REPORT FI 2011 IN ACCORDANCE WITH ARTICLES 6(3) AND 10(2) OF DIRECTIVE 2004/8/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE PROMOTION OF COGENERATION BASED ON A USEFUL HEAT DEMAND IN THE INTERNAL ENERGY MARKET AND AMENDING DIRECTIVE 92/42/EC

1. Transposition/implementation of the legal text of Directive 2004/8/EC

Q1 What is the level of transposition of the Directive in your country? What is the timeline for the remaining parts of the transposition of the Directive, if any?

The provisions necessary to comply with the Directive have been adopted and are already in force. In accordance with the procedure for notifying the implementation of Community legislation, Finland reported on 24 June 2009 and 13 July 2009 (MNE(2009)52734, MNE(2009)52733, MNE(2009)53141 and MNE(209)53139) that the implementation of Directive 2004/8/EC of the European Parliament and of the Council on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC has been transposed into national law by the Act on Verification and Notification of Origin of Electricity (1129/2003). The amendment to the Government Decree on Verification of Origin of Electricity (1375/2003) - the Government Decree on amending the Government Decree on Verification of Origin of Electricity (97/2010) - required for the adoption of the guarantee of origin procedure under Article 5 of the Directive, came into effect on 1 March 2010.

Q2 What is the timeline for implementing measures based on the Commission Decision of 19 November 2008 establishing detailed guidelines? Please indicate how this has taken place (revision of a general energy law, a specific law, decree, regulation,…).

When calculating electricity produced from cogeneration in compliance with Annex II to Directive 2004/8/EC, the calculation methods based on the Commission Decision of 19 November 2008 were applied in Finland already before the Decision was issued, so it was not necessary to amend the existing national guidelines.

Q3 To what extent do you consider your country to have already significantly implemented the Directive?

Finland has fully implemented the national provisions necessary to comply with Directive 2004/8/EC.

Q4 Is your country using the alternative calculation method according to Article 12(2)?

No

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Q5 Is there any need for your country to review in accordance with Article 13 the threshold values used for calculation of electricity from cogeneration and/or the threshold values used for calculation of efficiency of cogeneration production and primary energy savings?

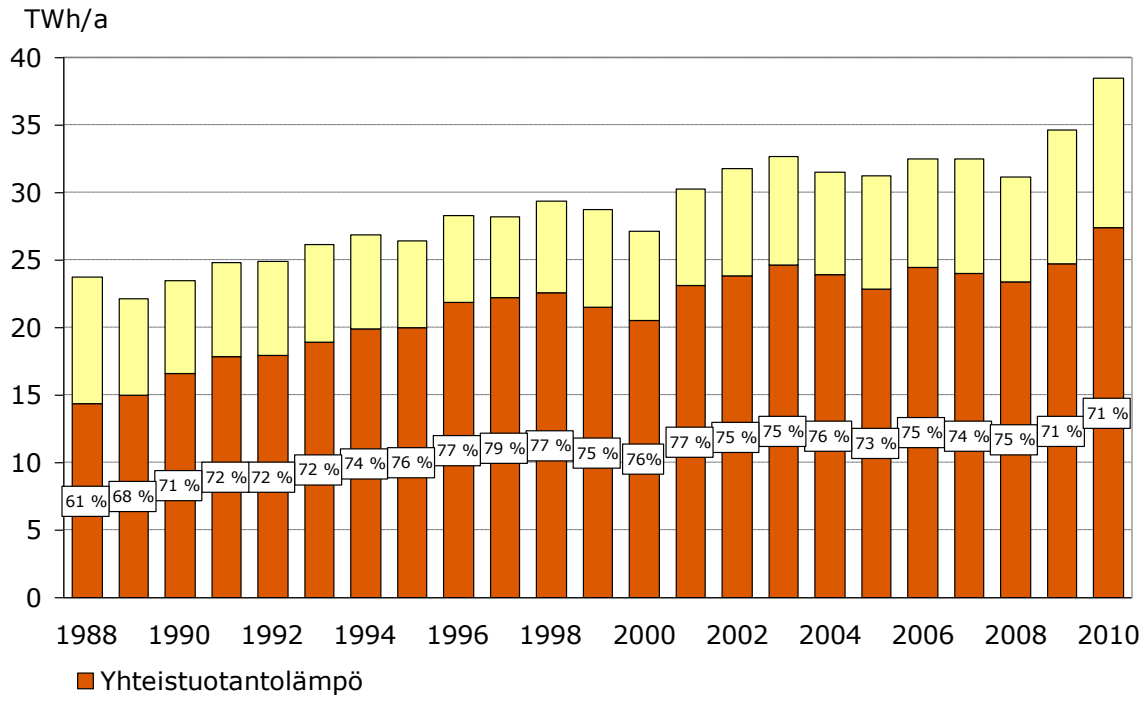
No

2. National potential to increase the share of high-efficiency cogeneration

Q6 Can your country already show progress in high-efficiency cogeneration since the last report on national potential which can be ascribed to either EU or national legislation and support schemes?

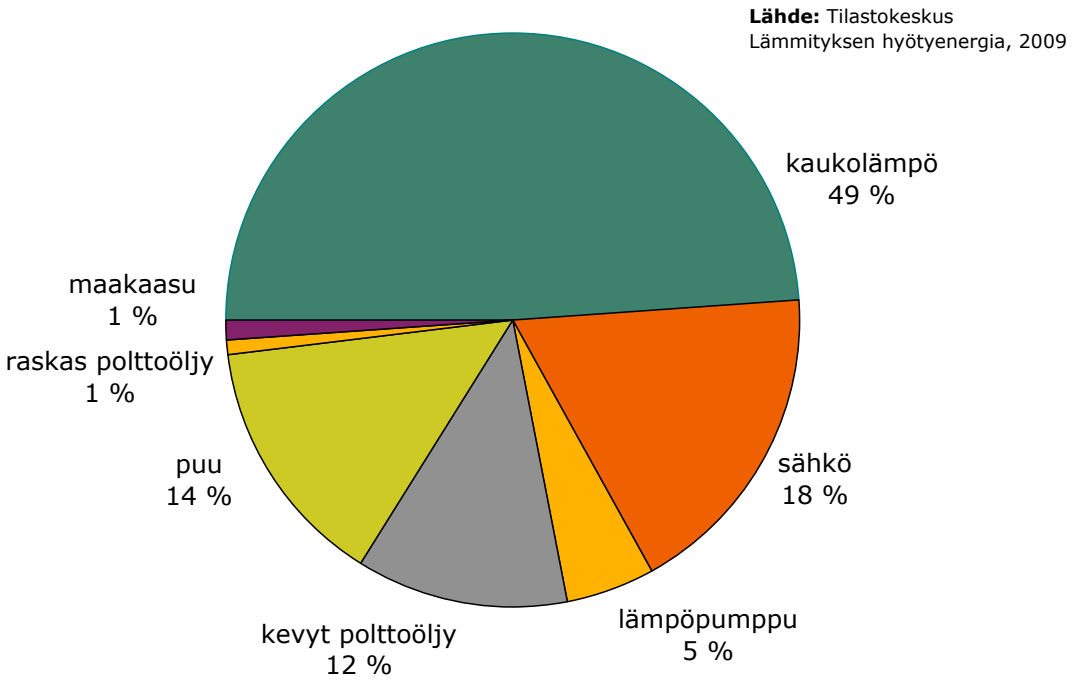
Progress has been made in high-efficiency cogeneration. This progress has been supported by investments in the development of technology and its promotion, legally guaranteed equal access to markets and good cooperation between private operators and public organisations. It is difficult to identify the impact of individual measures on the use and role of high-efficiency cogeneration. National legislation does not set out to promote cogeneration in any particular way but nor does it put any obstacles in the way of its use.

Figure 1: The share of cogeneration in district heat production



Heat produced by cogeneration

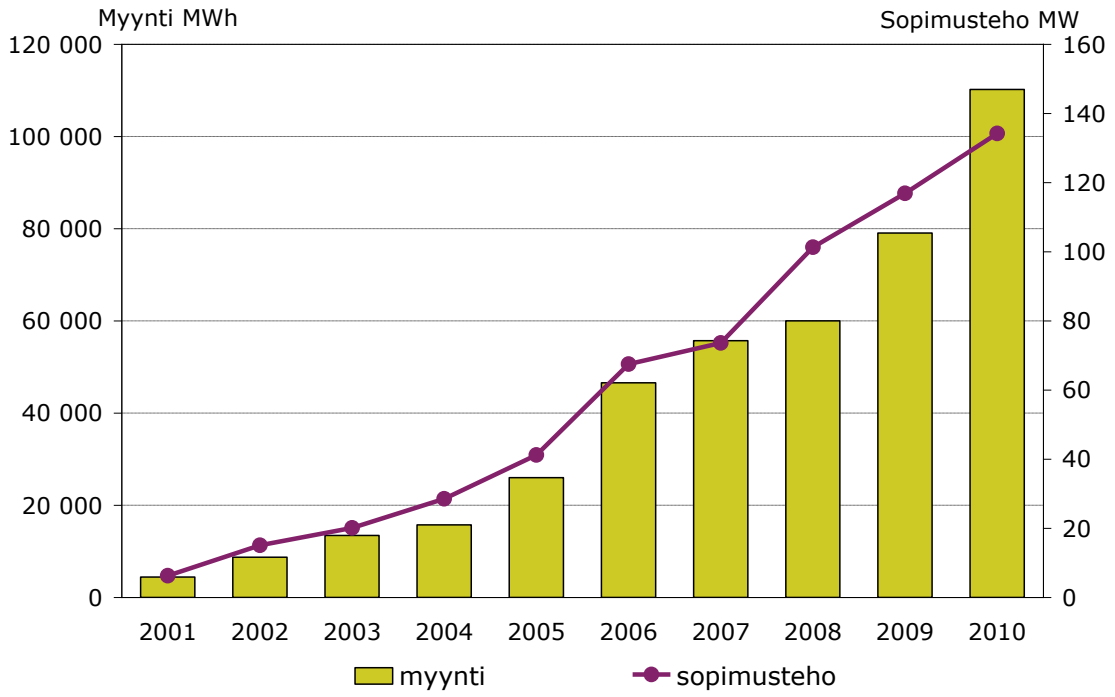
Figure 2: Market shares of heating in 2010



Source: Statistics Finland

district heat	49%
electricity	18%
heat pump	5%
domestic fuel oil	12%
wood	14%
heavy fuel oil	1%
natural gas	1%

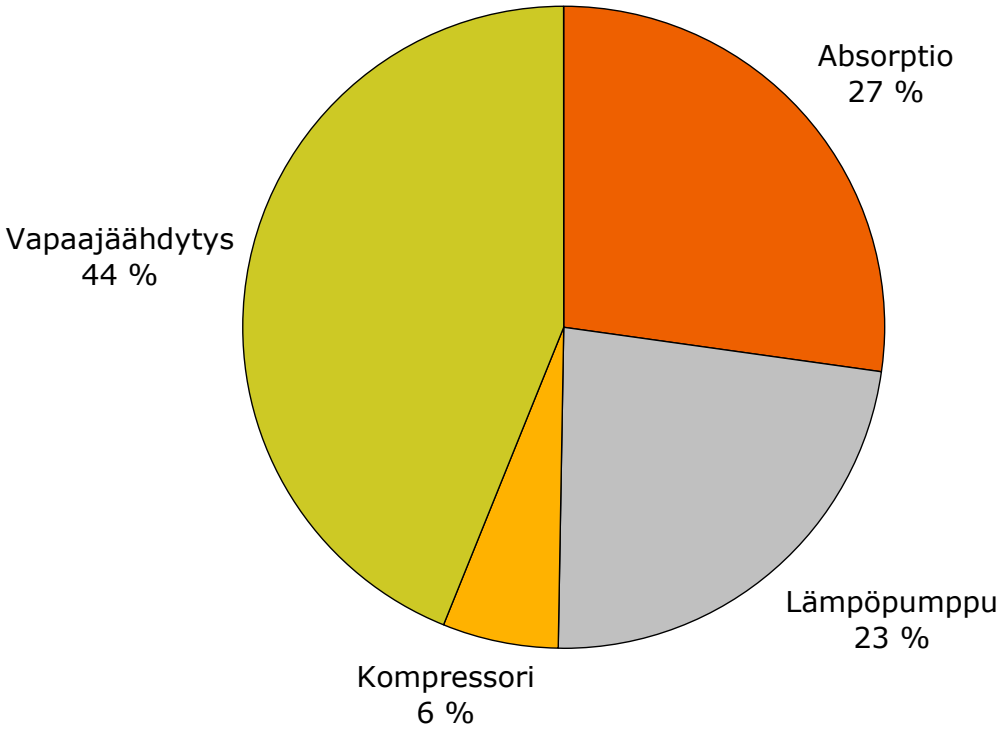
Figure 3: Sales and output of district cooling



Sales

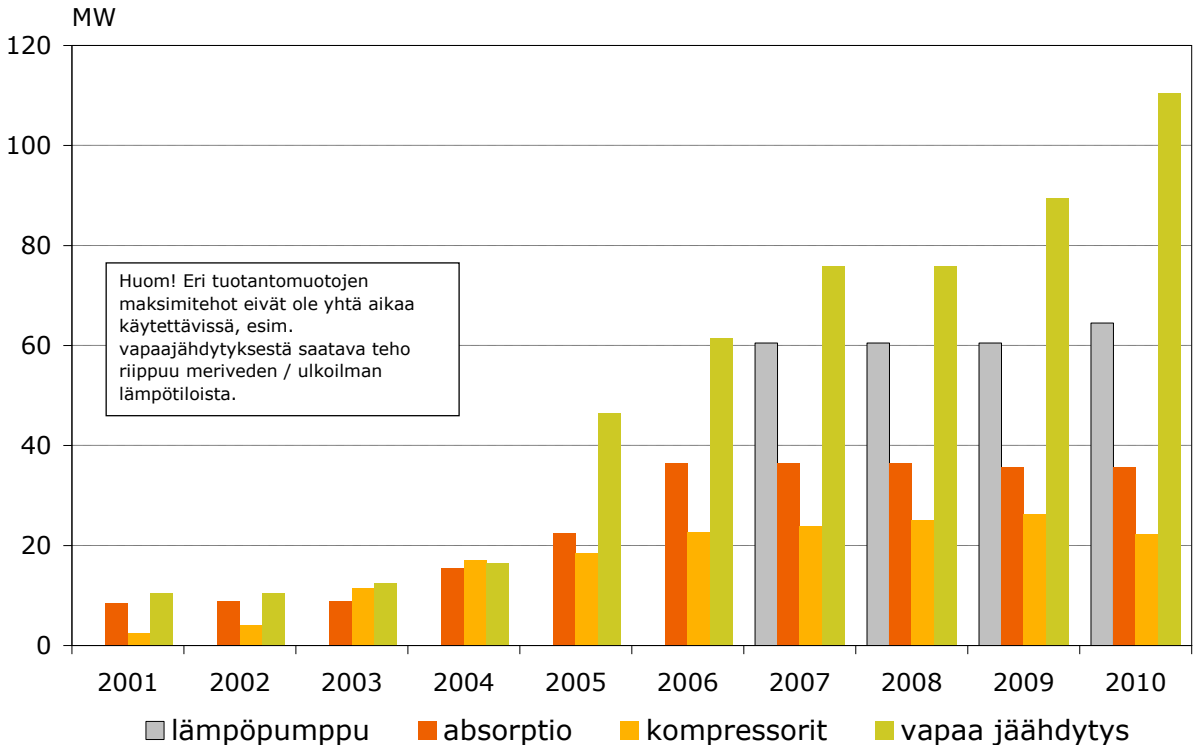
Output

Figure 4: Production percentages for production technologies in district cooling in 2010 (cooling by absorption is essentially produced by cogeneration).



Absorption	27%
Heat pump	23%
Compressor	6%
Free cooling	44%

Figure 5: Production capacity of district cooling



heat pump

absorption

compressors

free cooling

Note! The maximum capacities of the different production methods are not available simultaneously, e.g. the capacity of free cooling depends on the temperature of the sea water / ambient air.

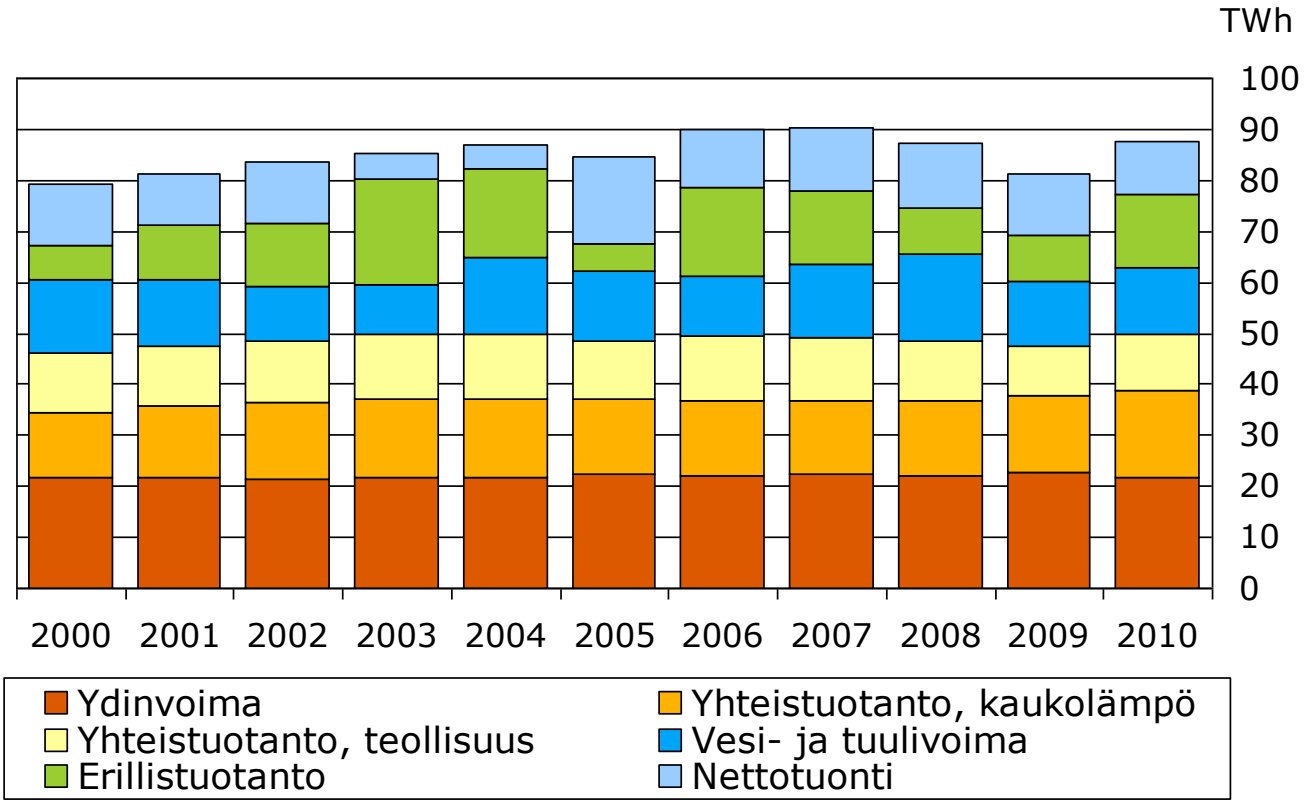
Q7 What is your evaluation of the progress towards increasing the share of high-efficiency cogeneration in your country? Your assessment should be based on the specific figures to be included in the attached spreadsheet (Excel file) designed to facilitate the submission of your data.

The cogeneration of district heat depends entirely on the heat load and the rate of utilisation in industry. In Finland 70-76% of district heat is produced by cogeneration, depending on the average winter temperature (Figure 1). There is no longer much potential to increase this share in Finland, because the market share of district heating is nearly half of the total heating demand of all residential and service buildings (Figure 1) and can exceed 90% in the biggest cities.

As shown in the attached table, in recent years cogeneration electricity has accounted for about 35% of all Finnish electricity production. In turn, cogeneration heat makes up nearly 80% of the heating energy used in industry and district heating.

The volume of district heating has continued to climb somewhat in recent years, but in order to increase its share markedly it would often be necessary to introduce district heating in areas where, due to low demand, it would not be able to compete with other heating solutions on market terms. Whether the energy-intensive industry can further increase cogeneration volumes depends directly on its capacity utilisation rate and the possibility of raising it, which in turn are dependent on the international competitiveness of these sectors and on trends in global demand.

Figure 6: Net purchase of electricity 2000-2010



Nuclear power

Cogeneration, district heat

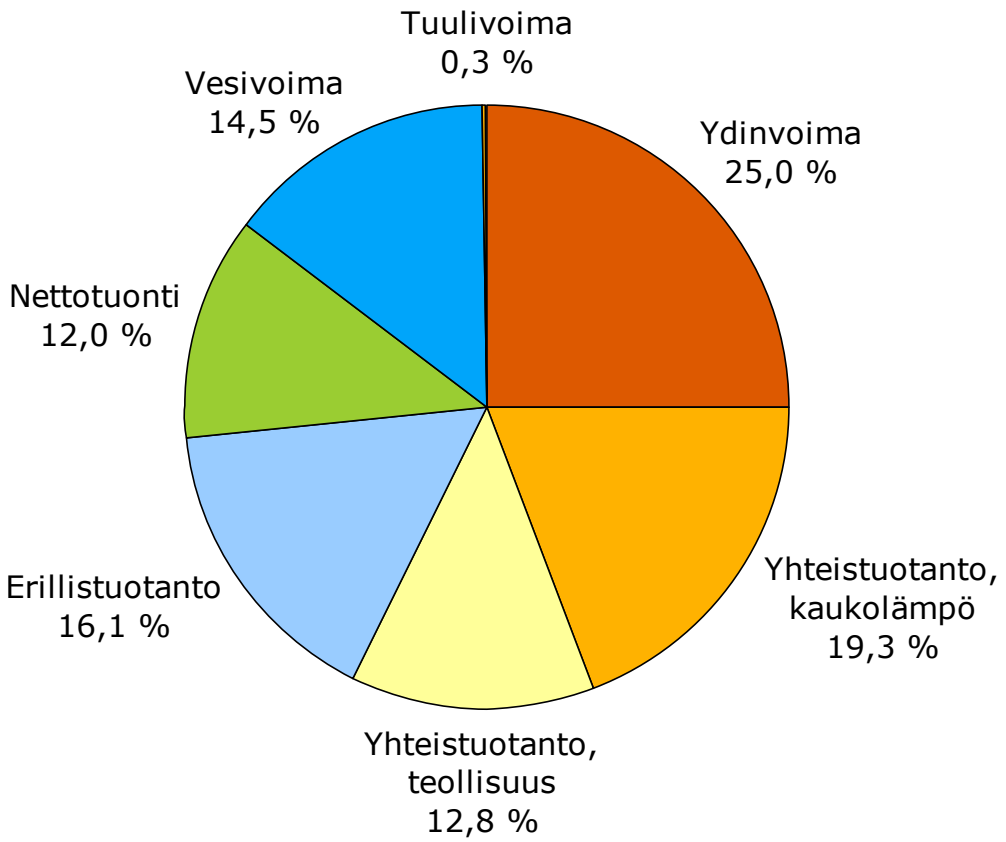
Cogeneration, industry

Hydropower and wind power

Separate production

Net import

Figure 7: Net purchase of electricity in 2010



Nuclear power	25.0%
Cogeneration, district heat	19.3%
Cogeneration, industry	12.8%
Separate production	16.1%
Net import	12.0%
Hydropower	14.5%
Wind power	0.3%

3. Barriers to high-efficiency cogeneration

Q8 Please give your views on the current barriers to high-efficiency cogeneration in your country:

- barriers in relation to administrative procedures (authorisation, coordination among competent authorities, streamlined simplified procedures, etc);

- barriers in relation to electricity grid system and tariff issues (including specific measures for small scale and micro cogeneration units);

- other barriers (internalisation of external costs, energy prices, financial and technical barriers, etc) in accordance with Articles 9 and 6 of the cogeneration Directive 2004/8/EC.

General remarks

No actual barriers to cogeneration can be identified in Finland. The barriers to electricity market access have been removed and the authorisation systems basically work well. Naturally there are a number of variables in the operating environment of cogeneration that also affect the competitiveness and operating conditions of cogeneration.

The district-heating sector is changing rapidly. Despite the record-high sales in 2010 and consistently high market shares, competitiveness and demand are being affected by factors that will bring challenges in coming years.
The district-heating sector will face a number of significant changes in the near future, stemming from the energy-policy objectives concerning emission reduction and renewable energy and the related regulations and tax changes affecting the energy sector, tougher competition, the reform of the production structure and the related IED (Industrial Emissions Directive) investments (tighter NOx, SO2 and particulate emission limits), the next phase of the emissions trading system and building regulations that increase energy performance. The sector is also subject to factors affecting housing and the age structure of the population.

Increasing competition

In recent years, district heating has had to face ever-tighter competition on the heating market. A few individual consumers have left existing district-heating networks and switched, for example, to geothermal heat. The growing competition can be seen especially in new residential areas, where there are discussions on which heating system(s) can best meet the areas' energy needs. Criteria include not just competitiveness but also other factors such as suitability for the area, reliability of the service, the company's image and effects on emissions.

In recent years, geothermal heat has emerged as the biggest challenger of district heat on the heating market. Geothermal heating systems work by transferring heat stored in the soil, rock or water by a heat pump to the buildings to be heated. The system is characterised by a rather high level of investment and relatively low operating expenses based on electricity. The competitiveness of geothermal heat is closely linked to the level of investment and trends in electricity prices.

In addition to geothermal heat, various hybrid systems that combine solar thermal/photovoltaic solar energy, heat pumps or e.g. pellet heating, have become more popular and they are considered modern heating systems like geothermal heat.

One of the central objectives of Finnish energy policy is to reduce the CO2 emissions of energy production and boost the share of renewable energy. In the district-heating sector, this change is based mainly on increasing the share of woodfuel and favouring cogeneration. Through cogeneration electricity, the effects will be also felt in electricity production. Emissions in electricity production can be reduced most significantly through cogeneration and also by increasing the share of nuclear power and wind power.

Both district heating and electric heating will produce less emissions in the future. Therefore the impact of different heating alternatives will often be evaluated locally on the basis of several factors. However, as a result of the increasing competition in the district-heating sector, companies will have to develop their operations and act proactively in sales and other services.

Taxation

Finland's energy taxation was reformed in the beginning of 2011. The reform consisted in raising the tax rates of all energy products except transport fuels. Energy taxes were raised by an annual total of EUR 700 million. At the same time, a new energy tax was introduced based on energy content and CO2 emissions. The objective is to encourage environmentally friendly choices.

The new energy taxes that came into effect in the beginning of 2011 weakened the competitiveness of district heating, especially that based on natural gas, oil and hard coal. Heating produced by cogeneration is favoured in taxation. It is subject to half of the CO2 tax rate, which is calculated by multiplying by 0.9 the heat produced by taxable fuels.

The IE (Industrial Emissions) Directive

Investments to replace the production structure will become necessary at the latest when old production units reach the end of their operating life. Investments might be called for earlier than expected if there are important changes in competitiveness or demand. They might also be necessary for example to meet objectives for the reduction of CO2 emissions or for renewable energy.

The energy sector also aims to reduce sulphur dioxide, nitrogen oxide and particulate emissions. The Industrial Emissions (IE) Directive, which replaces, among others, the Large Combustion Plants Directive and the Waste Incineration Directive, entered into force on 6 January 2011. The Directive sets new emission limits for the nitrogen, sulphur and particulate emissions of energy production as from 2016. The emission limit values correspond to emission levels in accordance with the best available techniques (BAT). Exceptions can be made in special cases but the deadline fixed in the Directive may not be exceeded.

In order to comply with the IE Directive, the Finnish energy industry will need to make investments totalling hundreds of millions of euros. As regards nitrogen oxide emissions, the biggest cost will be that of acquiring catalysts (SCR). Catalysts are needed for nearly all coal-fired units, a percentage of oil-fired boilers and some peat-fired units. In the case of sulphur dioxide emissions, the costs will be made up mainly of investments in the new desulphurisation equipment of coal power plants and, to a lesser extent, investments to reduce the sulphur

emissions of peat and heavy fuel oil. The most expensive investments related to particulate emissions will consist of investments in new particle separators or in improving existing separators in solid-fuel plants.

The draft Directive offers some flexibility, where plants commit to a maximum of 17 500 operating hours during eight years (2016-2023), during which period they must adhere to the limit values of the present LCP Directive. If a plant wants to continue operating after this period, it must comply with the emission limit values of *new* plants, which are much stricter than the values for *existing* plants.

The Directive lays down a transition period for small and medium-size district-heating plants to comply with the new emission limits. Plants with a maximum rated thermal input of 200 MW are subject to the emission levels of the present LCP Directive until the end of 2023, on condition that the plant received its permit no later than in November 2002 and at least 50% of the plant's useful heat production is delivered to the public district-heating network. The volume limit of 200 MW refers to the combined output of the different units connected to a single external stack, not to the output of an individual boiler.

The flexibility offered to district-heating plants does not lessen their need for investments, unless the plant terminates its operations at the end of the transition period or unless, as a result of other production plant investments on the same site, its dispatching is postponed and the plant becomes subject to the less-stringent emission limits applied to plants with less-extensive operations (if it does not already fall into this category).

The advantage of district heating is that concentrating heat production in units that are larger than residential units enables efficient waste gas scrubbing and the building of tall stacks, leading to low emissions and a smaller impact on the population. This impact will be reinforced with the implementation of the IE Directive.

Building regulations

In the future, the demand for district heating will be affected by the increasingly stringent requirements for the energy performance of buildings. Guidelines for the typical heat consumption of buildings in Finland are laid down in the modernised EU Directive on the energy performance of buildings (came into effect on 19 May 2010) and the new building regulations issued by the Finnish Ministry of the Environment on 30 March 2011 to improve energy performance. Reforming the building regulations is part of the national implementation of the EU's Buildings Directive.

Building regulations do not in themselves present an obstacle to cogeneration, but in some cases they may affect the competitiveness of district heating compared to other heating methods and thus create a financial barrier to district heating and thereby also to cogeneration.

4. Guarantees of origin and support schemes

Q9 Article 5 of the Directive requires Member States to ensure that accurate and reliable guarantees of origin are issued according to objective, transparent and non-discriminatory criteria. Please indicate what is the situation concerning the implementation of this

measure in your country (information on primary energy savings, type of registration system)?

Provisions on the granting of guarantees of origin are laid down in an Act and in a Government Decree adopted on the basis thereof. The guarantee of origin is granted by the national grid company Fingrid (TSO) once the applicant has submitted the information necessary to obtain the guarantee in accordance with the Directive. This activity is supervised by the Energy Market Authority.

The certificate issued under the European Energy Certificate System EECS is considered equivalent to the certificate referred to in the Act on Verification and Notification of Origin of Electricity. However, if this certificate has been issued for longer than five years, its period of validity under the guarantee of origin system is considered to be five years as from the date when it was issued.

Q10 Does your country have support schemes for cogeneration/CHP based on Directive 2004/8/EC (operational and/or investment aid)? What kind of support is provided (feed-in tariffs, certificates and quota, priority access to the grid,…)? Are they designed to provide stable long-term investment conditions? Which sectors will be targeted (agricultural and/or industrial and/or heating cogeneration)?

In order to reach the national objectives for the use of renewable energy sources and improve energy security, the government is using a variety of measures to create the right conditions for and to promote energy production based on renewable sources. The Finnish Funding Agency for Technology and Innovation (TEKES) is also funding the development of decentralised energy production in its different programmes, e.g. the Groove – Growth from Renewables 2010-2014 programme. The government is supporting small-scale cogeneration based on biogas and wood through the feed-in tariff system for renewable energy introduced recently. Small biogas plants receive the extra support in the form of a heat premium if, in addition to electricity, they also produce heat that can be recovered. Similar support is granted to small-scale, wood-fired cogeneration if it meets the minimum efficiency requirement. This support given to wood-fired plants is used to build small heat loads for cogeneration, for example in connection with sawmills and communities. The State budget includes funding for energy support. These funds can be granted to energy projects that are eligible to receive support. The Ministry of Employment and the Economy has granted and may, within the limits of the allocations in the budget, continue to grant such investment aid also to small-scale cogeneration power plant projects utilising new technology. The feed-in tariff system and the energy support have both been notified to the European Commission in accordance with the notification procedure concerning State aid. In its reply, the Commission approved these aid instruments (Commission letter of 22 March 2011, C(2011) 1950 final).

In addition, heat production based on cogeneration receives preferential treatment in taxation. It is subject to half of the CO2 tax rate, which is calculated by multiplying by 0.9 the heat produced by taxable fuels.

Q11 How much money on a yearly basis has been provided in this way in the past years to the promotion of high-efficiency cogeneration in particular? And how much money is expected to be made available on a yearly basis to the promotion of high-efficiency cogeneration in the coming years?

The feed-in tariff system was introduced only in 2011 and no support has yet been paid under that system. In 2008-2010 energy support was granted to different sectors as shown in the table below. Cogeneration is not in itself grounds for granting energy support. As support is granted on the basis of renewable energy use or new technology, there are no separate statistics on the support received by cogeneration plants. Most of the energy-production projects based on wood, biogas or recycled fuels are carried out at cogenerations plants.

Distribution of energy support 2008-2010 (total)

	Total MEUR	**%**
Reports and inspections	**6,7**	**4**
- related to energy saving	**5,6**	**3**
- related to renewables	**1,2**	**1**
Investments in renewable energy	**145,5**	**85**
Wood for energy		
- energy production	**52,9**	**31**
- woodfuel production	**17,9**	**10**
Wind power	**26,4**	**15**
Other renewable energy sources		
- biogas	**12,2**	**7**
- small-scale hydropower	**2,2**	**1**
- solar thermal / heat pumps / fuel cells	**3,7**	**2**
- recyclable fuels/field biomass/transport biofuel	**30,1**	**18**
Energy saving	**19,7**	**11**
TOTAL	**171,9**	**100**

ANNEX Cogeneration in Finland 2000-2010