Republic of Latvia
Ministry of the Economy

# Information report: Regular report by the Republic of Latvia on increasing the share of high-efficiency cogeneration pursuant to Articles 6(3) and 10(2) of Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC

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# Contents

## Introduction

Pursuant to Article 6(3) of Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC (hereinafter referred to as "Directive 2004/8/EC"), Member States shall for the first time not later than 21 February 2007 and thereafter every four years, following a request by the Commission at least six months before the due date, evaluate progress towards increasing the share of high-efficiency cogeneration and, pursuant to Article 10(2) of Directive 2004/8/EC, Member States shall not later than 21 February 2007 and thereafter every four years, following a request by the Commission at least six months before the due date, publish a report with the result of the evaluation referred to in Article 6(3).

This report has been drawn up having regard to the template and spreadsheet in the Annex appended to the European Commission's Director-General's for Energy letter of 11 April 2011 addressed to Latvia, the purpose of which is to simplify the submission of specific data on which the assessment of progress towards increasing the share of high-efficiency cogeneration pursuant to Articles 6(3) and 10(2) of Directive 2004/8/EC is based. See Annex 1 for an overview of energy generated by cogeneration and the fuel used, see Annex 2 for an overview of energy generated by cogeneration by sector and see Annex 3 for an overview of the types of technologies used in Latvia to generate energy by cogeneration.

On 27 June 2006, the Republic of Latvia's Cabinet approved policy planning document *Energy development guidelines 2007-2016* (hereinafter referred to as "Guidelines"), drawn up by the Ministry of the Economy, which set out the basic principles, objectives and action directions of Latvia's energy policy in future years and outline the sector's long-term development directions.

One of Latvia's national energy policy objectives defined in the Guidelines is increasing the amount of energy generated by cogeneration processes.

## 1. Outline of Regulatory Framework

In Latvia, energy generation by cogeneration is regulated by the Energy Law, the Electricity Market Law and Cabinet Regulation No 221 of 10 March 2009 ‘Regulation on electricity generation and price setting, when generating electricity by cogeneration’ issued pursuant to the latter, and also by the Law on Public Utility Regulators and Cabinet regulations issued pursuant to this Law.

General legislation regulating commercial activity and transactions also applies to electricity generation by cogeneration. This includes the Commercial Law, the Civil Law, the Labour Law and legislation regulating environmental protection and construction.

Latvia has established a legal framework in order to promote cogeneration based on a useful heat demand in the internal energy market.

Latvia has transposed the legal text of Directive 2004/8/EC in full, having regard to Commission Decision of 19 November 2008 establishing detailed guidelines for the implementation and application of Annex II to Directive 2004/8/EC of the European Parliament and of the Council, and European Commission Decision of 21 December 2006 establishing harmonised efficiency reference values for separate production of electricity and heat in application of Directive 2004/8/EC of the European Parliament and of the Council.

### 1.1. The Electricity Market Law

The Electricity Market Law incorporates legislative provisions arising from the following European Union (hereinafter 'EU') Directives:

1) Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of the electricity produced from renewable energy sources in the internal electricity market (hereinafter 'Directive 2001/77/EC');

2) Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC;

3) Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC (hereinafter 'Directive 2004/8/EC');

4) Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment;

5) Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (Text with EEA relevance);

6) Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Text with EEA relevance) (hereinafter referred to as "Directive 2009/28/EC").

The Electricity Market Law, adopted on 5 May 2005, stipulates that producers generating electricity by a cogeneration process can gain the right to sell the generated electricity within the framework of compulsory procurement (Article 28(1) of the Electricity Market Law).

The Cabinet has laid down the following criteria in relation to cogeneration, pursuant to Article 28(2) of the Electricity Market Law:

- qualifying criteria to gain the right to sell the generated electricity within the framework of compulsory procurement;
- compulsory procurement and a procedure for monitoring it;
- a procedure for setting the electricity price depending on the cogeneration station's electrical capacity and the fuel used;
- a procedure for covering the costs of compulsory procurement and a procedure for declining the right to sell the generated electricity within the framework of compulsory procurement.

The Electricity Market Law stipulates that producers generating electricity in a cogeneration station whose installed electrical capacity is at least 20 MW can gain the right to receive guaranteed payment for the electrical capacity installed in the cogeneration station (Article $28^1$(1) of the Electricity Market Law).

The Cabinet has laid down the following criteria in relation to cogeneration, pursuant to Article $28^1$(2) of the Electricity Market Law:

- qualifying criteria for classifying cogeneration power stations for them to obtain the right to receive guaranteed payment for the electrical capacity installed in the cogeneration station;
- a procedure for determining payment for the electrical capacity installed in the cogeneration station depending on the generating technology, the fuel used and the electrical capacity installed in the cogeneration station, and a procedure for effecting this payment;

– a procedure under which economic operators can decline the right to receive guaranteed payment for the electrical capacity installed in a cogeneration station.

If producers wish to sell their generated electricity within the framework of compulsory procurement and their cogeneration power station complies with the criteria laid down by the Cabinet, all the residual generated electricity after using electricity for their own needs shall be purchased by the public trader under the procedure and price stipulated by the Cabinet.

The public trader shall record separately the amount and cost of electricity purchased within the framework of compulsory procurement under the procedure laid down by the Cabinet. These procurement costs shall be covered by all of Latvia's electricity end users in proportion to their consumption of electricity, by buying a specified share of electricity generated by cogeneration power stations from the public trader or by covering their procurement expenditure. The procedure for covering the costs of procurement shall be laid down by the Cabinet, and the cost-allocation calculation methodology by the Public Utilities Commission (Article 28(5) of the Electricity Market Law).

Guaranteed payment for installed electrical capacity is incorporated in transmission tariffs. The transmission system operator shall record separately the amount of payments made. The costs comprising payments for installed electrical capacity shall be covered by all of Latvia's electricity end users. The calculation methodology for this cost allocation shall be laid down by the Public Utilities Commission (Article $28^1$(4) of the Electricity Market Law).

Cogeneration power stations complying with certain criteria can receive certificates of origin for the electricity they generate under the procedure laid down by the Cabinet. Certificates of origin shall be issued by a body authorised by the Cabinet (Article 28(7) and Article $28^1$(5) of the Electricity Market Law).

### 1.2. The Law on Public Utility Regulators

The Law on Public Utility Regulators stipulates that the State shall regulate the provision of public utilities as a commercial activity in the energy sector, including heating supply where, in process of producing heating, electricity is generated.

On the basis of the Law on Public Utility Regulators, on 27 October 2009 the Cabinet adopted Regulation No 1227 'Regulation on public utility types to be regulated'. This stipulated that, for electricity supply, electricity generation in power stations with installed electrical capacity greater than one megawatt requires regulation. The Public Utilities Commission licences heat energy production and electricity generation in cogeneration installations and lays down a methodology for the calculation of tariffs , as well as the tariffs themselves.

Decisions made and administrative orders issued by the Public Utilities Commission within the framework of its responsibilities laid down by legislation are also binding on economic operators producing energy by high-efficiency cogeneration. Pursuant to Article 85(1) of the Energy Law, the Public Utilities Commission, within the framework of its responsibilities, lays down provisions regulating energy supply and provides explanations thereof. In addition, pursuant to Article 13(2) of the Law on Public Utility Regulators, it provides information to State and local government authorities and bodies to ensure the transparency of its operation, to explain the actions of public utility providers and to ascertain public attitudes to them.

### 1.3. Cabinet Regulation No 221 of 16 March 2010 'Regulation on electricity generation and setting prices when electricity is generated by cogeneration'

In 2009 and 2010, several important pieces of legislation were drafted with the purpose of promoting electricity generation by cogeneration.

Pursuant to the Electricity Market Law, Cabinet Regulation No 221 'Regulation on electricity generation and setting prices when electricity is generated by cogeneration' (hereinafter referred to as "Cabinet Regulation No 221") was issued on 10 March 2009, laying down the compulsory procurement for a fixed price of electricity generated by a cogeneration process, and providing for the right to receive guaranteed payment for the electrical capacity installed in a cogeneration station.[1]

Cabinet Regulation No 221 incorporates legislative provisions arising from Directive 2004/8/EC, and from the European Commission Decision of 21 December 2006 establishing harmonised efficiency reference values for separate production of electricity and heat in application of Directive 2004/8/EC of the European Parliament and of the Council.

Cabinet Regulation No 221 lays down:

- criteria for classifying cogeneration power stations so that they may obtain the right to sell the electricity generated within the framework of compulsory procurement or to receive guaranteed payment for the electrical capacity installed in the cogeneration station;
- a procedure for the compulsory procurement, and the monitoring thereof, of electricity generated in cogeneration power stations;
- a procedure for covering the costs of compulsory procurement;
- a procedure for setting a price for the electricity generated by cogeneration power stations, depending on the cogeneration station's electrical capacity and the fuel used;

[1] Cabinet Regulation No 221 replaces Cabinet Regulation No 921 of 6 November 2006: Regulation on electricity generation by cogeneration
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- a procedure enabling economic operators to decline the right to sell the generated electricity within the framework of compulsory procurement;
- a procedure enabling economic operators to receive certificates of origin stating that the electricity generated by cogeneration power stations owned by them complies with the efficiency requirements laid down in this Regulation;
- a procedure for determining the payment for the electrical capacity installed in a cogeneration station depending on the generating technology, the fuel used and the electrical capacity installed in the cogeneration station, and a procedure for effecting this payment;
- a procedure enabling economic operators to decline the right to receive guaranteed payment for the electrical capacity installed in a cogeneration station.

The qualifying criteria referred to, including the calculation method used to calculate the amount of electricity generated by cogeneration, comply with the requirements of Annex II to Directive 2004/8/EC, and so the alternative calculation method provided for in Article 12(2) of Directive 2004/8/EC is not used.

Given the development level of cogeneration technology and the cost of investment, the implementation in practice of widely-used technologies – steam turbines, gas turbines, combined-cycle and internal combustion engines – can be expected in Latvia over the next ten years in populated areas with a sufficiently large, appropriate heat load. However, in the next few years more extensive implementation of innovative technologies is not expected in Latvia. Some utilisation of *Stirling engine* and *Organic Rankin Cycle* technologies for cogeneration can be expected. Consequently, there is no need to review the threshold values, referred to in Directive 2004/8/EC, used to calculate electricity generated by cogeneration, or the threshold values used to calculate cogeneration efficiency and primary energy savings included in Cabinet Regulation No 221.

Since 1 November 2010, only economic operators using or planning to use renewable energy sources to generate electricity qualify for the right to sell electricity generated by cogeneration within the framework of compulsory procurement or to receive guaranteed payment for installed electrical capacity pursuant to Cabinet Regulation No 221.

## 2. High-efficiency cogeneration potential in Latvia

Latvia has identified the necessity to satisfy existing energy demand through the use of the maximum possible amount of local energy sources and environmentally friendly and sustainable technologies. Consequently, it remains essential to gradually replace existing heat-production installations with cogeneration installations using local energy sources. Their considered replacement, together with the efficient utilisation of energy sources, would make a considerable contribution to reducing greenhouse gas emissions.

Around 22% of the necessary heat energy used is produced by district heating systems, whereas 78% of heat energy is produced by decentralised (local and individual) heating systems (2009, Eurostat). In 2010, around 70% of the final consumption of district heating systems' heat energy was consumed by households. In recent years, the amount of energy produced by district heating system boiler houses has gradually reduced, as shown in Table 1 of this report.

Table 1

Structure of energy produced from 2000 to 2010 (%)

| | **2000** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** |
|---|---|---|---|---|---|---|---|
| **Electricity generated** | **12.92** | **15.05** | **20.46** | **19.94** | **22.31** | **22.01** | **27.75** |
| Power stations | | 0.01 | | 0.01 | 0.02 | 0.03 | 0.07 |
| Cogeneration stations | 12.92 | 15.04 | 20.46 | 19.93 | 22.29 | 21.97 | 27.68 |
| **Heat produced by district heating** | **87.08** | **84.95** | **79.54** | **80.06** | **77.69** | **77.99** | **72.25** |
| Cogeneration stations | 32.89 | 40.03 | 44.08 | 44.87 | 40.85 | 42.86 | 42.40 |
| Boiler houses | 54.20 | 44.91 | 35.46 | 35.18 | 36.84 | 35.13 | 29.85 |

Source: Central Statistical Bureau

Looking at the structure of electricity supply, gross national electricity consumption was 7500 GWh in 2010, of which 2402 GWh was generated by large cogeneration stations (Riga TEC-1 and Riga TEC-2), while other cogeneration stations generated 648 GWh. The cogeneration station share of gross national electricity consumption comprised 40.7% in 2010. The contribution of the said large cogeneration stations increased from 19.6% in

2000 to 32.0% in 2010. In the same period, the share of other cogeneration stations grew from 2.5% in 2000 to 8.6% in 2010.

Looking at the structure of district heating supply, 28.66 PJ was produced in 2010, of which cogeneration stations produced 16.82 PJ and boiler houses produced 11.84 PJ of heat energy. Consequently, of all the heat supplied by district heating systems, cogeneration stations produced 58.7% and boiler houses 41.3%.

A rapid increase in the share of high-efficiency cogeneration can be seen in Latvia's energy sector since 2000. In 2010, the share of electricity generated by a cogeneration process in Latvia was 45% of the electricity generated in the country. Cogeneration is efficient in terms of utilising primary energy, but the useful utilisation of the heat energy produced is restricted by the seasonality of heating, and the lack of an appropriate industrial heat load.

The share of electricity generated by cogeneration has risen considerably, having increased by 132.3% from 2010 to 2000. In 2010, Latvia's gross electricity consumption was 7.5 TWh, but 2.98 TWh was generated by high-efficiency cogeneration, as shown in Table 2 of this report.

Table 2

Number of high-efficiency cogeneration stations, installed capacity and energy generated

| | **2007** | **2008** | **2009** | **2010** |
|---|---|---|---|---|
| **Number of high-efficiency cogeneration stations** | **30** | **35** | **46** | **55** |
| **Installed electrical capacity (MW)** | **555.1** | **876** | **891.4** | **898.3** |
| **Installed heat energy capacity (MW)** | **880.3** | **971** | **990.4** | **997.8** |
| **Electricity generated (GWh).** | **1911** | **1634** | **2000** | **2981** |
| **Heat energy produced (GWh)** | **2568** | **2059** | **2029** | **2790** |

Source: Ministry of the Economy

In 2010, cogeneration stations produced **4673 GWh** (16.82 PJ) or 58.7%, while boiler houses produced **3289 GWh** (11.84 PJ) or 41.3% of district heating system heat energy. Efficient cogeneration, as seen in Table 3, generated **2981 GWh** (10.73 PJ) of electricity in 2010, **63%** of the total amount of electricity generated by cogeneration (Table 3).

Table 3

Number of cogeneration stations, installed capacity and energy generated

| | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|
| **Number of cogeneration stations** | **43** | **48** | **56** | **71** |
| **Installed electrical capacity (MW)** | **593.3** | **587.7** | **933.6** | **947.5** |
| **Installed heat energy capacity* (MW)** | **3024.1** | **2737.3** | **2737.2** | **2856.6** |
| **Electricity generated (GWh)** | **1983.9** | **2103.6** | **2057.2** | **3049.9** |
| **Heat energy produced** (GWh)** | **4606.9** | **3990.2** | **4076.1** | **4730.8** |

* Installed heat energy capacity shown including installed capacity of water-heating boilers for producing heat energy

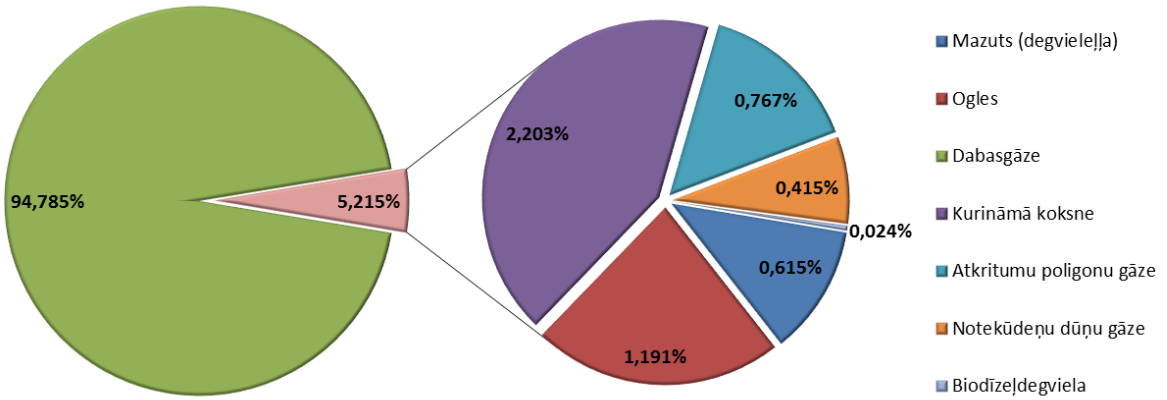
** Heat energy produced shown including heat energy produced by water-heating boilers

Source: Central Statistical Bureau

Given that implemented energy policy has nominated increasing energy generating efficiency as one of the priorities, the relationship between district heating energy produced in boiler houses and district heating energy produced by cogeneration has changed since 2000: the amount of heat energy produced by cogeneration district heating systems increased from 12.03 PJ (37.8%) in 2000 to 16.82 PJ (58.7%) in 2010 and the amount of heat energy produced by boiler houses fell from 19.83 PJ (62.2%) in 2000 to 11.84 PJ (41.3%) in 2010.

Latvia's consumption of primary energy sources has fallen considerably, from 333.2 PJ in 1990 to 200.5 PJ in 2010, with energy production by high-efficiency cogeneration utilising 24.9 PJ of energy sources in 2010, of which 0.26 PJ were renewable energy sources.

Currently, oil products (33.9% in 2010) and wood fuel (24.6% in 2010) are the fuels most consumed in final energy consumption. Natural gas is the main fuel utilised in Latvia's cogeneration stations. Small amounts of heating oil, peat, coal and biofuel (wood-chip fuel, fuel residues, biogas and biodiesel) are used. The diagram in this report displays the breakdown of fuel types used in all cogeneration stations, which has remained fundamentally unchanged since 2000.




**Key to diagram:**
Heavy oil (heating oil)
Coal
Natural gas
Wood fuel
Waste disposal site gas
Wastewater sludge gas
Biodiesel

**Diagram. Energy sources consumed in the cogeneration station conversion sector, 2010**
Source: Latvia's energy in numbers, Ministry of the Economy, 2011

Basically, the following cogeneration technologies are utilised in Latvia:

- combined cycle gas turbines with heat utilisation;
- back pressure steam turbines;
- internal combustion engines;
- gas turbines with heat utilisation.

In 2010, 86.3% of the electricity generated in high-efficiency cogeneration power stations was generated utilising combined cycle gas turbines (CCGT) with heat utilisation, with 12.8% utilising internal combustion engines, 0.7% utilising back pressure steam turbines, and 0.2% utilising gas turbines with heat utilisation.

Numerous cogeneration stations with installed capacity of up to 1 MW operate in Latvia. Operating these stations does not require a licence, and the electricity generated is sold pursuant to agreements with the transmission system operator, with the heat energy sold pursuant to agreements with local heating supply companies.

The rate of increasing the use of high-efficiency efficient cogeneration installations for district heating systems is being held back by the large amount of investment required, the restricted capacity of local governments to obtain loans, and the low rate of capital turnover. For these reasons, local governments continue to operate inefficient installations resulting in increased over-consumption of fuel and the inability to supply heat at the required quality level. The energy generating process can be optimised and heat losses in

transmission systems reduced through the complete overhaul of systems. Nevertheless, the overall average efficiency level of heat production installations in Latvia can be rated as high.

Efforts must also be made to maintain and develop existing district heating systems in the future as they provide the constant heat load and, to achieve the maximum impact, choose cogeneration capacity appropriate to the existing heat load. A considerable increase is not expected in the coming years.

Latvia is currently already paying particular attention to the application of those cogeneration technologies which use renewable energy sources to produce energy. Given the circumstances in Latvia, that is mostly wood fuel. One of the current priorities is the implementation of measures to promote energy produced from renewable energy sources, increasing the share in total gross final energy consumption,[2] which means support for the efficient utilisation of biomass not only for heat energy but also to generate electricity.

Considerable cogeneration potential also exists in local and individual heating supply, the uptake of which does not significantly affect existing district heating system cogeneration heat loads.

In promoting the development of cogeneration stations and energy generation from renewable energy sources, the potential electricity capacity in both transmission and distribution systems must be increased.

Three support instruments were selected for this purpose:

1. Compulsory procurement of electricity;
2. Guaranteed payment for installed electrical capacity;
3. To promote the development of cogeneration power stations using renewable energy sources, targeted grants for investment in the construction of such power stations are provided for, utilising European Union Structural Fund financing for this purpose.

[2] The share of energy generated using renewable energy sources must reach 40% of total final gross energy consumption by 2020.
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## 3. Barriers to high-efficiency cogeneration

Non-regulatory and regulatory barriers to the development of cogeneration can be separated. The following can be called **non-regulatory** barriers:

- technical barriers;
- financial (investment);
- operational problems;
- access to raw material sources and the necessary infrastructure;
- public attitudes;
- internalisation of external costs (for example, new taxes).

Overall, it can be concluded that Latvia has no significant non-regulatory barriers to the uptake of high-efficiency cogeneration potential.

High investment costs and problems with attracting appropriate amounts of funding can be seen as the most serious barrier, particularly for local governments. The opportunities for compulsory procurement and guaranteed payment laid down in current legislation offer considerable support in promoting the development of cogeneration.

Those barriers that can be considered **regulatory** relate to administrative procedures, such as obtaining permits (certificates, licences, etc.), standards, which the current regulatory framework lays down as necessary for entering the energy market, and the lack of optimised and simplified procedures for issuing these permits, disparate regulations for market participants, as well as a lack of coordination between different bodies.

To commence and carry out energy generation by a cogeneration process in Latvia, the following permits are required:

- a licence issued by the Public Utilities Commission (for cogeneration station above 1 MW);
- a permit to increase electricity generating capacity or implement new capacity issued by the Ministry of the Economy;
- a permit from the system operator to connect the power station to the system;
- an Environment State Bureau decision concerning an environmental impact assessment (hereinafter – EIA) or a technical regulation issued by a regional environmental board of the State Environment Service;
- a permit for polluting activity issued by a regional environmental board of the State Environment Service;
- a permit to emit greenhouse gas issued by a regional environmental board (pursuant to the provisions of the Law on Pollution);

- If producers wish to sell electricity within the framework of compulsory procurement or to receive guaranteed payments for installed electrical capacity, the Ministry of the Economy must issue a decision on qualification for compulsory procurement or allocation of the right to receive guaranteed payments for installed electrical capacity;
- heat and electricity tariffs approved by the Public Utilities Commission.

Table 4

Time taken to receive and review permit applications at various administrative bodies

| **Permit type** | **Competent authority** | **Time to make decision, days** |
|---|---|---|
| Issue of licence | Public Utilities Commission | 30 |
| Permit to connect to system | System operator | 60 |
| Permit to implement new capacity | Ministry of the Economy | 30 |
| EIA | Environment State Bureau | 60 |
| Technical regulation | Regional environmental board of the State Environment Service | 20 |
| Permit for polluting activity | Regional environmental board of the State Environment Service | A activity – 180<br>B activity – 90<br>C activity - 30 |
| Permit to emit greenhouse gas | Regional environmental board of the State Environment Service | 90 |
| Decision on qualification for compulsory procurement/guaranteed payment for installed electrical capacity | Ministry of the Economy | 30 |
| Heat energy and/or electricity tariffs | Public Utilities Commission | 90 |

Analysing the administrative procedures, it can be concluded that Latvia has no administrative barriers to the development of cogeneration, but shortening the time taken for some administrative procedures would be advisable.

Analysing the time taken to issue permits, it can be concluded that, having regard to the amount of documents to be examined and the evaluation procedures, they are, mostly, justified. The longest periods of time are for permits for polluting activity, but these decisions involve public consultation and coordination between different bodies.

Even though Latvia's previous regular reports on the implementation of Directive 2004/8/EC have expressed the recommendation that the time taken for licence-issuing, system-connection and tariff-calculation procedures be reviewed and, where possible shortened, when we evaluate the current situation we can see that shortening the time periods would not currently be useful to promote valid implementation and increasing of cogeneration capacity. However, we would draw attention to the fact that the maximum time periods to obtain permits given in Table 4 can differ significantly in each different case.

The rules regulating cogeneration can be considered as objective and non-discriminatory, since the right to qualify for compulsory procurement can be received by all cogeneration technologies or combinations thereof, if, when used, they can simultaneously generate electricity and useful heat.

The following administrative bodies are involved in the administration of the cogeneration process:

1. Ministry of the Economy;
2. Public Utilities Commission;
3. Ministry of Environmental Protection and Regional Development (Environment State Bureau and regional environmental boards of the State Environment Service).

Decisions made and administrative orders issued by the Public Utilities Commission can only be adjudged unlawful and rescinded by a court. The Public Utilities Commission is responsible for the legality of its actions. Losses arising from an unlawful decision by the regulator or because of an unlawful administrative order shall be compensated under the procedure laid down in legislation.

Decisions by the Ministry of the Economy not to allocate to economic operators the right to sell the electricity generated in an appropriate cogeneration power station within the framework of compulsory procurement can be appealed against by the economic operator under the procedure laid down in the Law on Administrative Processes.

Decisions by a regional environmental board of Latvia's State Environment Service can be disputed at the Environment State Bureau within one month. In such cases, the day the application was received is considered to be the day that the final decision on which information is considered to be limited-access information entered into force.

Decisions by the Environment State Bureau can be appealed against in court under the procedure laid down in the Law on Administrative Processes.

## 4. Certificates of origin and aid schemes

Article 5 of Directive 2004/8/EC imposes an obligation on Member States to ensure that the origin of electricity generated by cogeneration can be guaranteed according to objective, transparent and non-discriminatory criteria. Consequently, producers in Latvia are given the opportunity to demonstrate that the electricity they sell is generated by high-efficiency cogeneration.

Latvia's certificate of origin system for electricity generated by cogeneration is laid down in the Electricity Market Law and Chapter V of Cabinet Regulation No 221.

Economic operators can obtain a certificate of origin that the electricity generated by a cogeneration power station owned by them complies with stipulated efficiency requirements and therefore is acknowledged to be electricity generated by high-efficiency cogeneration. Such certificates of origin are issued by the Ministry of the Economy. If economic operators wish to receive a certificate of origin for electricity generated in one year, when submitting a report to the Ministry of the Economy on the operation of every cogeneration power station they own, they make a note in their submission that they wish to receive a certificate of origin.

Certificates of origin are issued for the amount of electricity generated by a cogeneration power station complying with stipulated efficiency criteria (the saving of primary energy sources is greater than 1% for low capacity cogeneration stations and not less than 10% for other cogeneration stations) and which is determined pursuant to the procedure laid down in this Regulation.

Producers can receive a certificate of origin for the amount of electricity generated by cogeneration in a shorter period, but not for less than three months. The Ministry of the Economy shall issue certificates of origin within 30 days of receiving annual reports or the prescribed submission and information, or decline to issue, providing the reason for the refusal,.

Certificates of origin can be considered accurate and credible, as, to receive a certificate, economic operators must submit a report to the Ministry of the Economy on the operation of each cogeneration power station they own in accordance with the report form, which must include the following information:

- general information about the cogeneration station (location, licence No, economic operator's registration No, system operator, installed heat and electrical capacity, cogeneration technology and fuel types used, number of employees and user of the useful heat);
- information on the cogeneration station's operation during the year, by month (fuel consumed, heat energy produced and sold and its price, electricity generated and transferred to the network, the cogeneration

installation's actual efficiency factor, electricity generated by the cogeneration process, price of cogeneration electricity).

The data submitted is confirmed by an authorised official of the system operator to whose electrical grid the cogeneration power station is connected, which strengthens the credibility of the information provided.

Overall, the certificate of origin system for electricity generated by high-efficiency cogeneration can be evaluated as being in compliance with the requirements of Directive 2004/8/EC. The issuer of certificates of origin, the Ministry of the Economy, is an independent, competent authority, not dependent on electricity generating and distribution activities. The procedure for obtaining a certificate is simple and the time required is sufficiently short. Only one authority need be approached to obtain a certificate – the Ministry of the Economy.

Aid for the generation of electricity by cogeneration is provided for in Cabinet Regulation No 221, which provides for the compulsory procurement of electricity generated by a cogeneration process for a set price, and provides for the right to receive guaranteed payment for the electrical capacity installed in a cogeneration station. This regulation is described in more detail in sub-section 1.3.

Electricity generation by cogeneration is also facilitated by the European Union Cohesion Fund-financed activity "Development of cogeneration power stations using renewable energy sources".

Cabinet Regulation No 165, "Regulation on Operational Programme 'Infrastructure and Services' supplementary activity 3.5.2.2 'Development of cogeneration power stations using renewable energy sources" (hereinafter referred to as the "Activity") entered into force on 17 February 2009 to implement the Operational Programme "Infrastructure and Services" supplementary activity 3.5.2.2 "Development of cogeneration power stations using renewable energy sources",.

The objective of the Activity is to significantly increase the amount of electricity and heat energy generated from renewable energy sources, so reducing Latvia's dependence on imported primary energy sources.

The Activity provides for aid for the construction of cogeneration stations utilising renewable energy sources.

Up to 1 July 2011, contracts have been concluded for ten projects within the framework of Activity 3.5.2.2, with Cohesion Fund funding of LVL 21 365 499.55.

## Conclusions

While Latvia has seen a steady expansion of cogeneration power stations since 2000, one of Latvia's energy policy objectives, currently laid down in the Guidelines, is to increase energy production by efficient cogeneration. To date, the main cogeneration potential has been seen in existing district heating systems and this has developed rapidly in recent years, with the amount of energy generated by district heating boiler houses falling gradually.

Cogeneration is efficient in terms of the utilisation of primary energy, but the useful utilisation of the heat produced is restricted by the seasonality of heating, and the lack of appropriate industrial heat load. As new heat loads emerge, the establishment of cogeneration stations should be evaluated.

In the light of current energy policy, under which increasing the efficiency of energy generation is designated as a priority, the relationship between district heating energy produced in boiler houses and district heating energy produced by cogeneration has changed since 2000, with the amount of heat energy produced by cogeneration district heating systems in 2010 increasing by 20.9 percentage points compared with 2000.

In 2010, Latvia's high-efficiency cogeneration power stations (with total installed electrical capacity of 898.3 MW and heat capacity of 997.8 MW) generated **2981 GWh** of electricity and **2790 GWh** of heat energy, mainly utilising natural gas as fuel (24.6 PJ). Only 0.01% (0.26 PJ) of all the fuel used in cogeneration derived from renewable energy sources. The share of high-efficiency cogeneration in total electricity generation in 2010, compared with 2004, increased by 16%, and the cogeneration share of district heating supply rose significantly.

After evaluating the development of high-efficiency cogeneration, and considering economic development trends and the technologies available, Latvia has concluded that there is no need to review the threshold limits referred to in Directive 2004/8/EC, used in calculating electricity generated by cogeneration, or the threshold limits used in calculating cogeneration efficiency and primary energy savings. For Latvia, considering the limited potential of district heating, the development of dispersed energy capacity is of vital importance in the next period, the use of local and renewable energy sources enabling reduced investment in grids, and particularly in transmission. Consequently the development of aid mechanisms for the production of dispersed energy is also planned, supporting the use of renewable energy sources and high-efficiency cogeneration**.**

**Annex 1**

## Overview of energy generated by cogeneration and fuel used

| Overview | | | | Electricity generated by cogeneration[1], capacity, amount of fuel | Core-business producers' production, capacity, amount of fuel | Own-use producers' production, capacity, amount of fuel | Cogeneration share in total electricity generation | Heat production by cogeneration | Core-business producers | Own-use producers | Cogeneration proportion in total heat production | Newly constructed cogeneration installations[1] | Modernisation of existing cogeneration installations[1] | Total installations(cogeneration and non-cogeneration)[2] | PES[3] | CO2 emissions eliminated |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | electricity | capacity | [GW] | 0,531 | | | * | | | | | 0,005 | 0 | 2,092 | * | * tCO2 |
| | | generated | [TWh] | * | * | * | | | | | | * | 0 | 4,136 | | |
| | heat | capacity | [GW] | | | | | 1,202 | | | * | 0,012 | 0 | * | | |
| | | produced | [TWh] | | | | | * | * | * | | * | 0 | 8,852 | | |
| | fuel | total | [PJ] | * | * | * | | * | * | * | | * | 0 | 45,5108 | | |
| | | natural gas | [PJ] | * | * | * | | * | * | * | | * | 0 | 30,3902 | | |
| | | anthracite | [PJ] | * | * | * | | * | * | * | | * | 0 | 0,5123 | | |
| | | lignite | | * | * | * | | * | * | * | | * | 0 | 0 | | |
| | | renewable energy sources | [PJ] | * | * | * | | * | * | * | | * | 0 | 0 | | |
| | | oil and oil products | [PJ] | * | * | * | | * | * | * | | * | 0 | 5,9739 | | |
| | | biomass | [PJ] | * | * | * | | * | * | * | | * | 0 | 5,196 | | |
| | | biogas | [PJ] | * | * | * | | * | * | * | | * | 0 | 0 | | |
| | | waste incineration | [PJ] | * | * | * | | * | * | * | | * | 0 | 0 | | |
| | | waste disposal gas | [PJ] | * | * | * | | * | * | * | | * | 0 | 0 | | |
| | | other fuels | [PJ] | * | * | * | | * | * | * | | * | 0 | 3,4384 | | |
| 2004 | electricity | capacity | [GW] | 0,591 | 0,589 | 0,002 | 29% | | | | | 0,003 | 0 | 2,156 | 2,08 PJ | * tCO2 |
| | | generated | [TWh] | 1,353 | 1,338 | 0,014 | | | | | | 0,009 | 0 | 4,689 | | |
| | heat | capacity | [GW] | | | | | 1,270 | 1,268 | 0,003 | 31% | 0,008 | 0 | * | | |
| | | produced | [TWh] | | | | | 2,683 | 2,665 | 0,018 | | 0,017 | 0 | 8,637 | | |
| | fuel | total | [PJ] | 6,031 | 5,970 | 0,061 | | 11,990 | 11,913 | 0,077 | | 0,112 | 0 | 44,584 | | |
| | | natural gas | [PJ] | 6,018 | 5,958 | 0,061 | | 11,785 | 11,708 | 0,077 | | 0,077 | 0 | 33,780 | | |
| | | anthracite | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0,315 | | |
| | | lignite | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | renewable energy sources | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | oil and oil products | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 3,013 | | |
| | | biomass | [PJ] | 0,011 | 0,011 | 0 | | 0,176 | 0,176 | 0 | | 0,035 | 0 | 7,251 | | |
| | | biogas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0,055 | | |
| | | waste incineration | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | waste disposal gas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0,111 | | |

| Overview | | | | electricity generated by cogeneration[1], capacity, amount of fuel | Core-business producers' production, capacity, amount of fuel | Own-use producers' production, capacity, amount of fuel | cogeneration share in total electricity generation | Heat production by cogeneration | Core-business producers | Own-use producers | cogeneration proportion in total heat production | Newly constructed cogeneration installations[1] | Modernisation of existing cogeneration installations[1] | Total installations(cogeneration and non-cogeneration)[2] | PES[3] | CO2 emissions eliminated |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | electricity | capacity | [GW] | 0.738 | 0.736 | 0.002 | 29% | | | | | 0.147 | 0 | 2.165 | 3.60 PJ | * tCO2 |
| | | generated | [TWh] | 1.414 | 1.399 | 0.015 | | | | | | 0.208 | 0 | 4.906 | | |
| | heat | capacity | [GW] | | | | | 1.419 | 1.416 | 0.003 | 30% | 0.148 | 0 | * | | |
| | | produced | [TWh] | | | | | 2.614 | 2.596 | 0.019 | | 0.214 | 0 | 8.651 | | |
| | fuel | total | [PJ] | 6.207 | 6.143 | 0.063 | | 11.906 | 11.825 | 0.081 | | 1.125 | 0 | 44.046 | | |
| | | natural gas | [PJ] | 6.188 | 6.125 | 0.063 | | 11.657 | 11.577 | 0.081 | | 1.125 | 0 | 34.547 | | |
| | | anthracite | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.262 | | |
| | | lignite | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | renewable energy sources | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | oil and oil products | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 2.224 | | |
| | | biomass | [PJ] | 0.017 | 0.017 | 0 | | 0.221 | 0.221 | 0 | | 0 | 0 | 6.688 | | |
| | | biogas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.095 | | |
| | | waste incineration | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.000 | | |
| | | waste disposal gas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.170 | | |
| | | other fuels | [PJ] | 0.001 | 0.001 | 0 | | 0.027 | 0.027 | 0 | | 0 | 0 | 0.060 | | |
| 2006 | electricity | capacity | [GW] | 0.548 | 0.546 | 0.002 | 41% | | | | | 0 | 0.330 | 2.151 | 3.69 PJ | * tCO2 |
| | | generated | [TWh] | 2.016 | 2.002 | 0.014 | | | | | | 0 | 0.857 | 4.891 | | |
| | heat | capacity | [GW] | | | | | 0.873 | 0.870 | 0.003 | 34% | 0 | 0.609 | * | | |
| | | produced | [TWh] | | | | | 2.843 | 2.825 | 0.018 | | 0 | 1.561 | 8.349 | | |
| | fuel | total | [PJ] | 8.562 | 8.502 | 0.060 | | 12.255 | 12.178 | 0.077 | | 0 | 10.679 | 45.022 | | |
| | | natural gas | [PJ] | 8.545 | 8.486 | 0.060 | | 12.039 | 11.962 | 0.077 | | 0 | 10.679 | 36.187 | | |
| | | anthracite | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.210 | | |
| | | lignite | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | renewable energy sources | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | oil and oil products | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 1.301 | | |
| | | biomass | [PJ] | 0.016 | 0.016 | 0 | | 0.202 | 0.202 | 0 | | 0 | 0 | 6.995 | | |
| | | biogas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.087 | | |
| | | waste incineration | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.000 | | |
| | | waste disposal gas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.142 | | |
| | | other fuels | [PJ] | 0.001 | 0.001 | 0 | | 0.013 | 0.013 | 0 | | 0 | 0 | 0.100 | | |

| Overview | | | | Electricity generated by cogeneration[1], capacity, amount of fuel | Core-business producers' production, capacity, amount of fuel | Own-use producers' production, capacity, amount of fuel | Cogeneration share in total electricity generation | Heat production by cogeneration | Core-business producers | Own-use producers | cogeneration proportion in total heat production | Newly constructed cogeneration installations[1] | Modernisation of existing cogeneration installations[1] | Total installations(cogeneration and non-cogeneration)[2] | PES[3] | CO2 emissions eliminated |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | electricity | capacity | [GW] | 0.555 | 0.553 | 0.002 | 40% | | | | | 0.006 | 0 | 2.132 | 3.63 PJ | * tCO2 |
| | | generated | [TWh] | 1.911 | 1.895 | 0.016 | | | | | | 0.026 | 0 | 4.771 | | |
| | heat | capacity | [GW] | | | | | 0.880 | 0.877 | 0.003 | 32% | 0.007 | 0 | * | | |
| | | produced | [TWh] | | | | | 2.568 | 2.548 | 0.021 | | 0.031 | 0 | 7.968 | | |
| | fuel | total | [PJ] | 8.018 | 7.949 | 0.069 | | 10.903 | 10.815 | 0.087 | | 0.243 | 0 | 42.825 | | |
| | | natural gas | [PJ] | 7.951 | 7.882 | 0.069 | | 10.624 | 10.537 | 0.087 | | 0.243 | 0 | 34.120 | | |
| | | anthracite | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.446 | | |
| | | lignite | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | renewable energy sources | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | oil and oil products | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 1.179 | | |
| | | biomass | [PJ] | 0.012 | 0.012 | 0 | | 0.158 | 0.158 | 0 | | 0 | 0 | 6.740 | | |
| | | biogas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.092 | | |
| | | waste incineration | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | waste disposal | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.139 | | |
| | | other fuels | [PJ] | 0.001 | 0.001 | 0 | | 0.020 | 0.020 | 0 | | 0 | 0 | 0.109 | | |
| 2008 | electricity | capacity | [GW] | 0.876 | 1.203 | 0.002 | 31% | | | | | 0.017 | 0.633 | 2.154 | 3.10 PJ | * tCO2 |
| | | generated | [TWh] | 1.634 | 1.618 | 0.016 | | | | | | 0.043 | 0.073 | 5.274 | | |
| | heat | capacity | [GW] | | | | | 0.971 | 1.577 | 0.003 | 28% | 0.019 | 0.680 | * | | |
| | | produced | [TWh] | | | | | 2.059 | 2.039 | 0.020 | | 0.048 | 0.137 | 7.334 | | |
| | fuel | total | [PJ] | 6.862 | 6.796 | 0.066 | | 8.750 | 8.666 | 0.084 | | 0.397 | 0.790 | 41.755 | | |
| | | natural gas | [PJ] | 6.842 | 6.777 | 0.066 | | 8.536 | 8.452 | 0.084 | | 0.397 | 0.790 | 33.689 | | |
| | | anthracite | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.524 | | |
| | | lignite | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | renewable energy sources | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | oil and oil products | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.692 | | |
| | | biomass | [PJ] | 0.019 | 0.019 | 0 | | 0.201 | 0.201 | 0 | | 0 | 0 | 6.519 | | |
| | | biogas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.092 | | |
| | | waste incineration | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | waste disposal | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.198 | | |
| | | other fuels | [PJ] | 0.001 | 0.001 | 0 | | 0.012 | 0.012 | 0 | | 0 | 0 | 0.040 | | |

| Overview | | | | Electricity generated by cogeneration[1], capacity, amount of fuel | Core-business producers' production, capacity, amount of fuel | Own-use producers' production, capacity, amount of fuel | Cogeneration share in total electricity generation | Heat production by cogeneration | Core-business producers | Own-use producers | cogeneration proportion in total heat production | Newly constructed cogeneration installations[1] | Modernisation of existing cogeneration installations[1] | Total installations(cogeneration and non-cogeneration)[2] | PES[3] | CO2 emissions eliminated |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009 | electricity | capacity | [GW] | 0.891 | 0.888 | 0.003 | 36% | | | | | 0.017 | 0.004 | 2.501 | 3.68 PJ | * tCO2 |
| | | generated | [TWh] | 2.000 | 1.980 | 0.020 | | | | | | 0.067 | 0.014 | 5.569 | | |
| | heat | capacity | [GW] | | | | | 0.990 | 0.986 | 0.004 | 28% | 0.019 | 0.034 | * | | |
| | | produced | [TWh] | | | | | 2.029 | 2.004 | 0.026 | | 0.078 | 0.083 | 7.308 | | |
| | fuel | total | [PJ] | 8.512 | 8.428 | 0.084 | | 8.604 | 8.497 | 0.107 | | 0.610 | 0.390 | 40.432 | | |
| | | natural gas | [PJ] | 8.493 | 8.409 | 0.084 | | 8.399 | 8.292 | 0.107 | | 0.610 | 0.325 | 32.151 | | |
| | | anthracite | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.577 | | |
| | | lignite | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | renewable energy sources | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | oil and oil products | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 1.101 | | |
| | | biomass | [PJ] | 0.009 | 0.009 | 0 | | 0.148 | 0.148 | 0 | | 0 | 0 | 6.284 | | |
| | | biogas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.115 | | |
| | | waste incineration | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | waste disposal | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.195 | | |
| | | other fuels | [PJ] | 0.009 | 0.009 | 0 | | 0.057 | 0.057 | 0 | | 0 | 0.066 | 0.010 | | |
| 2010 | electricity | capacity | [GW] | 0.898 | 0.895 | 0.003 | 45% | | | | | 0.007 | 0 | * | 5.23 PJ | * tCO2 |
| | | generated | [TWh] | 2.981 | 2.961 | 0.020 | | | | | | 0.028 | 0 | 6.627 | | |
| | heat | capacity | [GW] | | | | | 0.998 | 0.994 | 0.004 | 35% | 0.008 | 0 | * | | |
| | | produced | [TWh] | | | | | 2.790 | 2.764 | 0.025 | | 0.033 | 0 | 7.962 | | |
| | fuel | total | [PJ] | 12.883 | 12.801 | 0.082 | | 11.986 | 11.880 | 0.107 | | 0.248 | 0 | 48.028 | | |
| | | natural gas | [PJ] | 12.861 | 12.779 | 0.082 | | 11.746 | 11.640 | 0.107 | | 0.248 | 0 | 39.294 | | |
| | | anthracite | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.550 | | |
| | | lignite | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | renewable energy sources | [PJ] | 0.002 | 0.002 | 0 | | 0.003 | 0.003 | 0 | | 0 | 0 | 0.008 | | |
| | | oil and oil products | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.771 | | |
| | | biomass | [PJ] | 0.020 | 0.020 | 0 | | 0.237 | 0.237 | 0 | | 0 | 0 | 6.955 | | |
| | | biogas | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.137 | | |
| | | waste incineration | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | |
| | | waste disposal | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.302 | | |
| | | other fuels | [PJ] | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0.011 | | |

[1] only in relation to high-efficiency cogeneration pursuant to Article 3 of and Annex III to Directive 2004/8/EC.
[2] All types of electricity- and heat-production installations.
[3] Compared with separate generation of electricity and heat energy.
* No accurate data.

**Annex 2**

## Overview of energy generated by cogeneration, by sector

| Sector | | | TOTAL | Industry | Households, retailing and services | | | | Others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | District heating | Non-centralised heating | Micro-cogeneration | District cooling | |
| 2000 | electricity | capacity [GW] | 0.531 | 0 | 0.531 | 0 | 0 | 0 | 0 |
| | | generated [TWh] | * | 0 | * | 0 | 0 | 0 | 0 |
| | heat | capacity [GW] | 1.202 | 0 | 1.202 | 0 | 0 | 0 | 0 |
| | | generated [TWh] | * | 0 | * | 0 | 0 | 0 | 0 |
| | fuel | consumptior [PJ] | * | 0 | * | 0 | 0 | 0 | 0 |
| 2004 | electricity | capacity [GW] | 0.591 | 0 | 0.589 | 0 | 0 | 0 | 0.002 |
| | | generated [TWh] | 1.353 | 0 | 1.340 | 0 | 0 | 0 | 0.013 |
| | heat | capacity [GW] | 1.270 | 0 | 1.268 | 0 | 0 | 0 | 0.002 |
| | | generated [TWh] | 2.683 | 0 | 2.667 | 0 | 0 | 0 | 0.016 |
| | fuel | consumptior [PJ] | 18.021 | 0 | 17.897 | 0 | 0 | 0 | 0.123 |
| 2005 | electricity | capacity [GW] | 0.738 | 0 | 0.736 | 0 | 0 | 0 | 0.002 |
| | | generated [TWh] | 1.414 | 0 | 1.400 | 0 | 0 | 0 | 0.014 |
| | heat | capacity [GW] | 1.419 | 0 | 1.416 | 0 | 0 | 0 | 0.002 |
| | | generated [TWh] | 2.614 | 0 | 2.597 | 0 | 0 | 0 | 0.017 |
| | fuel | consumptior [PJ] | 18.113 | 0 | 17.979 | 0 | 0 | 0 | 0.133 |
| 2006 | electricity | capacity [GW] | 0.548 | 0 | 0.547 | 0 | 0 | 0 | 0.002 |
| | | generated [TWh] | 2.016 | 0 | 2.004 | 0 | 0 | 0 | 0.013 |
| | heat | capacity [GW] | 0.873 | 0 | 0.871 | 0 | 0 | 0 | 0.002 |
| | | generated [TWh] | 2.843 | 0 | 2.827 | 0 | 0 | 0 | 0.016 |
| | fuel | consumptior [PJ] | 20.817 | 0 | 20.696 | 0 | 0 | 0 | 0.121 |
| 2007 | electricity | capacity [GW] | 0.555 | 0 | 0.553 | 0 | 0 | 0 | 0.002 |
| | | generated [TWh] | 1.911 | 0 | 1.896 | 0 | 0 | 0 | 0.014 |
| | heat | capacity [GW] | 0.880 | 0 | 0.878 | 0 | 0 | 0 | 0.002 |
| | | generated [TWh] | 2.568 | 0 | 2.550 | 0 | 0 | 0 | 0.018 |
| | fuel | consumptior [PJ] | 18.920 | 0 | 18.783 | 0 | 0 | 0 | 0.137 |
| 2008 | electricity | capacity [GW] | 1.206 | 0 | 1.204 | 0.000 | 0 | 0 | 0.002 |
| | | generated [TWh] | 1.634 | 0 | 1.620 | 0.001 | 0 | 0 | 0.013 |
| | heat | capacity [GW] | 1.580 | 0 | 1.577 | 0.000 | 0 | 0 | 0.002 |
| | | generated [TWh] | 2.059 | 0 | 2.042 | 0.001 | 0 | 0 | 0.016 |
| | fuel | consumptior [PJ] | 15.612 | 0 | 15.484 | 0.007 | 0 | 0 | 0.121 |
| 2009 | electricity | capacity [GW] | 0.893 | 0.002 | 0.887 | 0.000 | 0 | 0 | 0.003 |
| | | generated [TWh] | 2.005 | 0.005 | 1.979 | 0.001 | 0 | 0 | 0.020 |
| | heat | capacity [GW] | 0.992 | 0.002 | 0.986 | 0.000 | 0 | 0 | 0.004 |
| | | generated [TWh] | 2.036 | 0.005 | 2.004 | 0.002 | 0 | 0 | 0.026 |
| | fuel | consumptior [PJ] | 17.166 | 0.047 | 16.917 | 0.011 | 0 | 0 | 0.191 |
| 2010 | electricity | capacity [GW] | 0.898 | 0.002 | 0.894 | 0.000 | 0 | 0 | 0.002 |
| | | generated [TWh] | 2.981 | 0.016 | 2.950 | 0.002 | 0 | 0 | 0.013 |
| | heat | capacity [GW] | 0.998 | 0.002 | 0.993 | 0.000 | 0 | 0 | 0.002 |
| | | generated [TWh] | 2.790 | 0.015 | 2.756 | 0.003 | 0 | 0 | 0.016 |
| | fuel | consumptior [PJ] | 24.869 | 0.141 | 24.591 | 0.017 | 0 | 0 | 0.119 |

* No accurate data.

**Annex 3**

## Overview of types of technologies used to generate energy by cogeneration

| Technology | | | | TOTAL | combined cycle gas turbine (CCGT) with heat utilisation | back pressure steam turbine | steam condensation turbine with heating steam | gas turbine with heat utilisation | internal combustion engines | microturbines | Stirling engine | Heating elements | steam engine | organic Rankin cycle | all othersi[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | electricity | capacity | [GW] | 0.531035 | 0 | 0.007 | 0.520 | 0 | 0.005 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 0 | 0 | * | * | 0 | * | 0 | 0 | 0 | 0 | 0 | 0 |
| | heat | capacity | [GW] | 1.202001 | 0 | 0.042 | 1.155 | 0 | 0.005 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 0 | 0 | * | * | 0 | * | 0 | 0 | 0 | 0 | 0 | 0 |
| | fuel | consumptior | [PJ] | 0 | 0 | * | * | 0 | * | 0 | 0 | 0 | 0 | 0 | 0 |
| 2004 | electricity | capacity | [GW] | 0.591276 | 0.048 | 0.008 | 0.520 | 0.001 | 0.015 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 1.352668 | 0 | 0.030 | 1.225 | 0.009 | 0.089 | 0 | 0 | 0 | 0 | 0 | 0 |
| | heat | capacity | [GW] | 1.270402 | 0.048 | 0.047 | 1.155 | 0.003 | 0.018 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.682674 | 0 | 0.189 | 2.367 | 0.027 | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 |
| | fuel | consumptior | [PJ] | 18.02068 | 0 | 1.017 | 16.003 | 0.150 | 0.849 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2005 | electricity | capacity | [GW] | 0.689976 | 0.144 | 0.008 | 0.520 | 0.001 | 0.018 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 1.414167 | 0.202 | 0.034 | 1.075 | 0.007 | 0.096 | 0 | 0 | 0 | 0 | 0 | 0 |
| | heat | capacity | [GW] | 1.370726 | 0.145 | 0.047 | 1.155 | 0.003 | 0.021 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.614429 | 0.206 | 0.218 | 2.057 | 0.022 | 0.112 | 0 | 0 | 0 | 0 | 0 | 0 |
| | fuel | consumptior | [PJ] | 18.11264 | 1.061 | 1.141 | 14.832 | 0.122 | 0.956 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2006 | electricity | capacity | [GW] | 0.548476 | 0.192 | 0.008 | 0.330 | 0.001 | 0.018 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.016308 | 1.035 | 0.033 | 0.857 | 0.005 | 0.086 | 0 | 0 | 0 | 0 | 0 | 0 |
| | heat | capacity | [GW] | 0.872926 | 0.193 | 0.047 | 0.609 | 0.003 | 0.021 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.843217 | 0.948 | 0.214 | 1.561 | 0.018 | 0.103 | 0 | 0 | 0 | 0 | 0 | 0 |
| | fuel | consumptior | [PJ] | 20.81697 | 8.092 | 1.120 | 10.679 | 0.099 | 0.827 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2007 | electricity | capacity | [GW] | 0.555067 | 0.192 | 0.008 | 0.330 | 0.001 | 0.024 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 1.910868 | 1.104 | 0.022 | 0.652 | 0.006 | 0.127 | 0 | 0 | 0 | 0 | 0 | 0 |
| | heat | capacity | [GW] | 0.880318 | 0.193 | 0.047 | 0.609 | 0.003 | 0.029 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.568338 | 1.018 | 0.144 | 1.232 | 0.019 | 0.155 | 0 | 0 | 0 | 0 | 0 | 0 |
| | fuel | consumptior | [PJ] | 18.92025 | 8.643 | 0.710 | 8.247 | 0.107 | 1.213 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008 | electricity | capacity | [GW] | 1.205857 | 0.825 | 0.008 | 0.330 | 0.001 | 0.042 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 1.633946 | 1.074 | 0.017 | 0.352 | 0.005 | 0.186 | 0 | 0 | 0 | 0 | 0 | 0 |
| | heat | capacity | [GW] | 1.57979 | 0.873 | 0.047 | 0.609 | 0.003 | 0.048 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.058635 | 1.068 | 0.111 | 0.637 | 0.017 | 0.225 | 0 | 0 | 0 | 0 | 0 | 0 |
| | fuel | consumptior | [PJ] | 15.61197 | 8.664 | 0.561 | 4.520 | 0.097 | 1.770 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009 | electricity | capacity | [GW] | 0.891439 | 0.825 | 0.006 | 0 | 0.001 | 0.059 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.000326 | 1.646 | 0.017 | 0 | 0.004 | 0.333 | 0 | 0 | 0 | 0 | 0 | 0 |
| | heat | capacity | [GW] | 0.99043 | 0.873 | 0.047 | 0 | 0.003 | 0.068 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.029122 | 1.502 | 0.126 | 0 | 0.013 | 0.388 | 0 | 0 | 0 | 0 | 0 | 0 |
| | fuel | consumptior | [PJ] | 17.11569 | 13.363 | 0.591 | 0 | 0.072 | 3.090 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010 | electricity | capacity | [GW] | 0.8983 | 0.825 | 0.006 | 0 | 0.001 | 0.066 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.9807 | 2.571 | 0.022 | 0 | 0.006 | 0.381 | 0 | 0 | 0 | 0 | 0 | 0 |
| | siltums | capacity | [GW] | 0.9978 | 0.873 | 0.047 | 0 | 0.003 | 0.075 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | generated | [TWh] | 2.7899 | 2.175 | 0.148 | 0 | 0.019 | 0.447 | 0 | 0 | 0 | 0 | 0 | 0 |
| | fuel | consumptior | [PJ] | 24.8689 | 20.512 | 0.713 | 0 | 0.108 | 3.536 | 0 | 0 | 0 | 0 | 0 | 0 |

[4] within the scope of Directive 2004/8/EC

* No accurate data.

## List and explanations of abbreviations

EIA: – Environmental impact assessment
EU: – European Union
EEA: – European Economic Area
TEC: – thermoelectric power station

## Units of measurement

MW – megawatt
J – joule
PJ – petajoule
kW – kilowatt
kWh – kilowatt hour
MWh – megawatt hour
GWh – gigawatt hour
TWh – terawatt hour

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