

## Environmental review

### Energy is part of everyday life

Energy is related to the ease and comfort level of everyday life directly in the form of heating or indirectly as the many functions and products enabled by electricity. In towns, the supply of energy is based on efficient district heating and combined heat and power generation. In Helsinki, this is still mainly carried out using fossil fuels (natural gas and coal), which are still the most suitable sources of energy. Measures to tackle the climate change have become an important boundary condition in the structures of societies, in energy production, and gradually also in consumer habits. The responsibility lies with all parties to the energy chain.

Helsingin Energia set a target towards a carbon-neutral future already a few years ago. The 20 per cent share of renewable energy was adopted as the local target by 2020. A major development programme was prepared for the changes. In the early years of the programme, the use of forest-based biomass and open-sea wind farms are emphasised in order to replace fossil fuels.

The environmental impact assessments of offshore wind farms were completed during the year of operation. Helsingin Energia's experts took part in the media debate and attended local events in Inkoo and Raasepori. The projects can be implemented in these locations, as well as in Siipyy, without having any significant impacts on the natural environment, but some of the future neighbours are very critical due to the visibility of the wind mills in the sea landscape.

With respect to the biomass projects, it was pointed out that the dreaded woodchip lorry rallies will not be necessary as wood pellets will be used in the first few years, and later on biomass will be converted in-

to biocoal with a higher energy density, or refined into methane along the natural gas pipeline. A study of the life-cycle impacts of biocoal was launched, covering the entire chain all the way from forest to ash.

In addition to the climate targets, major changes will be required in energy production plants as the terms of the EU Industrial Emissions Directive are becoming more stringent. Increasingly more efficient flue gas cleaning systems will be built in Helsingin Energia's power plants. Decisions taking the overall economy into account will be made in 2011.

The 4% saving achieved in the third year of implementing the energy efficiency agreements in line with the EU directive is faster than the target line in terms of production plants, electricity and heat transmission networks, and also customer service measures.

Promotion of sensible energy use is a key part of Helsingin Energia's environmental work. In addition to our own measures, we disseminated our expertise in working groups of the ministries and City departments, in the Earth Hour campaign in the spring, during the Energy Awareness Week in the autumn, and in the development of consumption reports.

The Energy Advisory Centre, which is aimed at schoolchildren and consumers, also provides answers to energy-related questions in Ilmastoinfo (Climate info), a joint project of the Helsinki metropolitan area.

The project on the suburbs of Helsinki examined differences in the district heating, electricity and water consumptions of the residents of six districts. Statistical monitoring will be utilised in the improvement of

energy efficiency in old and new areas.

Visibility in the cityscape is part of Helsingin Energia's environmental activities. The appearance of work sites was developed in a project for providing information about district heating and cooling excavations and tidy fencing. Street galleries displayed on electricity distribution cabinets, implemented in co-operation with visual artists, enlivened the cityscape for the sixth year running. The functioning Vanhankaupunginkoski hydropower plant museum is part of the Power Station Museum, which is earmarked for closure. The social media and co-operation with the Museum of Technology were utilised in order to save this piece of old industrial heritage.

#### ACTIVE ENVIRONMENTAL OPERATIONS

Helsingin Energia's environmental work was implemented in the business units through contact persons and experts in the environmental network. Environmental impact management uses operating systems, environmental handbooks for business operations, and energy efficiency systems. The operation of our power plants and heating plants has the ISO 14001 environmental certificate. The entire Group is committed to constant improvement of environmental operations, which is ensured with regular internal and external audits.

Environmental aspects were also taken into account in the Group scorecards.

Helsingin Energia's environmental experts took part in the preparation of national and EU-level statutes, which is a significant channel for receiving early information. We took part in the completion of

the Industrial Emissions Directive and the reform of the Directive on Workers' Exposure to Electromagnetic Fields.

The environmental operations of especially the cleaning department were developed in 2010. The department drew up its environmental goals and trained its employees, e.g. in environmentally friendly cleaning methods.

The Green Office environmental programme in the offices of Helsingin Energia was updated in 2010. The objective of the programme is to increase environmental awareness among employees and to reduce the consumption of natural resources by saving energy and materials.

The environmental agents of the Lautasaari primary school carried out an assessment of the environmental operations of the Engineering house and awarded it with the environmental certificate of the environmental agents.

#### EMISSIONS REMAINED AT A LOW LEVEL

Emissions from energy generation in the Helsinki region increased from the previous year to a certain extent due to increased energy generation. Calculated by useful energy, emissions remained practically unchanged, with the exception of sulphur dioxide whose specific emissions showed a slight increase.

Total fuel consumption in energy generation increased by 9%, the share of natural gas by 12% and coal by 2%. The share of natural gas in total fuel energy increased to 62%.

With respect to climate-warming carbon dioxide emissions in 2010, we stayed

at the level of specific emissions proportioned to the amount of generation in the long-term descending line; calculated by tonnes, the previous year's level was exceeded. Carbon dioxide emissions amounted to 3.8 million tonnes in the Helsinki region, an increase of 8%.

The carbon dioxide emissions of power assets elsewhere in Finland and those of purchased electricity are estimated to amount to 0.15 million tonnes. The carbon dioxide emissions per sold useful energy (electricity, heat, cooling), i.e. the specific emissions, remained unchanged at 260 g CO<sub>2</sub>/kWh. In the 2000s, specific carbon dioxide emissions have fluctuated between 240 and 330 g CO<sub>2</sub>/kWh.

Acidifying sulphur dioxide and nitrogen oxide emissions in the Helsinki region increased in 2010, sulphur dioxide by 20% and nitrogen oxide by 9%. Particulate emissions remained practically unchanged despite increased energy generation. The utilisation of the desulphurisation plants remained at the normal level, the cold year and the increased use of heating plants affected on the level of sulphur dioxide emissions.

The annual average sulphur dioxide contents at the Vallila measurement station, which describes the impacts of energy generation in the Helsinki air quality, totalled 2.2 µg/m<sup>3</sup>, and were at the same level as in the previous year. This was clearly below the limiting value of 20 µg/m<sup>3</sup>, which has been set to protect the ecosystem.

Fine particle emissions from the energy generation in the Helsinki region remained low, at 120 tonnes in 2010. The fluctuation of emissions in the 2000s has been 110–720 tonnes a year.

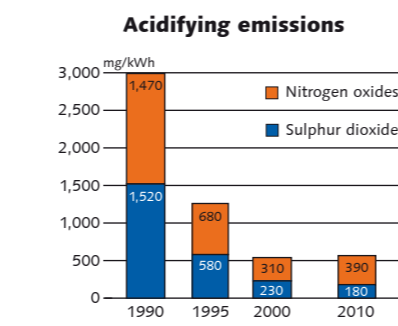
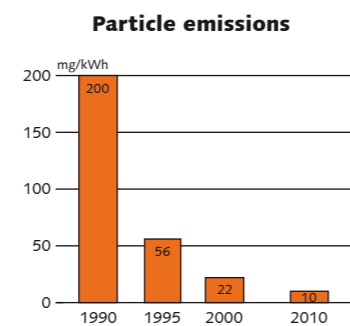
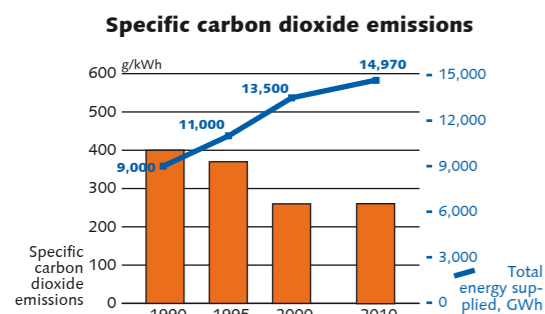
Due to district heating, the thermal load of sea water has been relatively low in the past decades in the mandatory monitoring. The thermal load of sea water in 2010 totalled 260 GWh. The thermal load has fluctuated in the 2000s between 180 and 2,200 GWh.

Any breakdowns of the Hanasaari and Salmisaari desulphurisation plants are reported immediately to the supervisory authorities. In 2010, there were few breakdowns, and the utilisation rate of the desulphurisation plants remained high, Hanasaari at 98% and Salmisaari at 96%. However, the disturbance limit of 120 hours, as defined in the environmental permit, was exceeded with respect to the particulate emissions of the district heating boiler at the Salmisaari A plant. Because the outage time of the Salmisaari B power plant lasted longer than expected the district heating requirement was met with the A plant which caused the minimum environmental impacts.

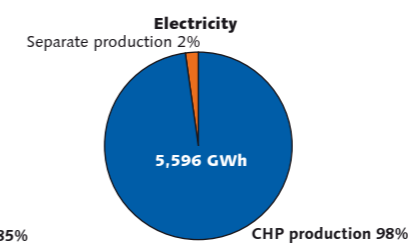
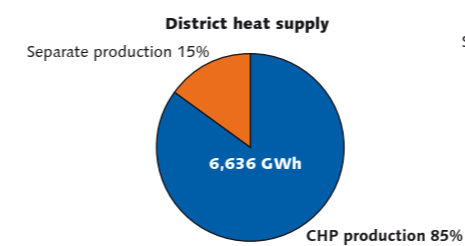
Due to spring floods, the annual maintenance of the museum power plant was delayed until summer when the water of the River Vantaanjoki fell below the regulated level for the duration of one weekend. After the pipelines in the Salmisaari power plant boiler had been renovated, they were blown clean using steam, which resulted in noise and steam clouds in the surrounding area for a couple of weeks. The local residents were kept fully informed of the situation.

#### BYPRODUCTS OF COMBUSTION

The combustion of solid fuel produces by-products in the form of bottom ash and fly ash, as well as a solid desulphurisation



#### Combined heat and power (CHP) production



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product created in the desulphurisation process. Utilisation of fly ash in the production of cement and concrete picked up on the previous year, and about half of the ash was utilised. Applications for bottom ash were also found in earth construction towards the end of the year.

### A FORERUNNER IN ENERGY EFFICIENCY

Helsingin Energia has long traditions in the promotion of energy efficiency. This is implemented in combined heat and power generation, district heating and cooling, and in energy advisory services. The significance of energy efficiency has grown strongly because it is a fast and cost-effective method in the mitigation of climate change.

We were able to further improve the energy efficiency of energy production and the distribution network in Helsinki, which was already at a high level, with co-generation and network operation and maintenance. Heat and cold accumulators help to even out consumption peaks. As a new innovation, we implemented the district cooling of the data centre beneath the Uspenski cathedral, as well as the capture of waste

heat from the data centre servers and its utilisation in the district heating network. Energy audits were carried out in the Salmisaari B power plants and the Lassila heating plant, with energy saving investment made on the basis of these audits. Improvement of energy efficiency in substations was also launched.

Development of consumption monitoring and audits in Helsingin Energia's office buildings was postponed until the current year.

We installed energy saving programmes in desktop computers, which is estimated to halve the energy consumption of work stations.

### GOOD SERVICES IN ENERGY SAVING

Good reporting services in energy use are important in the monitoring of consumption habits and in sensible allocation of saving measures. The Sävel Plus reporting service enables hourly monitoring for all customers with a remotely read meter. In the service, it is possible to record personal energy consumption targets and monitor their implementation. Own consumption can also be compared with other households.

In 2010, Helsingin Energia's energy advisory service received more than 40,000 telephone calls and over 30,000 e-mail enquiries, and had almost 5,000 visitors to the advisory centre in Sähkötalo in Kampi. Approx. 1,800 customers borrowed the electricity consumption, surface temperature and moisture meters.

As a new service, we piloted the home visits of an energy expert to map out the possibilities of improving the efficiency of customers' energy use. Distribution of information on energy saving with the aid of humour on Youtube is also a new project. The energy saving tips of MotoriikkaMiikka had more than 15,000 visitors.

The Ilmastoinfo (Climate info) advisory service, a joint project of the Helsinki metropolitan area, was launched in 2010. Helsingin Energia's energy advisors took part in Ilmastoinfo's first campaign, the Reduce a Tonne challenge, during the Energy Awareness Week. Citizens made climate pledges online and in Narinkkatori in the Kamppi shopping centre. Helsingin Energia is one of the main partners of Ilmastoinfo.

*MotoriikkaMiikka gives some good and also some wacky energy-saving tips in Helsingin Energia's YouTube channel.*

*District cooling equipment in the Uspenski data centre, which was inaugurated in October.*



## Environmental financial statements

### Environmental investments increased

Helsingin Energia's active approach to climate and environmental issues is manifested in the growing environmental costs, which last year amounted to almost EUR 17 million, a 15% increase on the previous year. Environmental costs accounted for 2.4% of the turnover.

Proportionally, environmental investments showed the greatest increase, trebling in the growing environmental costs, which last year amounted to almost EUR 17 million, a 15% increase on the previous year. Environmental costs accounted for 2.4% of the turnover. Proportionally, environmental investments showed the greatest increase, trebling to EUR 3.4 million compared with 2009. The greatest investment project was the construction of the by-product building for the Salmisaari power plant, costing EUR 1.5 million. In the building, by-products can be processed and recycled back to the combustion and flue gas treatment processes without disturbing the environment. Returning the water back into the process reduces the water consumption of the plant. The amount of waste and other environmental impacts are also reduced with the by-product building.

In Salmisaari, the availability of the desulphurisation plant was also developed and oil separation basins were built.

Major investments were also made in heating plants where, e.g. energy efficiency and noise and vibration abatement were developed.

Over EUR 10 million was spent on protection of air, soil and water systems, with desulphurisation amounting to almost EUR 7 million.

At EUR 1.3 million, environmental protection research and development costs continued to grow. Key research and development areas included improvement of eco-efficiency, development of desulphurisation and denitrification, development of emissions measurement, and research on renewable fuels and energy sources.

Environmental income totalled almost EUR 0.5 million, accrued mainly from the sale of energy saving advisory services.

|  | 2010<br>1,000 € | change % | 2009<br>1,000 € |
|--|-----------------|----------|-----------------|
| <b>ENVIRONMENTAL COSTS</b>                               |                 |          |                 |
| <b>Protection of air, soil and surface waters</b>        |                 |          |                 |
| Desulphurisation   | 6,724           | 29       | 5,217           |
| Denitrification  | 281             | -35      | 432             |
| Removal of particles                                     | 573             | 7        | 538             |
| Waste management and utilisation of combustion products  | 1,433           | 25       | 1,145           |
| Other waste management                                   | 1,063           | -1       | 1,068           |
| Monitoring of emissions and environmental impacts        | 234             | -27      | 322             |
| <b>Interaction</b>                                       |                 |          |                 |
| Energy-saving advice                                     | 1,122           | 10       | 1,022           |
| Environmental communication and marketing                | 269             | 9        | 247             |
| <b>Environmental management and training</b>             | 1,884           | 5        | 1,801           |
| <b>Environmental protection research and development</b> | 1,306           | 14       | 1,145           |
| Landscaping  | 19              | -80      | 95              |
| Noise and vibration abatement                            | 19              |          |                 |
| Improvement of eco-efficiency                            | 236             |          |                 |
| Depreciation on environmental protection investments     | 1,760           | 2        | 1,730           |
| <b>ENVIRONMENTAL COSTS IN ALL</b>                        | 16,921          | 15       | 14,760          |
| % of turnover  | 2.4 %           |          | 2.0 %           |
| % of all expenses  | 3.4 %           |          | 3.0 %           |
| <b>ENVIRONMENTAL INVESTMENTS</b>                         | 3,409           | 309      | 834             |
| % of all investments                                     | 3.6 %           |          | 1.2 %           |
| <b>ENVIRONMENTAL LIABILITIES</b>                         | 18,800          | 0        | 18,800          |
| % of balance sheet total                                 | 1.3 %           |          | 1.3 %           |
| <b>ENVIRONMENTAL REVENUE</b>                             | 496             | 154      | 195             |