rules and procedures in relation to grid system issues can facilitate the market penetration of cogeneration. Regulatory certainty about grid system issues is of particular importance for cogeneration given that cogeneration producers in many cases are smaller and independent operators that are vulnerable to costs and conditions in this field.

Cogeneration producers are generally faced with the same difficulties as producers of electricity from renewable energy sources in relation to grid system issues. As a consequence, this proposal in many respects bases itself on the same provisions as those contained in Directive 2001/77/EC. This implies that the proposal has provisions, which

guarantee the transmission and distribution of electricity produced from cogeneration. Grid connection and grid reinforcement is another area where barriers to cogeneration in some cases exist as described in section 3. To address such barriers, the proposal contains provisions requiring transmission system operators and distribution system operators to set up and publish standard rules relating to grid connection and reinforcement. Such rules must be based on objective, transparent and non-discriminatory criteria.

Due to the link between electricity production and the heat demand, cogeneration producers sometimes need to purchase additional electricity to back-up or top-up the producer's own generation. Excess electricity must also sometimes be sold, when production exceeds consumption. Special markets for balancing and regulating power are gradually emerging. However, not all cogeneration producers are currently eligible customers with access to such markets. Until the electricity market is fully opened, it is therefore necessary with specific provisions to ensure that the tariffs offered to cogeneration producers without market access that need to purchase electricity are set according to objective, transparent and non-discriminatory criteria. For reasons of transparency and for monitoring purposes, it is also proposed that benchmarking analyses on tariffs offered to cogeneration both for the purchase of additional electricity and for the selling of excess electricity are undertaken.

## **5.7 Administrative procedures**

It has been pointed out by organisations representing cogeneration developers that administrative procedures represent a barrier to the further development of cogeneration. Such barriers can for instance be the length of the procedure, the requirements necessary to meet, or high costs associated with the authorisation procedure.

Directive 96/92/EC provides the basic rules in this respect, notably with regard to authorisation procedures. Nevertheless, these general rules may not always be sufficient for smaller producers such as for example many independent cogeneration producers for whom administrative and planning procedures can be a serious barrier.

In many respects, harmonised rules in this area could contribute towards promoting cogeneration. On the other hand, administrative and planning procedures vary significantly across the Community reflecting very different administrative and constitutional set-ups. Taking this into consideration and with due regard to the principle of subsidiarity, this proposal does therefore not contain provisions for such harmonised rules.

Nevertheless, reinforced efforts to minimise administrative barriers are needed. It is therefore proposed that Member States or the competent bodies appointed by the Member States evaluate existing legislative frameworks with a view to reducing barriers to cogeneration, streamlining and expediting procedures and ensuring that rules are objective, transparent and non-discriminatory. Member States will be obliged to report the results of the evaluation and indicate, where appropriate, action taken to remove barriers.

## 6. JUSTIFICATION FOR ACTION AT COMMUNITY LEVEL

### 6.1 Current political context

In the Green Paper on the security of energy supply<sup>15</sup>, the Commission outlines the prospective energy situation in the EU for the coming decades. The Green Paper emphasises the need to reinforce efforts to reduce energy demand as a means to both reduce the dependence on external suppliers and to contribute to solving climate change problems. Clear rules for cogeneration, which allows plants to work properly with its fuel saving characteristics, can contribute to both policy objectives.

The Commission in its proposal for amendment of the electricity and gas directives<sup>16</sup> emphasised that a fully opened market needs an internalisation of external costs to ensure a true level playing field. According to for example the ExternE study<sup>17</sup>, CHP provokes with the same fuel at least two times less socio-environmental damages compared with conventional electricity production. As long as external costs are not fully integrated into energy prices, the Commission will promote initiatives that seek to rectify this imbalance. Such initiatives should seek to compensate the extra costs of the cogeneration producer compared to the costs involved in separate production of heat and electricity. At the present market conditions such compensation should seek to rectify the above mentioned imbalance and to avoid that the extra costs result in higher prices of the cogenerated heat and electricity compared to the separately produced. Compensation of extra costs should be adjusted in order to reflect the need for compensation for the different sizes of installations, types of technologies and fuels. Larger cogeneration plants have less need for compensation than the smaller ones.

The Commission in its Communication on the completion of the internal market<sup>18</sup> underlined that the creation of the internal market for electricity and gas in many respects has shown to have had positive environmental effects in terms of e.g. increased operating efficiency and switch to cleaner fuels. However, it was also stressed that falling energy prices might not be conducive to the development of energy efficiency and renewables. Waiting for the internal energy market to be fully completed could involve many risks because opportunities for cogeneration could be lost in the meantime. The Commission therefore announced in the above-mentioned Communication that it intends to prepare, in 2002, proposals with respect to cogeneration.

*Art.2 of the EC Treaty* calls for a sustainable development of the economy of the Community. *Art.6 of the EC Treaty* reinforced these objectives of sustainable development by integrating environment policy into other Community policies. In

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<sup>15</sup> “Towards a European strategy for the security of energy supply”, COM(2000) 769.

<sup>16</sup> “Proposal for a Directive of the European Parliament and of the Council amending Directives 96/92/EC and 98/30/EC concerning common rules for the internal market in electricity and natural gas”, COM(2001) 125 final.

<sup>17</sup> “ExternE – Externalities of Energy”, EC, DG Research, Brussels, 1999.

<sup>18</sup> “Completing the internal energy market”, COM(2001) 125 final

addition, the Commission's Communication on sustainable development<sup>19</sup> presented at the European Council in Göteborg in June 2001 identified greenhouse gas emissions as a one of the major obstacles to sustainable development. The European Council in Göteborg<sup>20</sup> adopted a strategy for sustainable development and added an environmental dimension to the Lisbon process on economic and social renewal.

To address climate change, the Commission recently adopted a Communication on implementation of the European Climate Change Programme<sup>21</sup>, in which it announced its intention to put forward a proposal for a cogeneration Directive in 2002. Moreover, a proposal for a Directive on greenhouse gas emission trading<sup>22</sup> has also recently been adopted by the Commission. When such a market is in full operation, a price on CO<sub>2</sub> emissions will in effect be disclosed whereby an important step towards internalisation of external costs will have been taken. Furthermore introduction of such a market will also be a step towards eliminating the justification of national economic support schemes for promoting cogeneration. However, as long as a well-functioning market reflecting the price of CO<sub>2</sub> emissions is not in operation, cogeneration is particular vulnerable to competition from less clean energy producers and will therefore often need specific promotion. In response to the Commission's energy efficiency action plan<sup>23</sup>, the Council identified promotion of cogeneration as one of the short-term priority actions in the follow-up on the action plan<sup>24</sup>. The European Parliament called on the Commission to submit proposals for common rules for the promotion of cogeneration<sup>25</sup>.

In the recently revised Community guidelines on state aid for environmental protection<sup>26</sup>, provisions were included, which allow under certain conditions financial support to cogeneration. In order to qualify under the guidelines, the environmental benefits of the concerned cogeneration scheme must be documented.

## **6.2 Additional impact of action at Community level**

Member States are becoming increasingly interdependent in the field of energy, notably as regards the internal energy market and the common commitment to reduce greenhouse gas emissions following the ratification of the Kyoto Protocol. Policy decisions on cogeneration in one Member State can have an impact on the energy markets in other member States. Member States are also faced with common competition rules of the Treaty, including the recently revised Community guidelines on state aid for

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<sup>19</sup> "A Sustainable Europe for a Better world: a European Union Strategy for Sustainable Development" COM(2001) 264.

<sup>20</sup> "Presidency Conclusions – Göteborg European Council 15 and 16 June 2001": SI(2001)500.

<sup>21</sup> COM(2001) 580 final.

<sup>22</sup> "Proposal for a framework Directive for greenhouse gas emissions trading within the European Community", COM(2001) 581.

<sup>23</sup> "Action Plan to improve energy efficiency in the European Community", COM(2000)247 final.

<sup>24</sup> Doc. 13407/1/00 ENER – COM (2000) 247 final.

<sup>25</sup> Resolution on the Action Plan to improve energy efficiency in the European Community, A5-0054/2001.

<sup>26</sup> "Community guidelines on State aid for environmental protection", OJ C 37, 03.02.2001 pages 3-15.

environmental protection, which also define the national room of manoeuvre in the field of cogeneration. In addition, the current lack of progress in the cogeneration market demonstrates that it is doubtful that the potential for cogeneration can be realised via initiatives at Member State level alone.

This has led the Commission to conclude that cogeneration policies at Member State level need to be complemented by legislative action at Community level. This Directive will create the necessary legislative framework whereby efforts at all levels can be concentrated on promoting high-efficiency cogeneration. The Directive will serve as a means to reduce the current market uncertainty surrounding cogeneration and provide important stimuli for cogeneration in individual Member States by establishing a coherent Community framework. Given the need to take account of the different national circumstances for cogeneration and to respect the principle of subsidiarity, it will to a large extent be left to Member States to decide how to operate within this overall Community framework for cogeneration.

Legislative action at Community level will ensure that a set of common principles for the promotion of cogeneration is developed. The definition of high-efficiency cogeneration is an example of an area where Community action is necessary to ensure a coherent methodology for promoting cogeneration so as to avoid market distortions. Moreover, common principles for high-efficiency cogeneration can also ensure that financial support for cogeneration is prioritised in such a way that support is allocated to the most efficient production.

It is also of common Community interest to work towards the creation of a level playing field within the internal energy market. Establishing an objective, non-discriminatory and transparent framework for cogeneration producers in relation to grid system issues is an important question with a clear Community dimension. Creation of a level playing field is also relevant from a competition point of view as it could contribute to ensuring a certain number of market players in the internal energy market. Community action in favour of independent, and often small-scale, power producers such as cogeneration could thereby indirectly contribute to stimulating competition in the internal electricity market.

From a security of energy supply perspective, the Community also has an interest in promoting high-efficiency cogeneration as an element in its overall strategy to reduce energy demand. Promotion of cogeneration using indigenous energy sources such as bioenergy, waste and geothermal energy is particularly important in this context.

In respect of the future Community a Directive on promotion of cogeneration provides the Candidate Countries with possibilities to improve security of supply based on the existence of large heat markets and existing support programmes.

Finally, cogeneration can due to its high fuel efficiency and reduced environmental impact contribute to Community policies on sustainable development, notably in relation to the need for increased use of clean energy and measures to reduce energy demand. In the context of climate change, the Community has a clear interest in putting forward

concrete proposals aimed at reducing the emission of greenhouse gases. A Directive on the promotion of cogeneration will therefore be one of the elements in the package of measures needed to comply with the Kyoto Protocol to the United Nations Framework Convention on Climate Change and any policy package to meet further commitments.

## **7 IMPACT OF THE PROPOSED DIRECTIVE**

### **7.1 Potential energy savings**

In its summary report on cogeneration statistics, Eurostat presents the following calculation of the estimated primary energy savings achieved by different types of cogeneration plants in the years 1994 to 1998.

**Table 3 – Energy savings calculated for different cycles in the EU, TJ.**

	1994*	1996	1997	1998
Combined cycle	139349	240175	309744	385842
Total backpressure steam turbine	329604	321296	326528	278328
Condensing steam turbine with heat recovery	83645	258982	247361	236937
Gas turbine with heat recovery	79041	91287	128305	149877
Internal combustion engine	36684	71375	103506	124823
Others	1068	4015	2585	138
<b>Total EU-15</b>	<b>669391</b>	<b>987130</b>	<b>1118029</b>	<b>1175946</b>

\* German figures are for 1995.

Source: “Combined Heat and Power production (CHP) in the EU – summary of statistics 1994-1998”, Eurostat, 2001.

According to Eurostat the absolute primary energy savings from cogeneration in 1998 amounted to 1176 PJ, or 28 Mtoe. This corresponds to 2% of total EU gross inland consumption of primary energy. The Eurostat calculation is based on an assumed average efficiency of separate electricity generation of 36%, an average efficiency of separate heat generation of 85% and an overall efficiency of CHP plants of 75% in 1998

### **7.2 Impact on security of energy supply**

Import dependency and rising import ratios may lead to concern about the risk of interruption to or difficulties in supply. However, it would be simplistic and wrong to conceive security of supply as merely a question of reducing import dependency and boosting domestic production. Security of supply calls for a wide range of policy

initiatives aimed at, inter alia, diversification of sources and technologies and improved international relations.

From an import dependency point of view, cogeneration would be beneficial, if the import of fuel to the EU were to be reduced compared with separate production of electricity and heat. However cogeneration schemes do not automatically trigger a reduction in energy imports. When it follows, the benefits from a security of supply point of view can be of varying size. If a more diversified fuel mix results from a cogeneration project than from separate production, the security of supply will be increased. Local production of electricity may also enhance security of electricity supply, since it ensures that electricity is produced in many different regions of a country where heat is needed. These regions become more self sufficient in power supply and less vulnerable to power failures. Most large industries with a steam demand are very sensitive to power failures for their industrial production and see their own electricity generation as an increased security of electricity supply.

If cogeneration takes place in a district heating system the security of heat supply is increased, considering that a large cogeneration installation always has stand-by capacity to back-up failures in individual units, something that a small heat installation can rarely afford.

The physical security of a cogeneration plant as regards sabotage and terrorist attacks also needs to be considered, especially following the 11 September 2001 attack on the USA. Cogeneration production would take place in a large number of plants, whereas electricity production in the reference case would take place in a few, large, centralised power plants, which are more likely targets for terrorists because of the larger impact of an attack. Cogeneration production would thus normally increase the physical security of the power system.

### **7.3 Cost-effectiveness of the measure**

New high-efficiency and well-designed cogeneration installations dimensioned on the basis of a relatively stable heat demand and operated for a reasonable amount of hours over the year are generally considered to be a cost-effective energy solution.

Nevertheless, determining the costs-effectiveness of this proposal must necessarily be subject to many uncertainties and assumptions. In this context, a key issue is to define the reference case with which the cost-effectiveness of cogeneration is compared. The huge differences in the calculation of CO<sub>2</sub> savings from cogeneration referred to in section 6.2 illustrate the impact of applying different assumptions to the calculation of CO<sub>2</sub> savings or to calculations of cost-effectiveness.

In the context of the European Climate Change Programme reference was made to an estimated savings potential from a cogeneration Directive of 65 Mt CO<sub>2</sub>eq of which 12

Mt CO<sub>2</sub>eq could be achieved at costs of between €20 and €50 per tonne<sup>27</sup>. However, the document subsequently underlines that actual reductions are subject to uncertainties because the proposed Directive will leave the choice of implementation strategy and specific support mechanisms in favour of cogeneration to the Member States.

It should also be noted that these cost estimates are based on the assumption that the reference to cogeneration is a gas economy with combined cycle gas turbines with electrical efficiencies of 55%. In other words, this is the assumption that generates the most conservative estimates as to the cost-effectiveness of cogeneration. If other references were used, cogeneration would be more cost-effective.

The fact that this Directive will only promote high-efficiency cogeneration installations that make optimal use of the fuel input is also likely to improve the overall cost-effectiveness of the measure. In addition, it should be kept in mind that promotion of cogeneration is not only aimed at reducing greenhouse gas emissions, but also at saving energy. Important additional benefits with regard to energy savings and security of energy supply must therefore also be taken into account when judging the cost-effectiveness of the measure.

## **8. RELEVANCE FOR THE CANDIDATE COUNTRIES**

Community action promoting cogeneration is also very important for the Candidate Countries of in particular Central and Eastern Europe where cogeneration, and especially district heating, for many years has been an important component in the energy supply system. Most of the Central and Eastern European Countries have cogeneration shares of at least 10% of electricity production and some substantially higher<sup>28</sup>. District heating is even more widespread in Central and Eastern Europe with district heating networks in most major cities and markets shares for district heating in the range between 13-70%<sup>29</sup>. According to Euroheat & Power<sup>30</sup> almost 40% of the inhabitants of Central and Eastern Europe are customers of district heating representing 41 million users compared with around 20 million in the EU.

The energy sectors in most of the countries in Central and Eastern Europe are generally characterised by a high heat demand and a considerable potential for energy savings. The general conditions of many district heating systems in Central and Eastern Europe is not good with sometimes oversized capacities and old district heating networks in need of refurbishment. This often results in relatively low system efficiencies. At the same time, district heating is sometimes faced with competition from other energy sources. Community action to promote cogeneration could therefore provide a stable and supportive framework for cogeneration and district heating in this region.

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<sup>27</sup> “Communication from the Commission on implementation of the first phase of the European Climate Change Programme”, COM(2001) 580 final.

<sup>28</sup> “The European Cogeneration Review”, Cogen Europe, 1999.

<sup>29</sup> “District Heat in Europe – Country by Country 2001 Survey”, Euroheat & Power, 2001.

<sup>30</sup> “District Heat in Europe – 1999 Survey”, Euroheat & Power, 1999.

In this context, it could be of particular importance to protect the existing district heating infrastructure, which has come under threat due to lack of renovation and competition from individual heating. A cogeneration Directive could provide guidance and incentives to promote high-efficiency cogeneration on the basis of i.a. the existing infrastructure and the documented experiences with cogeneration and district heating in the region. Modernisation of the district heating networks and shift to cogeneration instead of heat-only boilers could in many cases be important elements in future efforts to improve energy efficiency in the Candidate Countries.

## **9. CONSULTATION DURING THE PREPARATION OF THE PROPOSAL**

This proposal follows a consultation and preparation phase involving a number of different meetings and working groups.

Member States and representatives of European associations and non-governmental organisations were invited to a formal consultation meeting organised by the Commission services on 26 November 2001. At this meeting Member States and stakeholders were given the opportunity to present their views and positions on the possible elements of a cogeneration Directive. A background document circulated prior to the meeting formed the basis for the consultation. A number of Member States and stakeholder organisations have subsequently submitted written comments on the Directive.

Specific consultation with experts from industry, associations and research institutes took place on 12 November 2001 in the form of a workshop devoted exclusively to discussing technical issues relating to the definition and certification of cogeneration.

Another workshop focussing on the future outlook for cogeneration in Europe was organised on 25 October 2001 where representatives from Member States and Candidate Countries as well as industry were invited.

Finally, Community action in favour of cogeneration was also subject to discussions in two separate working groups under the European Climate Change Programme working from mid-2000 to mid-2001. In these working groups work was conducted through a co-operative effort involving representatives from the Commission's different departments, the Member States, industry and environmental groups.

## **10. CONTENTS OF THE PROPOSAL**

**Article 1** defines the purpose of the proposal.

**Article 2** sets out the scope of the proposed Directive.

**Article 3** lays down technical definitions.

**Article 4** contains provisions for guarantee of origin of electricity from cogeneration, in line with the “disclosure” provisions on common rules for the internal markets in electricity and natural gas.

**Article 5** obliges Member States to develop criteria to determine the energy efficiency of cogeneration on the basis of a common methodology.

**Article 6** obliges Member States to publish reports with analyses of national potentials for high-efficiency cogeneration and national barriers to their realisation.

**Article 7** contains provisions for the evaluation of support schemes for cogeneration.

**Article 8** concerns grid system issues.

**Article 9** obliges Member States to evaluate the scope for reducing administrative barriers to cogeneration.

**Article 10** concerns reporting requirements under the Directive.

**Annex I** lists the cogeneration technologies covered by the proposal

**Annex II** sets out the methodology to be used for the basic definition of cogeneration.

**Annex III** outlines a methodology for determining the efficiency of cogeneration production.

**Annex IV** lists the criteria to be followed when analysing national potentials for high-efficiency cogeneration.

Proposal for a

**DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

**on the promotion of cogeneration based on a useful heat demand in the internal energy market**

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 175 thereof,

Having regard to the proposal from the Commission<sup>31</sup>

Having regard to the opinion of the Economic and Social Committee<sup>32</sup>

Having regard to the opinion of the Committee of the Regions<sup>33</sup>

Acting in accordance with the procedure laid down in Article 251 of the Treaty<sup>34</sup>

Whereas:

- (1) The potential for use of cogeneration as a measure to save energy is underused in the Community at present. Promotion of high-efficiency cogeneration based on a useful heat demand is a Community priority given the potential benefits of cogeneration with regard to saving primary energy and reducing emissions, in particular of greenhouse gases. In addition, efficient use of energy by cogeneration can also contribute positively to the security of energy supply and to the competitive situation of the European Union and its Member States. It is therefore necessary to take measures to ensure that the potential is better exploited within the framework of the internal energy market.
- (2) Directive 96/92/EC of the European Parliament and of the Council of 19 December 1996 concerning common rules for the internal market in electricity<sup>35</sup> provides for an important step in the completion of the internal market in

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<sup>31</sup> OJ C....., p.

<sup>32</sup> OJ C....., p.

<sup>33</sup> OJ C....., p.

<sup>34</sup> OJ C....., p.

<sup>35</sup> OJ L 27, 30.1.1997, p.20.

electricity. At its meeting in Lisbon on 23 and 24 March 2000, the European Council called for rapid work to be undertaken to complete the internal market in both electricity and gas and to speed up liberalisation in these sectors with a view to achieving a fully operational internal market. In response, the Commission adopted on 13 March 2001 a package of measures on completing the internal energy market, including a proposal for a Directive amending Directives 96/92/EC and 98/30/EC concerning common rules for the internal market in electricity and natural gas<sup>36</sup>.

- (3) The Green Paper<sup>37</sup> on security of energy supply points out that the European Union is extremely dependent on its external energy supplies currently accounting for 50% of requirements and projected to rise to 70% by 2030 if current trends persists. Import dependency and rising import ratios may lead to concern about the risk of interruption to or difficulties in supply. However, it would be simplistic and wrong to conceive security of supply as merely a question of reducing import dependency and boosting domestic production. Security of supply calls for a wide range of policy initiatives aimed at, inter alia, diversification of sources and technologies and improved international relations. The Green Paper emphasised furthermore that security of energy supply is essential for a future sustainable development. The Green Paper concludes that the adoption of new measures to reduce energy demand is essential both in terms of reducing the import dependence and in order to limit greenhouse gas emissions.
- (4) The Commission's Communication "A Sustainable Europe for a better world – A European Union Strategy for Sustainable Development"<sup>38</sup> presented at the Gothenburg European Council on 15 and 16 June 2001 identified climate change as one of the principal barriers to sustainable development and emphasised the need for increased use of clean energy and clear action to reduce energy demand.
- (5) The increased correct use of cogeneration constitutes an important part of the package of measures needed to comply with the Kyoto Protocol to the United Nations Framework Convention on Climate Change, and of any policy package to met further commitments. The Commission in its Communication on the implementation of the first phase of the European Climate Change Programme<sup>39</sup> identified promotion of cogeneration as one of the measures needed to reduce the greenhouse gas emissions from the energy sector and announced its intention to present a proposal for a Directive on the promotion of cogeneration in 2002.
- (6) The increased correct use of cogeneration is a priority as outlined in the Communication "A Community strategy to promote combined heat and power (CHP) and to dismantle barriers to its development"<sup>40</sup>. This was endorsed by the

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<sup>36</sup> COM(2001) 125 final.

<sup>37</sup> COM(2000) 769 final

<sup>38</sup> COM(2001) 264 final

<sup>39</sup> COM(2001) 580 final

<sup>40</sup> COM(97) 514 final

Council in its resolution of 18 December 1997 on a Community strategy to promote combined heat and power<sup>41</sup>, and by the European Parliament in its resolution of 23 April 1998 on the Community strategy to promote combined heat and power<sup>42</sup>.

- (7) The Council in its Conclusions of 30 May 2000 and of 5 December 2000<sup>43</sup> endorsed the Commission's Action Plan on energy efficiency<sup>44</sup> and identified promotion of cogeneration as one of the short-term priority areas. The European Parliament in its resolution of 7 February 2001<sup>45</sup> on the Action Plan on energy efficiency called on the Commission to submit proposals establishing common rules for the promotion of cogeneration, where this makes environmental sense.
- (8) Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control<sup>46</sup>, Directive 2001/80/EC of the European Parliament and of the Council on the limitation of emissions of certain pollutants into the air from large combustion plants<sup>47</sup> and Directive 2000/76/EC of the European Parliament and of the Council on the incineration of waste<sup>48</sup> all recite the need to evaluate the potential for cogeneration in new installations.
- (9) High efficiency cogeneration is in this directive defined by the energy savings obtained by combined production in stead of separate production of heat and electricity. For existing plants energy savings of more than 5%, and for new plants energy savings of more than 10% qualify for the term 'high efficiency cogeneration'. To maximise the energy savings and to avoid that energy savings are lost through incorrect operation of the cogeneration plants the greatest attention must be paid to the functioning conditions of these plants, mainly to ensure that the heat production is being properly used.
- (10) It is important for monitoring purposes and for reasons of transparency to adopt a harmonised basic definition of cogeneration. Where cogeneration installations are equipped to generate separate electricity or heat production, such production should be excluded from the definition of cogeneration.
- (11) To ensure that only cogeneration that provides benefits in terms of primary energy savings is promoted, it is necessary to develop additional criteria to determine and quantify the energy efficiency of the cogeneration production identified under the basic definition. To avoid distortions of the internal energy market, national

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<sup>41</sup> OJ C 4, 8.1.1998, p. 1

<sup>42</sup> A4-0145/98

<sup>43</sup> Council Conclusions 8835/00 (30 May 2000) and Council Conclusions 1400/00 (5 December 2000).

<sup>44</sup> COM(2000) 247 final

<sup>45</sup> A5-0054/2001.

<sup>46</sup> OJ L 257, 10.10.1996, p. 26

<sup>47</sup> OJ L 309, 27.11.2001, p. 1

<sup>48</sup> OJ L 332, 28.12.2000, p. 91

efficiency reference values used to define high-efficiency cogeneration should be adopted on the basis of a common methodology.

- (12) The definitions of cogeneration and of high-efficiency cogeneration used in this Directive do not prejudice the use of different definitions in national legislation, for purposes other than those set out in this Directive. It is appropriate to borrow the definitions contained in Directive 96/92/EC of the European Parliament and of the Council of 19 December 1996 concerning common rules for the internal market of electricity<sup>49</sup> and in 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.<sup>50</sup>
- (13) To increase transparency for the consumer's choice between electricity from cogeneration and electricity produced on the basis of other techniques, guarantee of origin of high efficiency cogeneration is necessary.
- (14) To ensure increased market penetration of cogeneration in the medium term, it is appropriate to require all Member States to adopt and publish a report analysing the national potential for high-efficiency cogeneration and to include a separate analysis of barriers to cogeneration in the report. The Commission, on the basis of these reports and the progress made in achieving the global indicative Community target of 18% of electricity consumption from cogeneration by 2010, should consider whether it is appropriate to establish indicative objectives for each Member State. Special considerations should be given to analysing the scope for increased use of renewable energy sources in the national heat markets via cogeneration.
- (15) Public support should be consistent with the provisions of the Community guidelines on State aid for environmental protection<sup>51</sup>. These guidelines currently allow certain types of public support if it can be shown that the measures are beneficial in terms of protection of the environment because the conversion efficiency is particularly high, because the measures will allow energy consumption to be reduced or because the production process will be less damaging to the environment. Such support will in some cases be necessary to further exploit the potential for cogeneration, in particular to take account of the need to internalise external costs.
- (16) Public support schemes for promoting cogeneration should focus on support for cogeneration based on a useful heat demand and avoid encouragement of increased heat demand in order to avoid increase of fuel consumption and CO<sub>2</sub> emissions. Member States should take steps to prevent public financial support for electricity from cogeneration from being used to subsidise heat production, thereby creating incentives for being less careful about the proper use of the heat

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49 OJ L 27, 30.01.1997, p.20

50 OJ L 283, 27.10.2001, p.33

51 OJ C 37, 03.02.2001, pages 3-15

output. Without prejudice to the Community Guidelines on State aid for environmental protection, direct support for production should in principle be focused on the share of cogenerated electricity produced either in installations with a capacity below a threshold value that should be set at 50 MW(e) or lower or in larger installations but then only the amount of electricity produced by the capacity below such a threshold value.

- (17) Member States operate different mechanisms of support for cogeneration at the national level, including investment aid, tax exemptions or reductions, green certificates and direct price support schemes. The Commission intends to monitor the situation and report on experiences gained with the application of national support schemes.
- (18) Grid connection costs and tariffs related to the transmission and distribution of electricity from cogeneration and tariffs related to the purchase of additional electricity sometimes needed by cogeneration producers should be set according to objective, transparent and non-discriminatory criteria taking into account the costs and benefits of cogeneration. Especially for cogeneration installations using renewables and small ones with capacity below 1 MW(e), costs and administrative burdens in relation to connection to the electricity grid constitute considerable barriers for further development.
- (19) The specific structure of the cogeneration sector, which includes many small and medium-sized producers, should be taken into account, especially when reviewing the administrative procedures for obtaining permission to construct cogeneration capacity.
- (20) Within the purpose of this Directive to create a framework for promoting cogeneration it is important to emphasise the need for a stable economical and administrative environment for investments in new cogeneration installations. Member States are encouraged to address this need by designing support schemes with a duration period of at least 4 years and by avoiding frequent changes in administrative procedures etc. Member States are furthermore encouraged to ensure that public support schemes respect the phase-out principle.
- (21) The overall efficiency and sustainability of cogeneration is dependent on the many factors such as technology used, fuel types, load curves, the size, and also on the properties of the heat. Use of heat as high pressure steam for industrial processes provides limits of the electrical efficiency of the cogeneration installation because of the high temperature level for the heat (above 140°C). Use of heat for central heating purposes, demanding a lower temperature level (from 40°C to 140°C) than the industrial use, allows a higher electrical efficiency of the cogeneration installation. Use of heat for agricultural heating, such as warming of greenhouses and aquaculture pools, provides an even lower level of temperature (below 40°C) and improves thereby the possibilities to increase the electrical efficiency. This Directive reflects these considerations by introducing three classes of cogeneration in order to ensure that evaluation of electrical efficiency of

different cogeneration installations take the different heat temperature levels into consideration.

- (22) In accordance with the principles of subsidiarity and proportionality as set out in Article 5 of the Treaty, general principles providing a framework for the promotion of cogeneration in the internal energy market should be set at Community level, but the detailed implementation should be left to Member States, thus allowing each Member State to choose the regime, which corresponds best to its particular situation. This Directive confines itself to the minimum required in order to achieve those objectives and does not go beyond what is necessary for that purpose.

HAVE ADOPTED THIS DIRECTIVE:

### *Article 1*

#### **Purpose**

The purpose of this Directive is to create a framework for promotion of cogeneration based on useful heat demand in the internal energy market. Implementation of this Directive shall take into account the specific national circumstances especially concerning climatic and economic conditions.

### *Article 2*

#### **Scope**

This Directive shall apply to cogeneration as defined in Article 3. Annex I provides a list of different types of cogeneration units covered by this Directive.

### *Article 3*

#### **Definitions**

For the purpose of this Directive, the following definitions shall apply:

- (a) “cogeneration” shall mean the generation in one process of thermal energy and electrical and/or mechanical energy. For practical reasons and based on the fact, that the use of the heat output for different purposes requires different temperature levels of the heat, and that these differences influence efficiencies of the cogeneration, cogeneration shall be divided into three classes: “industrial cogeneration”, “heating cogeneration” and “agricultural cogeneration”;
- (b) “industrial cogeneration” shall mean the generation in one process of electrical and/or mechanical energy and thermal energy useful for industrial production generally with heat temperatures of 140°C or higher;

- (c) “heating cogeneration” shall mean the generation in one process of electrical and/or mechanical energy and thermal energy useful for heating purposes in district heating systems or directly in buildings generally with heat temperatures between 40°C and 140°C;
- (d) “agricultural cogeneration” shall mean the generation in one process of electrical and/or mechanical energy and thermal energy useful for agricultural heating of greenhouses, aquaculture plants and similar applications generally with heat temperatures between 15°C and 40°C;
- (e) “useful heat” is heat produced in a cogeneration process to satisfy an economically justified demand, on the basis of the efficiency criteria laid down in Annex III, point c. 2; useful heat could via a secondary process be used to generate useful cooling;
- (f) “electricity from cogeneration” shall mean electricity generated in accordance with the methodology laid down in Annex II and in a process linked to production of useful heat;
- (g) “district heating” shall mean a system supplying commercially heat in the form of hot water or steam to users via a distribution network;
- (h) “district cooling” shall mean a system supplying chilled water or hot water or steam to chillers via a distribution network;
- (i) “back-up electricity” shall mean the electricity that has to be supplied through the electricity grid whenever the cogeneration process is disrupted or out of order;
- (j) “top-up electricity” shall mean the electricity that has to be supplied through the electricity grid in cases where the electricity demand is greater than the electrical output of the cogeneration process.
- (k) “heat efficiency” shall mean annual useful heat output divided by the fuel input used for heat produced in a cogeneration process and for gross electricity production.. In the case of cogeneration with district heating useful heat output is measured at the point of outlet to the heat distribution network decreased by a realistic estimation of losses in the distribution network. In the case of other cogeneration applications useful heat output is measured at the point of use;
- (l) “electrical efficiency” shall mean annual electricity production measured at the point of outlet of the main generators divided by the fuel input used for heat produced in a cogeneration process and gross electricity production;
- (m) “overall efficiency” shall mean the annual sum of electricity production and useful heat output divided by the fuel input used for heat produced in a cogeneration process and gross electricity production;

- (n) "efficiency" shall mean efficiency calculated on the basis of Net Calorific Values of fuels (lower calorific value) which means that the latent heat of vaporisation of moisture is not included;
- (o) "high efficiency cogeneration" shall mean cogeneration meeting the criteria outlined in Annex III;
- (p) "efficiency reference value for separate production" shall mean efficiency of the alternative separate productions of heat and electricity that the cogeneration process is assumed to displace.
- (q) "Power to Heat Ratio" shall mean the relation of electrical energy to useful thermal energy;
- (r) "cogeneration unit" shall mean a unit mainly intended for cogeneration processes as defined under point a); when a cogeneration unit generates only electrical energy or only thermal energy it is still to be defined as a cogeneration unit, but its output shall not be considered cogeneration for the purpose of this Directive.
- (s) "cogeneration installation" shall mean an installation made up of one or more cogeneration units. A cogeneration installation may include equipment where it is possible to generate only electrical energy or only thermal energy. The output from such equipment shall not be considered cogeneration for the purpose of this Directive;
- (t) "new cogeneration units" shall mean cogeneration units having started operation on, or after, 1 January 2004;
- (u) "existing cogeneration units" shall mean cogeneration units having started operation before 1 January 2004.

In addition, the definitions in Directive 96/92/ and in Directive 2001/77/EC shall apply.

#### *Article 4*

##### **Guarantee of origin of electricity from cogeneration**

1. Member States shall no later than two years after the entry into force of this Directive ensure that the origin of electricity produced in cogeneration units can be guaranteed as such within the meaning of this Directive according to objective, transparent and non-discriminatory criteria laid down by each Member State. Member States shall ensure that this guarantee of origin of the electricity is issued to this effect in response to a request.
2. Member States shall designate no later than one year after the entry into force of this Directive one or more competent bodies, independent of generation and

distribution activities, to supervise the issue of the guarantee of origin referred in paragraph 1 Member States or the competent bodies shall put in place appropriate mechanisms to ensure that the guarantee of origin are both accurate and reliable and they shall outline in the report referred to in Article 6(3) the measures taken to ensure the reliability of the certificate system

3. Guarantee of origin shall:
  - specify the fuel source from which the electricity was produced, specify the use of the heat generated together with the electricity and finally specify the dates and places of production;
  - specify the quantity of electricity from cogeneration that the guarantee represents;
  - specify the efficiency reference values for separate production of electricity and heat, and the efficiency of cogeneration in accordance with Article 5;
  - enable producers of electricity from cogeneration to demonstrate that the electricity they sell is produced from cogeneration within the meaning of this Directive.

Member States may include additional information on the guarantee of origin.

4. Guarantee of origin, issued according to paragraph 2, shall be mutually recognised by the Member States, exclusively as proof of the elements referred in paragraph 3. Any refusal to recognise a certificate of origin as such proof, in particular for reasons relating to the prevention of fraud, must be based on objective, transparent and non-discriminatory criteria. In the event of refusal to recognise a certificate of origin, the Commission may compel the refusing party to recognise it, particularly with regard to objective, transparent and non-discriminatory criteria on which such recognition is based.

#### *Article 5*

#### **Efficiency criteria**

1. Member States shall no later than two years after the entry into force of this Directive ensure that the efficiency of cogeneration production, defined in terms of achievement of primary energy savings can be determined in accordance with Annex III.
2. For the purpose of determining the efficiency of cogeneration, Member States shall not later than two years after the entry into force of this Directive adopt:

- (a) efficiency reference values for separate production of heat and electricity to be used for the calculation of primary energy savings from cogeneration in accordance with the methodology set out in Annex III.
  - (b) principles for defining the national efficiency reference values for separate production of heat and electricity based on a well-documented analysis of the most realistic references in each Member State.
3. Member States shall review the national efficiency reference values for separate production of heat and electricity every 5 years to take account of technological developments and changes in the distribution on energy sources. Where changes in the national efficiency reference values for separate production are made, the new reference values shall be published and shall be notified to the Commission.
4. The Commission shall evaluate the criteria for determining the efficiency of cogeneration adopted by the Member States pursuant to (paragraph 2). After having consulted the Member States, the Commission shall in the report referred to in Article 10 (1), consider the scope for a harmonised methodology that Member States could follow in order to determine the efficiency of cogeneration production.

#### *Article 6*

#### **National potentials for high-efficiency cogeneration**

1. Member States shall establish an analysis of the national potential for high-efficiency cogeneration.
2. The analysis shall comply with the criteria listed in Annex IV. It shall be based on well-documented scientific data and shall distinguish between applications of cogeneration in at least the following categories:
  - industrial cogeneration
  - heating cogeneration
  - agricultural cogeneration
3. Member States shall include in the analysis a separate analysis of barriers, which may prevent the realisation of the national potential for high-efficiency cogeneration. In particular, this analysis shall consider barriers relating to the prices of and access to fuels, barriers in relation to grid system issues, barriers in relation to administrative procedures, and barriers relating to the lack of internalisation of the external costs in energy prices.
4. Member States shall for the first time not later than two years after the entry into force of this Directive and thereafter every three years evaluate progress towards

increasing the share of high-efficiency cogeneration. Member States shall also evaluate measures taken to promote high-efficiency cogeneration and indicate to what extent the measures are consistent with national climate change commitments.

5. On the basis of the reports referred to in paragraphs 1, 3 and 4, the Commission shall assess how much progress Member States have made towards realising their national potentials for high-efficiency cogeneration.

The Commission shall publish its conclusions in the report referred to in Article 10, for the first time not later than four years after the entry into force of this Directive and thereafter every three years.

#### *Article 7*

##### **Support schemes**

1. Member States shall ensure that support for cogeneration production is based on the useful heat demand, in the light of opportunities available for reducing energy demand through other economically feasible measures like energy efficiency measures.
2. Without prejudice to Articles 87 and 88 of the Treaty, the Commission shall evaluate the application of support mechanisms used in Member States according to which a producer of cogeneration receives, on the basis of regulations issued by public authorities, direct or indirect support, which could have the effect of restricting trade.

The Commission shall consider whether those mechanisms contribute to the pursuit of the objectives set out in Articles 6 and 174(1) of the Treaty.

3. The Commission shall in the report referred to in Article 10 present a well-documented analysis on experience gained with the application and coexistence of the different support mechanisms referred to in paragraph 2. The report shall assess the success, including cost-effectiveness, of the support systems in promoting the use of high-efficiency cogeneration in conformity with the national potentials referred to in Article 6. The report shall further review to what extent the support schemes have contributed to the creation of stable conditions for investments in cogeneration.

#### *Article 8*

##### **Electricity grid system issues**

1. Without prejudice to the maintenance of the reliability and safety of the grid, Member States shall take the necessary measures to ensure that transmission

system operators and distribution system operators in their territory guarantee the transmission and distribution of electricity produced from cogeneration.

2. Member States shall establish a legal framework or require transmission system operators and distribution system operators to set up and publish standard rules on the bearing of the costs of technical adaptations, such as grid connections and grid reinforcements, which are necessary in order to integrate new producers feeding into the grid electricity produced from cogeneration.

Member States shall establish a legal framework or require transmission system operators and distribution system operators to set up and publish standard rules relating to the sharing of costs of system installations, such as grid connections and reinforcements, between all system users benefiting from them.

The sharing shall be enforced by a mechanism based on objective, transparent and non-discriminatory criteria taking into account the benefits which initially and subsequently connected producers as well as transmission system operators and distribution system operators derive from the connections.

The rules shall be based on objective, transparent and non-discriminatory criteria taking particular account of all the costs and benefits associated with the connection of the producers to the grid. The rules may provide for different types of connection.

3. Member States may require transmission system operators and distribution system operators to bear, in full or in part, the costs referred to in paragraph 2.
4. Transmission system operators and distribution system operators shall be required to provide any new producer wishing to be connected with a comprehensive and detailed estimate of the costs associated with the connection.
5. Member States shall ensure that the charging of transmission and distribution fees does not discriminate against electricity from cogeneration. Where appropriate, Member States shall put in place a legal framework or require transmission system operators and distribution system operators to ensure that fees charged for the transmission and distribution of electricity from installations using cogeneration reflect realisable cost benefits resulting from the installation's connection to the network. Such cost benefits may arise from the direct use of the low-voltage grid.
6. Unless the cogeneration producer is an eligible customer under national legislation within the meaning of Article 17 (2) of Directive 96/92/EC, Member States shall take the necessary measures to ensure that the tariffs for the purchase of electricity to back-up or top-up electricity generation are set on the basis of published tariffs and terms and conditions. Such tariffs and terms and conditions shall be fixed or approved in accordance with objective, transparent and non-discriminatory criteria by an independent regulatory authority prior to their entry into force.

7. Member States shall designate one or more competent bodies, which may be an independent regulatory authority, to monitor and benchmark the tariffs and terms and conditions offered to cogeneration producers when back-up or top-up electricity is purchased or when excess electricity is sold. The body shall publish for the first time three years after the entry into force of this Directive and thereafter every third year a report outlining the findings of these assessments. The report shall be forwarded to the Commission.
8. Member States shall particularly facilitate access to the grid system of electricity produced from cogeneration units using renewables energy sources and installations with a capacity less than 1 MW<sub>e</sub>, as set out in Annex III, a).

### *Article 9*

#### **Administrative procedures**

1. Member States or the competent bodies appointed by the Member States shall evaluate the existing legislative and regulatory framework with regard to authorisation procedures or the other procedures laid down in Article 4 of Directive 96/92/EC, which are applicable to cogeneration installations, with a view to:
  - (a) encouraging the design of cogeneration installations to match economically justified demands for heat output and avoiding production of more heat than useful heat.
  - (b) reducing the regulatory and non-regulatory barriers to an increase in cogeneration;
  - (c) streamlining and expediting procedures at the appropriate administrative level; and
  - (d) ensuring that the rules are objective, transparent and non-discriminatory, and take fully into account the particularities of the various cogeneration technologies.
2. Member States shall – where this is appropriate in the context of national legislation – provide an indication of the stage reached specifically in:
  - (a) co-ordination between the different administrative bodies as regards deadlines, reception and treatment of applications for authorisations;
  - (b) the drawing up of possible guidelines for the activities referred to in paragraph 1, and the feasibility of a fast-track planning procedure for cogeneration producers; and

- (c) the designation of authorities to act as mediators in disputes between authorities responsible for issuing authorisations and applicants for authorisations.
3. The Commission shall, in the report referred to in Article 11 and on the basis of the Member States' reports referred to in Article 10(1), assess best practices with a view to achieving the objectives referred to in paragraph 1.

#### *Article 10*

#### **Member States' reporting**

1. Member States shall, not later than two years after the entry into force of this Directive, publish a report with the following content:
- (a) efficiency reference values for separate production of heat and electricity referred to in Article 5 (2);
  - (b) principles for defining the national efficiency reference values for separate production of heat and electricity referred to in Article 5 (2);
  - (c) analysis of national potential for high efficiency cogeneration referred to in Article 6(1);
  - (d) analysis of barriers, which may prevent the realisation of the national potential for high efficiency cogeneration referred to in Article 6(3);
  - (e) examination of the measures taken to facilitate access to the grid system of electricity produced from cogeneration and, inter alia, the feasibility of introducing two-way metering for cogeneration units installed in residential buildings;
  - (f) evaluation of the existing legislative and regulatory framework referred to in Article 9(1) and 9(2).
2. Member States shall not later than two years after the entry into force of this Directive and hereafter every three years publish a report on progress towards increasing the share of high efficiency cogeneration referred to in Article 6(4);
3. Member States shall submit to the Commission on an annual basis statistics on national electricity and heat production from cogeneration, in accordance with the methodology shown in Annex II.

They shall also submit annual statistics on cogeneration capacities and fuels used for cogeneration.

## *Article 11*

### **Commission reporting**

On the basis of the reports submitted pursuant to Article 8(7) and Article 10 (1) and (3), the Commission shall review the application of this Directive and submit to the European Parliament and to the Council not later than four years after the entry into force of this Directive and thereafter every six years, a progress report on the implementation of this Directive.

In particular, the report shall:

- (a) consider the scope for further harmonisation of the criteria to determine the efficiency of cogeneration.
- (b) consider progress towards realising national potentials for high-efficiency cogeneration referred to in Article 6.
- (c) assess the extent to which rules and procedures defining the framework conditions for cogeneration in the internal energy market are set on the basis of objective, transparent and non-discriminatory criteria taking due account of the benefits of cogeneration.
- (d) examine the experiences gained with the application and coexistence of different support mechanisms for cogeneration.
- (e) review reference values for separate production on the basis of the current technologies

If appropriate, the Commission shall submit with the report further proposals to the European Parliament and the Council.

## *Article 12*

### **Transposition**

Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive not later than two years after the entry into force of this Directive. They shall forthwith inform the Commission thereof.

When Member States adopt these measures, they shall contain a reference to this Directive or shall be accompanied by such a reference on the occasion of their official publication. The Member States shall lay down the methods of making such reference.

*Article 13*

**Entry into force**

This Directive shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Communities.

*Article 14*

**Addressees**

This Directive is addressed to the Member States.

Done at Brussels,

*For the Council  
The President*

## **ANNEX I**

### **Cogeneration technologies covered by the Directive**

- a) Combined cycle gas turbine with heat recovery
- b) Steam backpressure turbine
- c) Steam extraction condensing turbine
- d) Gas turbine with heat recovery
- e) Internal combustion engine
- f) Microturbines
- g) Stirling engines
- h) Fuel cells
- i) Steam engines
- j) Organic Rankine cycles
- k) Any other type of technology or combination thereof falling under the definitions laid down in Article 3.

## ANNEX II

### **Definition of electricity from cogeneration**

Values used for calculation of electricity from cogeneration shall be determined on the basis of the expected or actual operation of the unit under realistic conditions.

- a) Electricity production from cogeneration shall be considered equal to total annual electricity production of the unit.
- in cogeneration units of type b), d), e), f), g), and h) referred to in Annex I, with an annual overall efficiency higher or equal to 75%, and
  - in cogeneration units of type a) and c) referred to in Annex I with an annual overall efficiency higher or equal to 85%.
- b) Calculations shall be made in order to separate electricity from cogeneration and electricity not produced in a cogeneration process. In cogeneration units with an annual overall efficiency below 75% (cogeneration units of type b), d), e), f), g), and h) referred to in Annex I) or with an annual overall efficiency below 85% (cogeneration units of type a) and c) referred to in Annex I) The following formula shall be used:

$$E_{\text{CHP}} = Q_{\text{net}} \cdot C$$

where

$E_{\text{CHP}}$  is the amount of electricity from cogeneration

$C$  is the power to heat ratio

$Q_{\text{net}}$  is the net heat production from a cogeneration process (defined as total heat production minus any heat produced in separate boilers)

If the actual power to heat ratio of a cogeneration unit is not known, the following default values may be used for units of type a), b), c), d), and e) referred to in Annex I provided that the calculated cogeneration electricity is less or equal to total electricity production of the unit:

Type of the unit	Default power to heat capacity ratio, C	
	District heating	Industrial
Combined cycle gas turbine with heat recovery	0,95	0,75
Steam backpressure turbine	0,45	0,30
Steam condensing extraction turbine	0,45	0,30
Gas turbine with heat recovery	0,55	0,40
Internal combustion engine	0,75	0,60

Subject to prior notification to the Commission, Member States may use other default values for power to heat ratios than the ones provided in this Annex. Such alternative default values shall be published by Member States.

If Member States introduce default values for power to heat ratios for units of type f), g), h), i), j) and k) referred to in Annex I, such default values shall be published and shall be notified to the Commission.

- c) Subject to prior approval by the Commission, Member States may use other methods than the one provided for in paragraph b) of this annex to subtract possible electricity production not produced in a cogeneration process from the reported figures.

## ANNEX III

### **Methodology for determining the efficiency of cogeneration production**

Values used for calculation of efficiency of cogeneration production and primary energy savings shall be determined on the basis of the expected or actual operation of the unit under realistic conditions.

#### **a) High-efficiency cogeneration**

For the purpose of this Directive high-efficiency cogeneration production shall fulfil the following criteria:

- production from new cogeneration units shall provide primary energy savings of at least 10% compared with the references for separate production of heat and power;
- production from existing cogeneration units shall provide primary energy savings of at least 5% compared with the references for separate production of heat and power;
- production from cogeneration units using renewable energy sources and from cogeneration installations with an installed capacity below 1 MWe providing primary energy savings in the range 0-5% may qualify as high-efficiency cogeneration;
- Member States may introduce principles whereby production from cogeneration units below the thresholds referred to in this Annex may be considered to be partially fulfilling the efficiency criteria. If such principles are applied, appropriate methodologies for determining the reduced efficiency of such production, calculated in proportion to the reduced primary energy savings, shall be developed by the Member State and shall be notified to the Commission. In such cases, the reduced efficiency of the cogeneration production shall be clearly displayed on the certificate of origin.

**b) Calculation of primary energy savings**

The amount of primary energy savings provided by cogeneration production defined in accordance with Annex II to this Directive shall be calculated on the basis of the following formula:

$$PES = \left( 1 - \frac{1}{\frac{CHP H\eta}{Ref H\eta} + \frac{CHP E\eta}{Ref E\eta}} \right) \times 100\%$$

Where:

PES is primary energy savings

CHP Hη is the heat efficiency of the cogeneration production

Ref Hη is the heat efficiency of the reference for separate heat production

CHP Eη is the electrical efficiency of the cogeneration production

Ref Eη is the electrical efficiency of the reference for separate electricity production

Subject to prior notification to the Commission, Member States may use other formula leading to the same results to calculate the primary energy savings from cogeneration. In the cases where alternative formulas are used, such formula shall be published by the Member State.

**c) Efficiency reference values for separate production of heat and electricity**

The principles for defining the references for separate production of heat and electricity referred to in Article 5(2) and in the formula set out in paragraph b) of this Annex shall establish the operating efficiency of the separate heat and electricity production that cogeneration is assumed to displace.

To define the efficiency reference values, the following principles shall be applied:

1) For new cogeneration units as defined in Article 3, the comparison with new separate electricity production shall be based on the principle that similar fuel categories are compared. The following indicative efficiency reference values for new separate electricity production may be used:

**Indicative efficiency reference values for new separate electricity production**

Fuel category	Operating efficiency
---------------	----------------------

Natural gas	55%
Coal	42%
Oil	42%
Renewables and waste	22-35%

In the case of cogeneration units connected at the electricity distribution system, the reference values provided in the above table may be lowered with 5-10% to take account of avoided network losses.

2) For new cogeneration units as defined in Article 3, the indicative efficiency reference value of new separate heat production shall be an operating efficiency of 90%.

In the case of heat production based on oil or coal, the efficiency reference value may be lowered to 85%. In the case of heat production based on renewable energy sources or waste, the efficiency reference value may be lowered to 80%. In the case of high temperature steam used for industrial processes, the reference values for separate heat production may be lowered to 80%.

3) For existing cogeneration units as defined in Article 3, the efficiency reference value for separate electricity production shall be based on the average operating efficiency of the national fossil-fuelled electricity production. Where appropriate, possible cross-border trade in electricity having an impact on the reference values may be taken into account.

4) For existing cogeneration units as defined in Article 3 the efficiency reference value for separate heat production shall be based on the average operating efficiency of the national heat production mix.

5) Subject to prior notification to the Commission, Member States may include additional aspects in the national criteria for determining the efficiency of cogeneration.

## ANNEX IV

### **Criteria for analysis of national potentials for high-efficiency cogeneration**

- a)** The analysis of the national potential for high-efficiency cogeneration shall identify suitable heating and/or cooling demands and shall distinguish between application of cogeneration in at least the following main categories:
- Industrial cogeneration
  - Heating cogeneration
  - Agricultural cogeneration
- b)** For each of the three categories referred to under a), the analysis shall consider:
- The type of fuels that are likely to be used to realise the cogeneration potentials, including specific considerations on the potential for increasing the use of renewable energy sources in the national heat markets via cogeneration.
  - The type of cogeneration technologies as listed in Annex I that are likely to be used to realise the national potential.
  - The type of separate production of heat and electricity that high-efficiency cogeneration is likely to substitute.
  - A division of the potential into modernisation of existing capacity and construction of new capacity.
- c)** The analysis shall include appropriate mechanisms to assess the cost effectiveness – in terms of primary energy savings - of increasing the share of high-efficiency cogeneration in the national energy mix. The analysis of cost effectiveness shall also take into account national commitments accepted in the context of the climate change commitments accepted by the Community pursuant to the Kyoto Protocol to the United Nations Framework Convention on Climate Change.
- d)** The analysis of the national cogeneration potential shall specify the potentials in relation to the timeframes 2010, 2015 and 2020 and include appropriate cost estimates for each of the timeframes.