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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT AND THE COUNCIL**

Europe can save more energy by combined heat and power generation

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1. INTRODUCTION

The main objectives of this Communication are to report on the current status of the combined heat and power generation (CHP or cogeneration), and to present possibilities for its development. In doing so, the Commission also meets the reporting obligations of Directive 2004/8/EC¹ on cogeneration, notably on cogeneration potential and progress in realising these potentials in the Member States. However, the reporting is only partial because of delays in the implementation of the Directive and the small number of national reports available² at this stage. The Communication presents the way forward to speed up the process in the future and enhance CHP potential in Europe.

2. WHAT IS CHP AND ITS ROLE IN EU'S ENERGY PORTFOLIO?

Many electricity production technologies generate heat in parallel that is wasted, often in cooling towers and to the detriment of the environment. The current average electricity generation efficiency from conventional thermal power plants is about 40%³ in the European Union. If the heat generated in parallel could be used, the overall efficiency of the combined production plant could almost be doubled.

A limiting factor may be the availability of the parallel heat demand, heat load. A sufficiently big heat load can normally be found in a district heating network or in an industrial process.

Combined heat and power generation is a very efficient energy technology which can provide energy savings compared to other technologies. In addition, as CHP plants should be relatively close to the final consumers, whether communities or the industry, the energy transmission and distribution losses remain small. Many energy sources can be used in cogeneration, from coal to natural gas as well as renewable energy sources⁴. CHP may be used in a wide range of capacities, from one kilowatt micro-cogeneration in private houses to hundreds of megawatts in district heating and industrial plants.

¹ Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004, on the promotion of cogeneration based on a useful heat demand in the internal energy market; also called CHP Directive.

² Only 8 Member States have provided reports covering all items required (progress report, national potential, guarantees of origin and barriers): BE, DK, DE, EE, PL, SI, SK and UK.

³ If not otherwise stated, the data used in the document are derived from Eurostat.

⁴ Energy sources in EU27 (2006): 38% gas, 34% solid fuels, 12% renewable energy, 6% oil and 10% others.

Of the EU final energy consumption (FEC)⁵ in 2006, CHP represented 13.1%, a level that has not shown significant improvement⁶. The variation between countries is significant from nearly zero to more than 40% in Denmark and Finland (See Figure 1).

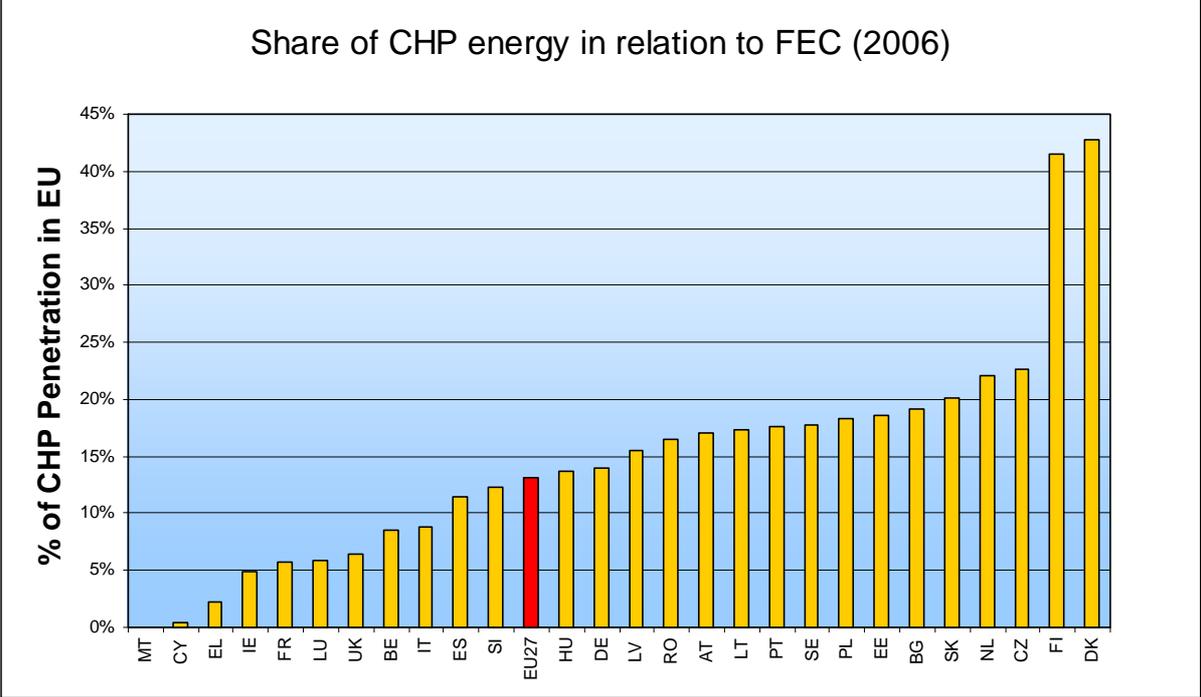


Figure 1: Share of CHP energy output in relation to FEC by Member States (Eurostat – 2006)

The CHP electricity capacity in EU27 is about 100 GW, representing 13.6% of the total EU27 electricity capacity. The production of CHP electricity in EU27 amounts to 366 TWh, i.e. 10.9% of the total electricity generation in 2006⁷. The level of production varies very much between Member States, from 0.3% in Cyprus to more than 40% in Latvia and in Denmark.

The benefits in terms of energy saving from cogeneration are today estimated to be around 35 Mtoe per annum in EU27, equivalent to Austria's gross inland consumption. The CO₂ savings are about 100 Mt per annum⁸.

CHP is an energy saving technology which today contributes about 2% towards the 20% annual primary energy savings objective for 2020.

3. CHP IN THE EU ENERGY POLICY TOOLBOX

The EU has taken ambitious energy and climate policy objectives to reduce greenhouse gas emissions by 20%, to increase the share of renewable energies to 20% and to save 20% of energy by the year 2020. Europe's Energy Policy aims to promote security of supply, sustainable development and competitiveness. CHP can play an important role in fulfilling these policy objectives by contributing to energy security, sustainable energy, a better

⁵ Excluding energy consumed in transport sector.
⁶ The share of CHP energy was 12.0% in 2004 (EU25) and 13.2% in 2002 (EU-15).
⁷ The share of CHP electricity was 10.2% in 2004 (EU25) and 14.1% in 2002 (EU-15).
⁸ Consumption of 1 Mtoe fuel generates approximately 3 MtCO₂ emissions.

environment and combating climate change. In addition, cogeneration constitutes European technology know-how with growing export possibilities, promoting European competitiveness and offering opportunities for economic development, also at regional and local level. For these reasons a specific legal framework to promote high efficiency cogeneration has been introduced, the cogeneration Directive.

The cogeneration Directive recognises the benefits of this technology and establishes the principles as to how the Member States could support it. The support schemes, for instance financial support, and the electricity grid access and tariffs, as well as, administrative procedures to facilitate cogeneration market penetration are without prejudice to the necessary respect of the rules on state aid covered by this Directive. To ensure the energy efficiency merit of the promoted technology, the Directive has defined the term "useful heat". In practice, this definition has been established to ensure energy saving and not to promote a particular technology.

An important tool of the Directive is Guarantee of Origin (GO). As has happened in the renewables sector, GOs were created to provide transparent information to energy consumers about where their electricity comes from and enable producers to demonstrate that the electricity they sell is produced from high-efficiency cogeneration. These GOs will be issued by the competent body of each Member State. They should be mutually recognizable between countries. Harmonisation of GOs still requires further efforts but their format and responsibilities for issuing them still need to be defined.

GOs specify the amount of electricity from high efficiency cogeneration. So as to be able to identify this amount of electricity, the Commission has developed detailed guidelines⁹ for the calculation of the electricity produced by cogeneration.

The Directive also defines reporting obligations for the Commission and Member States. This Communication responds to some of these tasks as discussed below.

4. WHERE ARE WE IN CHP PROMOTION?

EU measures

The cogeneration Directive was adopted in 2004. Its implementation has progressed but more slowly than originally expected. A major challenge has been the adoption of detailed guidelines for the cogeneration electricity calculation. These guidelines have now been developed following thorough discussions between Member States and the Commission. An indispensable element of the guidelines was a Decision adopted in 2006 on harmonised efficiency reference values for separate production of electricity and heat¹⁰.

To date, 22 Member States have transposed parts of the CHP Directive and the related Commission Decision on reference values. Where this is not yet the case, it often due to the particular legal system of the country which requires a complete transposition of the Directive and all related secondary legislation in one legislative process. This process could not take place before the adoption of the detailed guidelines in November 2008.

⁹ Commission Decision [to be adopted in November 2008].

¹⁰ Commission Decision 2007/74/EC.

Other Community legislation will also have an impact on combined heat and power production in the EU. Among the current policy tools, the following should be noted:

- The Energy Services Directive¹¹ includes provisions that may support the development of micro-cogeneration, for example by the promotion of advanced metering¹². The National Energy Efficiency Plans, under this Directive, should also include cogeneration as an energy saving measure.
- The Buildings Directive¹³ – in the case of new buildings with a total useful floor area over 1000 m² - calls for ensuring technical, environmental and economic feasibility of CHP or district or block heating or cooling systems ("alternative systems"). A recast of this Directive proposes to eliminate this threshold of 1000 m² for new buildings.
- The Community Guidelines on State aid for environmental protection¹⁴ allow financial support for investment and operational costs related to the implementation and running of high-efficiency cogeneration plants, as well for investment aid for high-efficiency district heating. A core principle is that there should be primary energy savings resulting in less CO₂ emissions. Currently, Member States are adapting their support schemes to the new provisions.
- The proposed Renewable Energy Directive provides for European legislation covering heating and cooling from renewable sources for the first time. The National Action Plans under this Directive should include targets for the shares of energy from renewable sources in heating and cooling in 2020. Cogeneration from renewable sources should be included in Member States strategies to achieve these targets.

Member States reporting

The CHP Directive requires the **Member States to report on the cogeneration potential** and the established administrative structures to promote combined heat and power. In addition, they have to report on the progress of cogeneration and provide relevant statistics every four years. Only 11 Member States have submitted their analysis of the national potential so far. These reports generally follow the analysis guidelines as endorsed by the Committee of the Directive.

The existing reports do not give much clear information or figures that can be meaningfully compared. It is therefore difficult to have a complete overview of the cogeneration potential in the whole of the EU. However, it is clear that cogeneration capacity can be considerably increased, but this requires that some Member States pay more attention to policy and fulfil their obligations stipulated in the CHP Directive.

¹¹ Directive 2006/32/EC of the European parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC.

¹² Article 13 of the Directive 2006/32/EC.

¹³ Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.

¹⁴ OJ C 82, 1.4.2008, p. 1.

Currently, the countries with relatively high shares of CHP capacity have a relatively high share of district heating. As district heating is not growing fast in Europe, promoting CHP may help to boost district heating in Member States where it is not developed yet. Industrial applications of CHP represent a further opportunity to develop this technology. The future CHP potential in a country's energy mix is mainly dependent on these developments in district heating and industrial applications.

Concerning the CHP share¹⁵ in electricity and heat sectors, it appears that Member States can be classified into four groups or categories, based on their relative position with respect to the EU27 average as a whole. The ideal situation for Member States concerning cogeneration is to have both a high level of heat and electricity generation, corresponding to area I of figure 2.

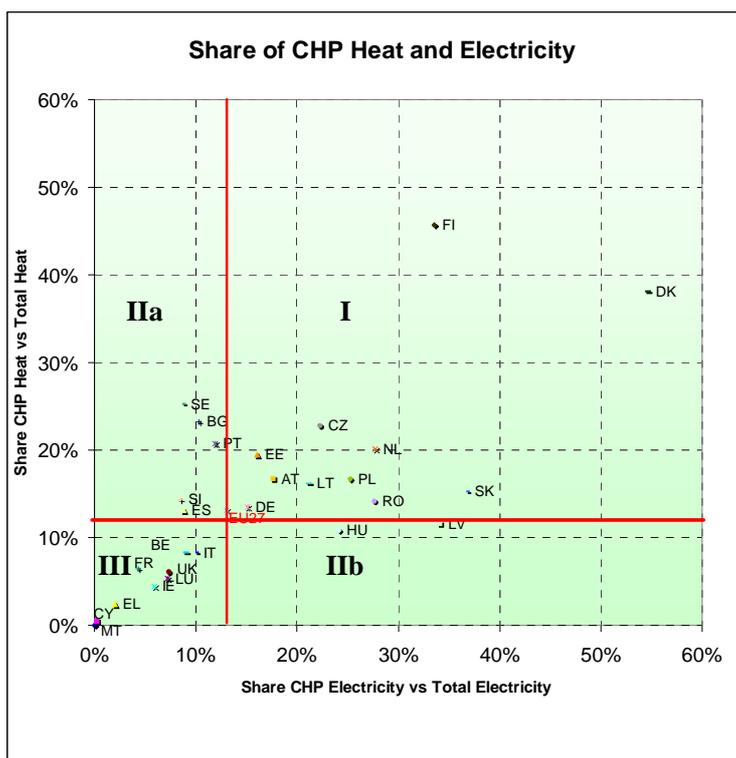


Figure 2: Share of CHP concerning heat and electricity

The reports from the Member States underline some inherent difficulties in the development of the cogeneration sector (related to the weak and/or declining demand for CHP and the lack of economic attractiveness of this technology). For instance:

- CHP requires an appropriate useful heat demand nearby;
- high investment and fixed costs for CHP induce low profitability and long pay-back period;
- decreasing heat demand in buildings affects the use of CHP in district heating.

¹⁵ ESTAT – data 2006.

The Member States reports on the national potential also point to **barriers**. These are not present in all countries that reported so far, but they include:

- unclear long-term prospects of government support; complex legal frameworks (federal/regional levels); complex and time-consuming administrative procedures; effects of other legislation; and
- availability of grid connection at a reasonable price and timeframe and costs to update the grid to accommodate CHP electricity; unfavourable conditions for back-up electricity supplies from the grid;

The CHP Directive addresses several of these barriers and its full transposition could therefore lead to a higher CHP potential than indicated by Member States.

Although more interest is being shown in district cooling, using heat from CHP installations for this purpose is rarely the preferred option. Even if technically possible, it is not an efficient process. District cooling is therefore not expected to contribute much to the further development of combined heat and power production.

Despite the lack of comprehensive data, there are indications that micro- and small scale CHP applications are penetrating the market, for example in the residential sector. However, most Member States' reports include only limited information on the micro-CHP's potential in the coming decades.

- The Commission developed secondary legislation to ensure full implementation of the Directive
- Member States work on transposition of the CHP Directive but are slow in reporting
- More potential could be harnessed but administrative and other barriers persist

5. THE WAY FORWARD

Combined heat and power production is important to enhance energy efficiency and contribute to all common EU energy and climate policy objectives. For this reason, the legal framework to promote high efficiency cogeneration has been established. The implementation of this legal framework, notably the CHP Directive, has not advanced as quickly as was planned. The Member States should take urgent measures to implement the legislation now as all the principal conditions are set by the two Commission Decisions already referred to on harmonised efficiency reference values for separate production of electricity and heat¹⁶ and on detailed guidelines for the calculation of the electricity from cogeneration¹⁷. Also, it is of paramount importance that all countries report on the cogeneration potential and the administrative structures put in place, as defined in this legislation. Further reporting on progress and data should follow.

¹⁶ Commission Decision 2007/74/EC.

¹⁷ Commission Decision [to be adopted in November 2008].

The Commission will continue to fulfil its share of the responsibilities in the follow-up of the Directive. The **permanent monitoring of implementation** continues. The Commission will launch infringement procedures as necessary in order to ensure the correct implementation of this legislation. In addition, other support measures could be envisaged to assist Member States. The concerted action model has proved to be useful in many Directives. It provides Member States with the possibility to address implementation problems of legislation with other Member States and the Commission. This could also be applied here to support Member States.

The **developments in other related energy measures** will also have impact on CHP. For micro CHP: the energy labelling and the implementing measures for boilers under the Eco-design Directive in 2009. For large scale CHP: the proposal for amending the ETS Directive¹⁸ and the proposal for a RES Directive¹⁹ which will regulate the preferential calculation of emission savings of CHP plants using fuels from renewable sources.

The Energy Efficiency Action Plan (EEAP) of 2006 included some measures to support cogeneration. The European Commission launched several studies in 2008. The outcome of these studies - the development of a system for a harmonised electronic CHP guarantee of origin, the preparation of minimum efficiency requirements for district heating and cooling systems and the definition of minimum efficiency requirements for micro-cogeneration - could help to identify the policy measures where further efforts are required.

The Commission will evaluate the Energy Efficiency Action Plan in 2009 with a view to producing an update. Possible new proposals and ideas related to combined heat and power could be assessed in that context. The crucial role of towns and cities in the European and worldwide energy policy picture will be considered at that stage. By 2030 some 80% of European citizens will live and work in urban areas. Large urban areas – consuming much of the energy – provide some of the best opportunities for emerging European energy efficiency investments. In these urban areas, the presence of large district heating systems and the existence of an important electricity demand associated with the proximity of numerous end-users increase the viability and feasibility of cogeneration. In addition to legislation, it is also necessary to further support activities such as the initiative of Covenant of Mayors which will help CHP development in urban areas.

Moreover, cogeneration as a decentralised technology encourages local and regional development and the promotion of local employment. In rural and isolated areas, CHP particularly using renewable energy sources offers opportunities for economic development and job creation.

The EEAP update may also consider the further role of the National Energy Efficiency Action Plans. These plans should be a leading policy tool encompassing all activities on energy efficiency, including cogeneration. They should provide the general policy framework in the country- and be the single reporting instrument to the Commission. This should lighten the administrative burden on the Governments of the Member States.

¹⁸ Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community - COM(2008) 16.

¹⁹ Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources - COM(2008) 19.

The CHP country reports revealed some persistent barriers to the wider uptake of cogeneration. The Member States could address many of these without delay. For instance, smooth administrative processes and transparent support schemes, when applied, are essential to stimulate energy efficiency, also cogeneration. A common framework of grid access rules should be of help to all stakeholders. Naturally, the public authorities have powers on the urban planning framework which is a starting point for district heating networks. Inadequate grid access and interconnection limit the increase of CHP technologies, especially in those Member States where stricter operational rules have recently been passed because of grid security principles.

- Member States need to finalise the implementation of the CHP Directive
- Commission monitors the implementation and provides support
- Energy Efficiency Action Plan update will consider possible new measures

6. CONCLUSION

The Commission sees the CHP Directive as a significant tool in contributing to Europe's answers to the energy challenges. As monitoring of the implementation continues, despite the absence of or late reporting by Member States, the Commission acknowledges the administrative and non-administrative barriers hampering the development of cogeneration. Some of these barriers have been already addressed by the Commission, such as the set-up of harmonised efficiency reference values and the adoption of Community detailed guidelines for the calculation of electricity produced from cogeneration, as previously mentioned. However, the Member States could also enhance their efforts to ensure development of cogeneration.

The Commission will continue to monitor the process and will present further proposals if appropriate to foster cogeneration. As a first step, the Commission will evaluate the Energy Efficiency Action Plan in 2009 with a view to producing an update.

Cogeneration takes the European Union closer to its' energy-related goals. It is a proven tool to increase energy efficiency and achieve savings. At the same time, it reinforces efforts to fight climate change by reducing CO₂ emissions and decreasing network losses. Furthermore, CHP can enhance competitiveness through development of high efficiency cogeneration technologies with export potential and contribute to economic development, creating growth and jobs. Ensuring and exploiting CHP's full potential throughout the Member States is therefore important for the EU.