



Environmental Information 2004



CONTENTS

<i>4</i>	To the reader
<i>5</i>	The Pohjolan Voima Way – sound operating practice
<i>6</i>	Electricity and heat production
<i>7</i>	Pohjolan Voima's power plants and power plant shares
<i>8</i>	Environmental policy
<i>9</i>	Environmental management
<i>10</i>	Environmental issues at Pohjolan Voima
<i>12</i>	Power plant-specific information
<i>12</i>	Nokia
<i>13</i>	Mussalo
<i>14</i>	Kristiina
<i>15</i>	Tahkoluoto
<i>16</i>	Seinäjäjoki
<i>17</i>	Vaskiluoto
<i>18</i>	New CHP plants

TO THE READER

The Environmental Information 2004 supplement complements the environmental information provided in Pohjolan Voima's Annual Report. The supplement deals with Pohjolan Voima's own energy production.

The weather in 2004 was mild and rainfall was heavy in the latter part of the year. In 2004, Pohjolan Voima's own electricity production totalled 17.7 TWh, which was just under 2% less than in the previous year. As a result of the improved water conditions, hydropower generation increased and the production of condensing power was reduced. Combined heat and power production increased as well.

The emissions from thermal power production decreased from the 2003 level. In 2004, the carbon dioxide emissions, for instance, amounted to 6.1 million tonnes, which was 14% less than a year earlier.

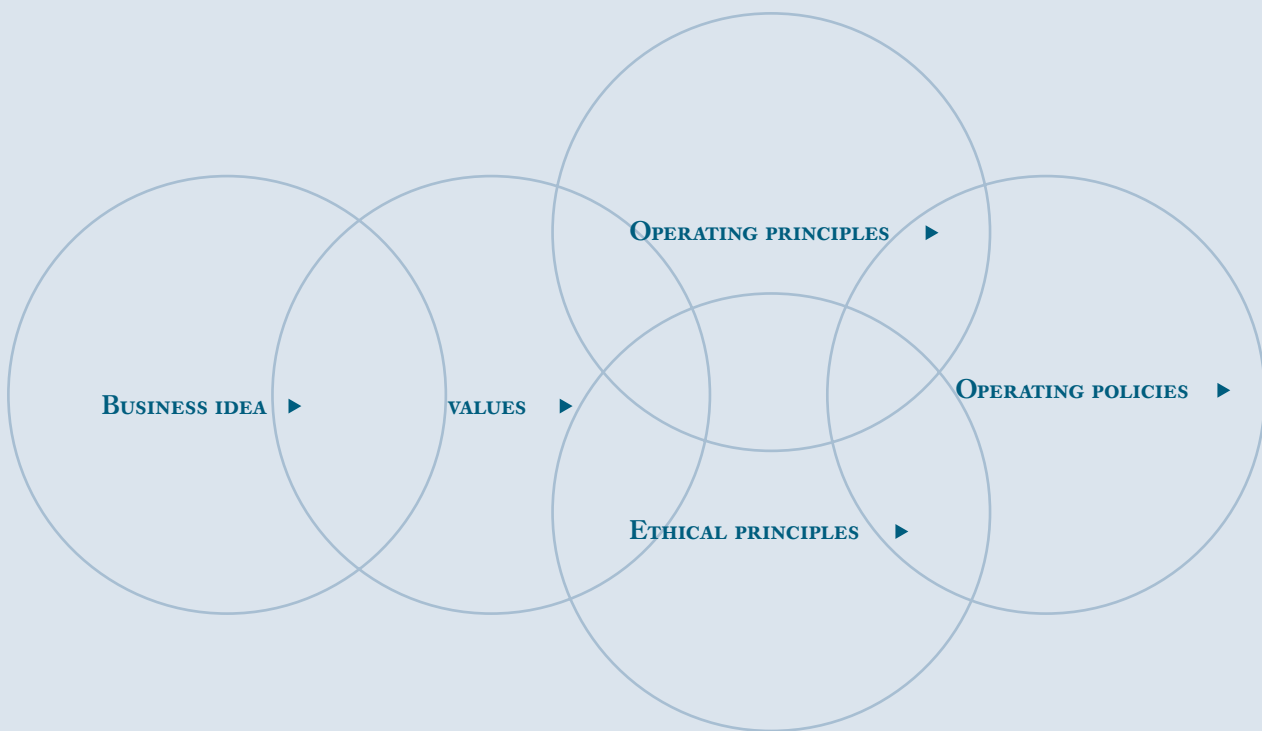
Arto Piela

Executive Vice President

The Pohjolan Voima Way – sound operating practice

The set of ground rules entitled “The Pohjolan Voima Way – sound operating practice” guides Pohjolan Voima’s corporate responsibility. These rules unite Pohjolan Voima’s core values, operating principles and ethical principles as well as the operating policies concerning the personnel, stakeholders and environment.

Pohjolan Voima has committed itself to good management and continuous improvement of environmental issues. The environmental policy, which forms a part of “The Pohjolan Voima Way” ground rules, defines the basic principles of Pohjolan Voima’s work for the benefit of the environment.



Scope of the Environmental Information 2004 supplement

The Environmental Information 2004 supplement complements the environmental information provided in Pohjolan Voima’s Annual Report.

The supplement deals with Pohjolan Voima’s own energy production. In addition to the Group’s own power plants, the parameters, e.g. fuels and emissions, include all power plant shares in so far as Pohjolan Voima obtains electricity from them on the basis of its shareholding. Purchased and imported electricity is not included in the examination. The heat production volumes are shown as a whole, without taking account of the shareholdings.

The calculation limits used in this report differ from the scope of the consolidated financial statements. However, these calculation limits describe the environmental burden placed by the whole of Pohjolan Voima’s own energy production in the best possible manner.

Additional environmental information is available on Pohjolan Voima’s and Teollisuuden Voima’s Web sites at www.pohjolanvoima.fi and www.tvo.fi.

Electricity and heat production

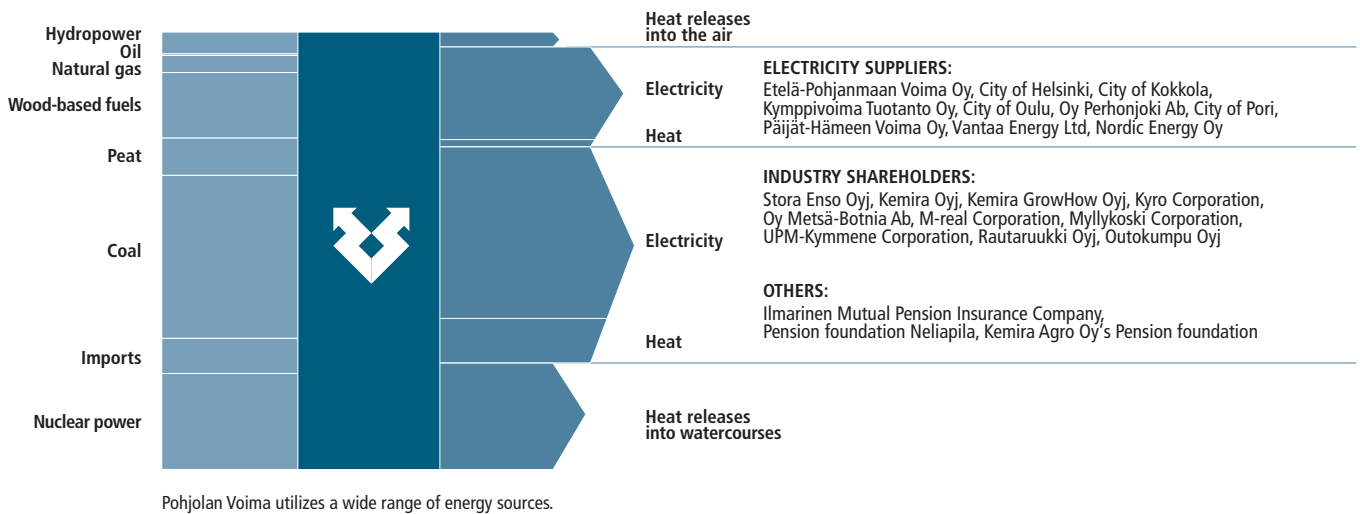
In Finland, the weather in 2004 was mild and rainfall was heavy in the latter part of the year. The market prices of fuels, coal in particular, rose and abundant rain in Finland hampered peat production.

In 2004, Pohjolan Voima's total electricity supply and own production kept at the previous year's level. Electricity generation with hydropower and wind power and at CHP plants increased compared with the previous year. On the

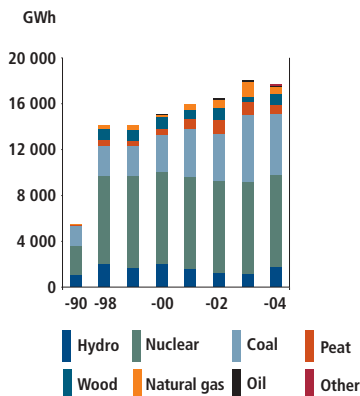
other hand, production at the condensing power plants was slightly smaller than in 2003.

Electricity supply totalled 22.9 TWh, of which the Group's own production represented 17.7 TWh. In addition to the Group's own production, electricity was imported from Russia and purchased from the electricity markets. Pohjolan Voima's production accounted for about 22% of the electricity produced in Finland in 2004.

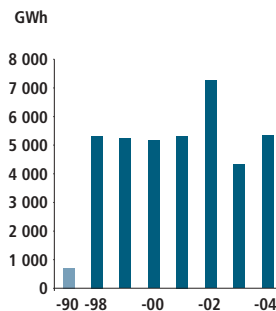
Energy balance in 2004



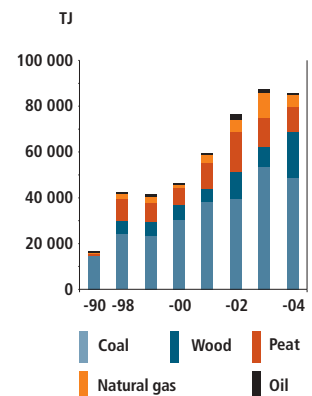
Pohjolan Voima's electricity generation



Heat production



Pohjolan Voima's fuel consumption



Pohjolan Voima's power plants and power plant shares

Hydropower plants and regulation

	Location	Electrical output MW ^{*)}
Kaaranneskoski	Ylitornio	1.3
Jolmankoski	Pello, Ylitornio	0.3
Portimokoski	Ylitornio	5.3
Isohaara	Keminmaa	106.0
Jumisko	Kemi Posio, Salla	30.0
Raasakka	Ii	58.0
Maalismaa	Yli-Ii	33.0
Kierikki	Yli-Ii	32.0
Pahkakoski	Yli-Ii	34.0
Haapakoski	Yli-Ii, Pudasjärvi	28.0
Melo	Nokia	67.0
Harjavalta	Harjavalta	14.5
Kosto (reg.)	Taivalkoski, Posio	
Irni (reg.)	Kuusamo, Taivalkoski	
Total		409 MW

Wind power plants

	Location	Electrical output MW ^{*)}
Kokkola	Kokkola	1
Oulunsalo	Oulusalo	2
Kristiina	Kristiinankaupunki	2
Oulu	Oulu	1
Total		6 MW

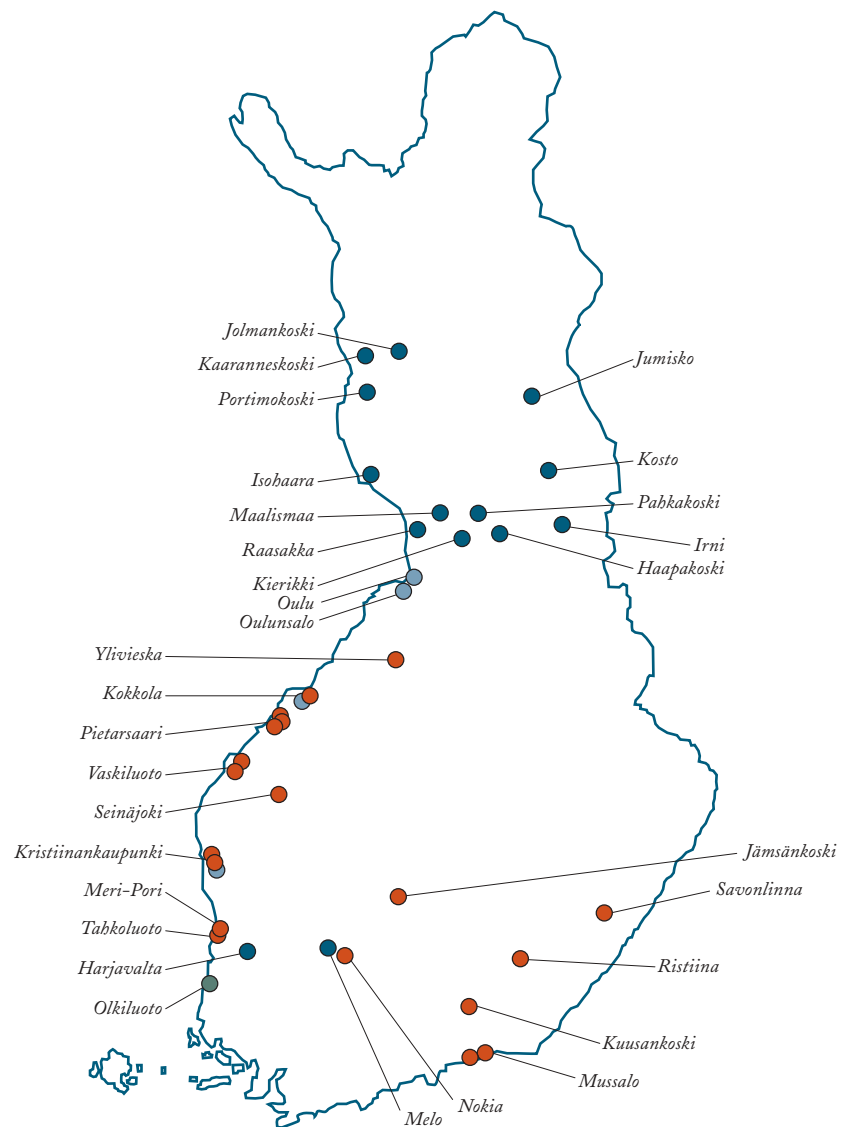
Nuclear power plants

	Location	Electrical output MW ^{*)}
Olkiluoto 1	Eurajoki	477
Olkiluoto 2	Eurajoki	477
Total		954 MW

Thermal power plants

	Location	Electrical output MW ^{*)}
Ylivieska	Ylivieska	6
Kokkola	Kokkola	20
Vaskiluoto 2	Vaasa	115
Vaskiluoto 3	Vaasa	160
Seinäjäki	Seinäjäki	63
Alholma 1	Pietarsaari	12
Alholma 2	Pietarsaari	120
Kristiina 1	Kristiinankaupunki	210
Kristiina 2	Kristiinankaupunki	242
Tahkoluoto	Pori	225
Meri-Pori	Pori	146
Jämsänkoski	Jämsänkoski	46
Nokia	Nokia	70
Savonlinna	Savonlinna	0
Ristiina	Ristiina	8
Mussalo 1	Kotka	75
Mussalo 2	Kotka	238
Kuusankoski	Kuusankoski	58
Wisapower	Pietarsaari	140
Total		1954 MW

*) Pohjolan Voima's share



Environmental policy

Pohjolan Voima conducts long-range energy business. One of the prerequisites for this is the preservation of a safe, healthy and diverse living environment. Pohjolan Voima, for its part, bears the responsibility for this. The operations are guided by this environmental policy, which is based on the Group's core values, responsibility, reliability and competence. The Group companies set their own environmental objectives and targets on the basis of the principles of the Group's environmental policy.

POHJOLAN VOIMA IS AWARE OF THE ENVIRONMENTAL EFFECTS OF ITS OPERATIONS

Pohjolan Voima is aware of the effects its operations may have on the environment and of the risks they may pose. The identification and analysis of these effects and risks are also essential elements in planning new projects. The life-cycle aspect is also taken into account in assessing these effects.

EFFICIENT ENVIRONMENTAL PROTECTION IS BASED ON THE MANAGEMENT OF ALL ASPECTS OF OPERATIONS

Environmental protection and management are based on the fulfilment of the requirements set by laws, licences and other binding regulations. Pohjolan Voima also considers it important that energy is generated and raw materials are used efficiently with respect to the whole system while conserving the environment. This means, first of all, that power plants and other systems for which Pohjolan Voima is responsible are operated and maintained carefully and appropriately. The management of all aspects of the operations also involves utilizing, handling and disposing of by-products and waste safely. In the event of accidents and malfunctions, everything that is possible will be done to prevent pollution of the environment.

PERSONNEL PLAY A KEY ROLE IN ENVIRONMENTAL PROTECTION

All work tasks in the entire Group involve due consideration of the environment. By training and guidance, and through encouraging its personnel, Pohjolan Voima sees to it that the personnel are aware of the principles of the environmental policy as well as their own responsibility. Every employee

must recognize the environmental aspects connected with his/her own operations and the ways of affecting them. Pohjolan Voima also requires that every employee is capable and willing to act in a responsible and professional manner in his/her own work.

POHJOLAN VOIMA TAKES STAKEHOLDER GROUPS INTO ACCOUNT

Pohjolan Voima maintains an open dialogue with the authorities, associations and residents in the power plant locations, and other stakeholder groups. An important target for this co-operation is to find environmentally friendly and cost-efficient solutions.

POHJOLAN VOIMA CONTINUES TO DEVELOP ITS OPERATIONS

Pohjolan Voima monitors changes in its operating environment and takes environmental aspects into account in developing its operations. Suitable management and monitoring methods ensure continuous progress. Sustainable development is also promoted through research operations.

Pohjolan Voima's Executive Officers have approved this environmental policy, which is binding on the entire Group, on 10 November 2003.

Environmental management at Pohjolan Voima

Pohjolan Voima's energy generation takes place in a number of separate subsidiaries and associated companies. The Board of Directors of each subsidiary, which mainly consists of the representatives of Group management, takes decisions on the issues of each subsidiary and on implementation of the decisions taken by the Group's top management. This ensures that the entire Group operates in compliance with the adopted strategies. The environmental committee established by the Board of Directors follows environmental issues. In addition to Pohjolan Voima's representatives, the committee consists of the environmental management or other representatives of the largest shareholders.

Pohjolan Voima's production companies have the certified environmental management systems according to the ISO 14001 standard in use. Furthermore, Teollisuuden Voima has been accepted into the EMAS register. In 2004, environmental management systems were being built at the Kuusankoski and Pietarsaari plants. The environmental programmes included in the systems ensure continuous improvement of the operations. The implementation of the measures proposed by the programmes is monitored with the aid of audits at various levels.

In accordance with the Environmental Protection Act, all power plants of more than 50 MW should apply for new environmental permits by the end of 2004. Indeed, the authorities are considering the applications of nearly all of Pohjolan Voima's production companies for environmental permits. No deviations from regulatory compliance were discovered in 2004.

Towards the end of the year, a leak was detected in an underground light fuel oil pipe at Nokian Lämpövoima Oy's Mussalo power plant. Removal of the contaminated soil for further treatment and decontamination of the area began immediately in accordance with the instructions given by the authorities. The decontamination was completed in January 2005. The leak caused no damage outside the plant site.

Pohjolan Voima has published an Environmental Report since 1994. From 2001, the most significant environmental information has been published as part of the Annual Report and on the Group's Web site, which also includes data on the origin of and emissions from electricity production required by law. Pohjolan Voima reports on the most important environmental issues to its shareholders in the Group-internal Environmental Reviews and in reports that describe the environmental quality of electricity. In 2004, the Environmental Review was published three times.

Environmental issues at Pohjolan Voima

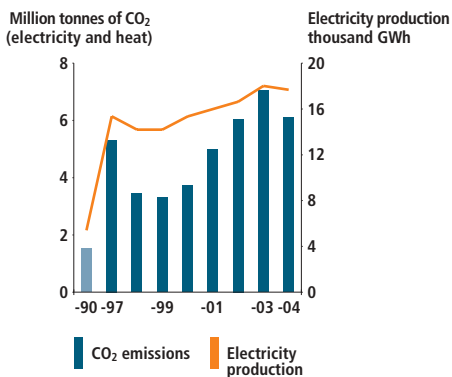
The versatile range of energy production forms means that the environmental effects are distributed accordingly. Hydropower plants alter the watercourses and their fish stocks, while wind power plants affect the landscape. The environmental effects of thermal power production primarily concern the atmosphere. The greatest effect of nuclear power results from the heat released into the sea.

Pohjolan Voima controls its environmental effects as a whole. In accordance with the life-cycle approach, the starting point is to identify and reduce the environmental effects and risks of our operations, and to ensure the overall efficiency of operations.

The emissions from thermal power production are subject to international agreements, which provide a basis for national legislation. Emissions from the power plants are restricted and their effects are reduced by plant-specific permits, and they are monitored in accordance with the plans validated by the authorities. The emissions from outside Finnish borders place the greatest burden on Finnish soil. Power plants account for a small proportion of the particles and other impurities present in urban air, of the order of a few per cent at most.

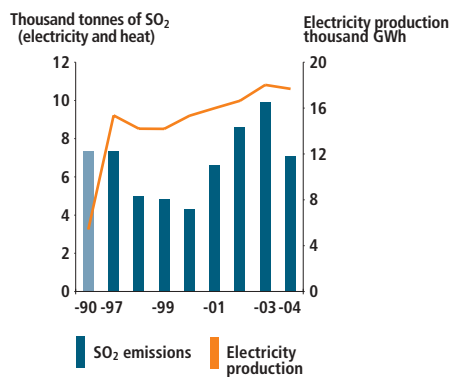
Pohjolan Voima curbs its carbon dioxide emissions by increasing emission-free forms of production, by conducting

Pohjolan Voima's carbon dioxide emissions



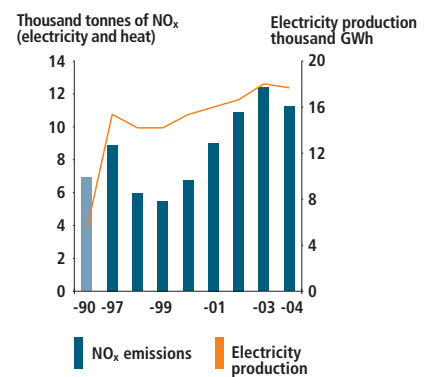
The emissions accounted for 9% of the emissions in Finland. The specific emissions decreased 14%.

Pohjolan Voima's sulfur dioxide emissions



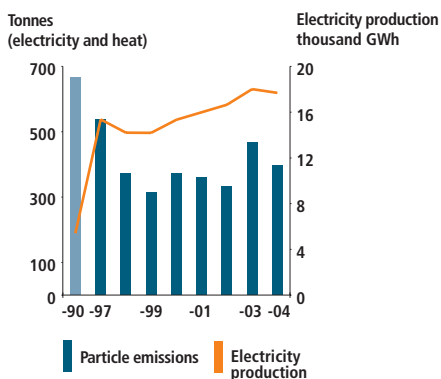
The emissions were 50% of the permissible amounts and accounted for 8% of the emissions in Finland. The specific emissions decreased 31%.

Pohjolan Voima's nitrogen oxide emissions



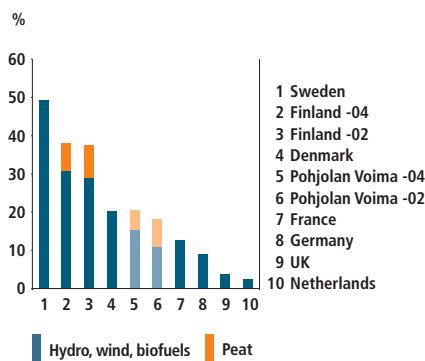
The emissions were 82% of the permissible amounts and accounted for 5% of the emissions in Finland. The specific emissions decreased 11%.

Pohjolan Voima's particle emissions



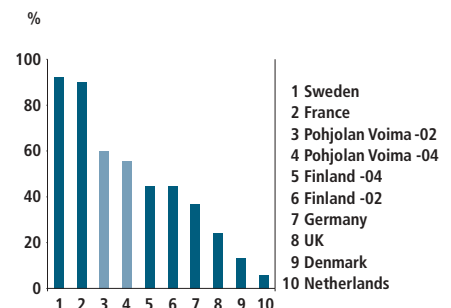
The emissions were 23% of the permissible amounts and accounted for 0.5% of the emissions in Finland. The specific emissions decreased 14%.

Electricity generation structure 2002 renewables and peat



Of Pohjolan Voima's electricity generation, 56% originated from emission-free energy sources. The consumption of logging residue and other new energy sources increased.

Electricity generation structure 2002 emission-free (hydro, nuclear, wind)



studies into alternative fuels and by increasing energy efficiency. Since 1990, Pohjolan Voima has built eight biofuel-fired power plants, of which the latest will be completed in Rauma in 2006. Sulfur emissions are controlled by the choice of fuel and desulfurization technology. The emissions of nitrogen oxides are mainly reduced by combustion technology. Particle emissions are cut by means of electrostatic precipitators.

The emissions from thermal power production decreased from the 2003 level. In 2004, the carbon dioxide emissions amounted to 6.1 million tonnes and the particle emissions to 397 tonnes. A total of 393 thousand tonnes of fly ash, bottom ash and desulfurization gypsum were produced as by-products from the cleaning of flue gases. Of this amount, 55.9% was utilized.

The production of hydropower has regional and local effects on the watercourses and fish stocks. Pohjolan Voima has been carrying out systematic management and restoration measures of the aquatic environments since the 1980s, mostly voluntarily and jointly with the Regional Environment Centres, municipalities, fishery associations and other interested parties. Since 1992, the co-operation partners' share of the financing for this work has totalled EUR 3.5 million. The environmental costs of hydropower production amounted to EUR 2.5 million. These costs mostly consisted of environmental management work, management of the fish stocks and monitoring of the dam safety. Pohjolan Voima invests heavily in the management and monitoring of fishing grounds. In 2004, the costs of fish stock management totalled EUR 1.7 million. Most of the fish is stocked in the mouths of

Compensation for the damage and harm caused by the use of hydropower up to 2004

Clearing and landscaping of shores*	988 km
Protection against erosion of shores	1 978 areas of real estate, 270 km
Deepening and shaping of shores	27 locations
Boat-moving ramps	116 pcs
Boat harbours*	402 areas of real estate
Drainage ditches*	117 km
Tap water*	449 households
Roads*	794 areas of real estate
Landscaping weirs*	42 pcs
Beaches	38 pcs
Clearing of fishing grounds	470 pcs
Migration barriers for fish*	6 pcs
Fish stocking (required by the authorities)	2.6 million individuals/year

* Some of them joint projects
(PVO-Vesivoima Oy/ municipalities/authorities/local fishery associations)

rivers to compensate for preventing migratory fish from naturally spawning. Fish stocking in inland waters is also extensive.

Teollisuuden Voima, which produces nuclear power, has operated in accordance with the environmental permits and the environmental management system. No serious deviations from regulatory compliance were detected in the company during 2004.

The heat load carried with cooling-waters into the sea totalled 27.8 TWh. The cooling-water causes changes to the ice conditions because the place of discharge of cooling-waters remains open. The size of the open area varies between 3 and 20 square kilometres, depending on the winter. Monitoring has shown that operation of the power plant has no major harmful effects on the fish stock and fishing in the surrounding sea area.

Releases from the Olkiluoto nuclear power plant into the air were extremely small. Radioactive releases into the sea are caused by fission and activation products. Their releases into the sea continued to be reduced, and represented 0.17% of the release limits set by the authorities. Tritium releases into the sea were 1.52 TBq, which constitutes 8.3% of the official limit.

The radiation situation in the environment has been normal. During the year under review, the individual radiation dose caused to the population in the sphere of influence of the plant was 0.0002 mSv, while the average annual dose received by Finns is 3.7 mSv.

The average occupational radiation doses received by the people working at the Olkiluoto power plant were 1.28 mSv per person. The highest single personal dose was 12.95 mSv, which is a quarter of the maximum value of 50 mSv in a single year set by the authorities. The combined radiation dose received by staff working at Olkiluoto was 1.514 manSv. By international standards, the total dose received by staff working at Olkiluoto is fairly low.

The company paid EUR 13.78 million to the State Nuclear Waste Management Fund.

Pohjolan Voima's shareholding in Teollisuuden Voima is 57.2%.

Pohjolan Voima generates wind power at nine power plants; the output of each plant is 1 MW. Furthermore, the testing of a new 3 MW unit was launched in Oulu in December 2004.

POWER PLANT-SPECIFIC INFORMATION

The information on emissions and by-products given below includes the combined amounts of all units by power plant. On the basis of its participation, Pohjolan Voima also obtains electricity from the Meri-Pori power plant located at Tahkoluoto in Pori, which is owned by Fortum Power and Heat Oy. Emissions from the Meri-Pori power plant are not included in the emission figures of the Tahkoluoto plant, however.

Information on the specific emissions is given by power plant unit with regard to the principal emission sources. In most cases, the emissions regulations issued for the power plants concern specific emissions, which have been defined

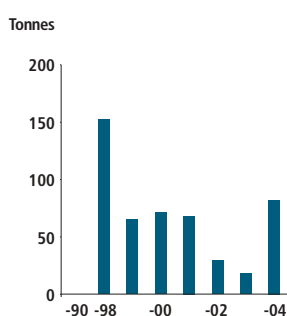
per volume of energy fed into the boiler (mg/MJ). Annual quotas have been fixed for some plants. Emissions and their effects are monitored and the data is reported to the authorities in accordance with the regulations imposed by the permits.

The amounts of ash shown in the graphs concerning the use and final disposal of ash do not correspond to the accumulation of ash, since some of the ash may have been taken to interim stores.

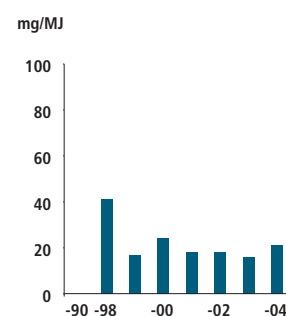
Information on the environmental quality of electricity generated by Pohjolan Voima is available on the Group's Web site.

Pohjolan Voima's plant-specific data • Nokia

Nitrogen oxide emissions

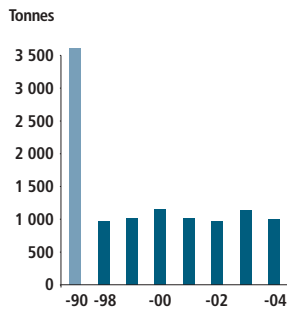


Specific emissions of nitrogen oxides

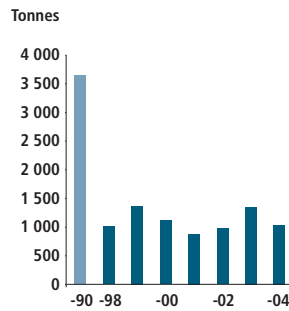


Pohjolan Voima's plant-specific data • Mussalo

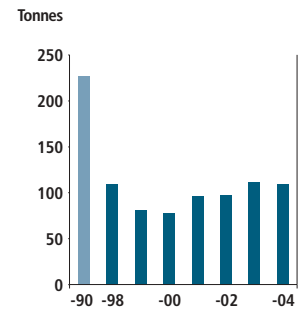
Sulfur dioxide emissions



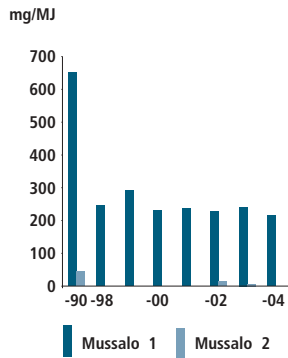
Nitrogen oxide emissions



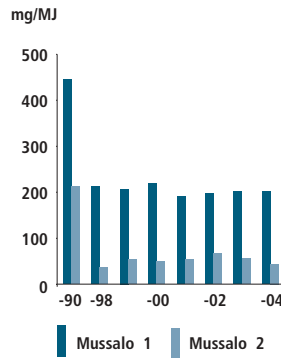
Mussalo 1 and 2
Particle emissions



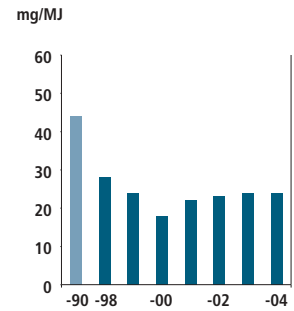
Specific emissions
of sulfur dioxide



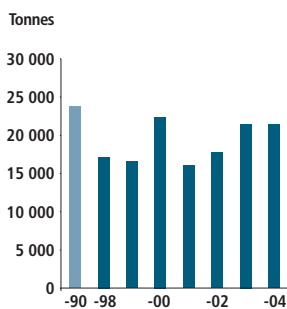
Specific emissions
of nitrogen oxides



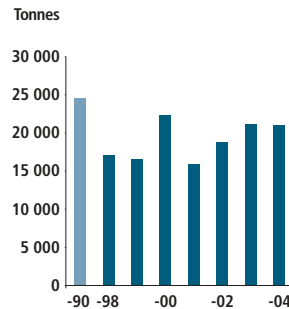
Specific emissions
of particles



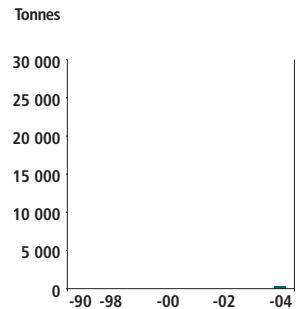
Accumulation of ash



Use of fly ash

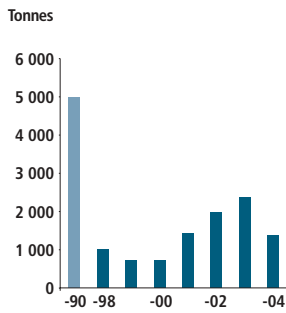


Disposal of ash

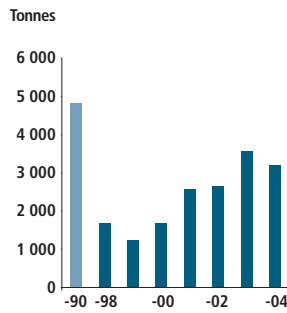


Pohjolan Voima's plant-specific data • Kristiina

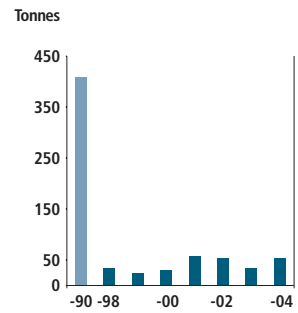
Sulfur dioxide emissions



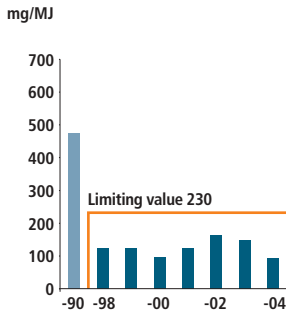
Nitrogen oxide emissions



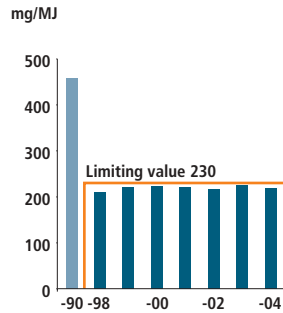
Particle emissions



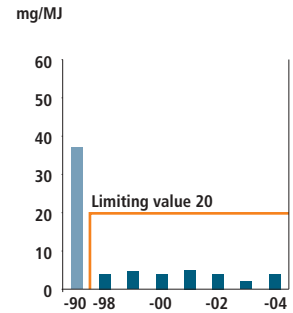
Kristiina 2
Specific emissions
of sulfur dioxide



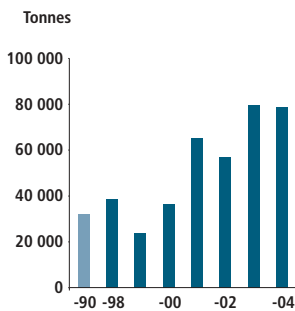
Kristiina 2
Specific emissions
of nitrogen oxides



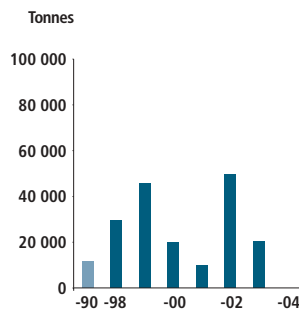
Kristiina 2
Specific emissions
of particles



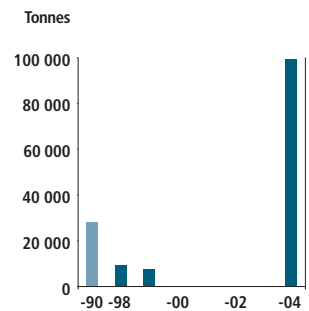
Accumulation of ash



Use of fly ash

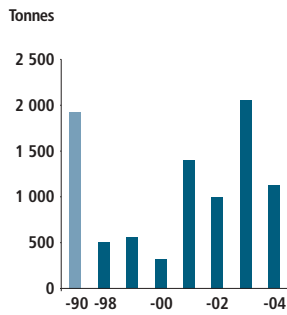


Disposal of ash

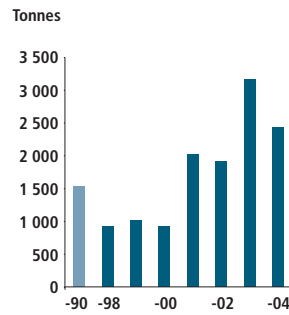


Pohjolan Voima's plant-specific data • Tahkoluoto

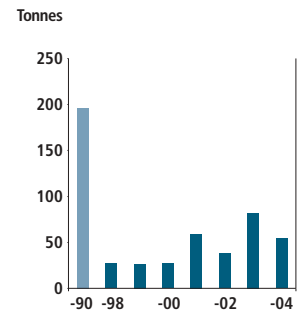
Sulfur dioxide emissions



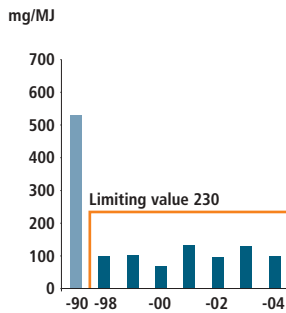
Nitrogen oxide emissions



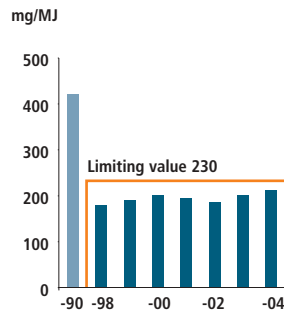
Particle emissions



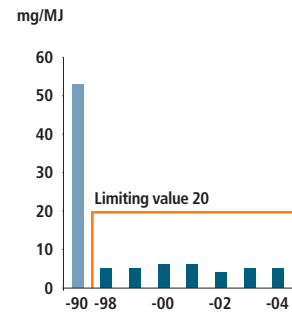
Specific emissions of sulfur dioxide



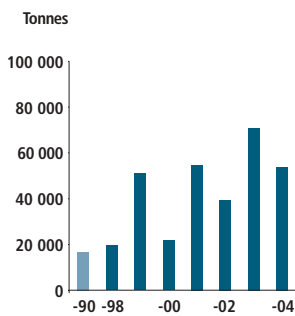
Specific emissions of nitrogen oxides



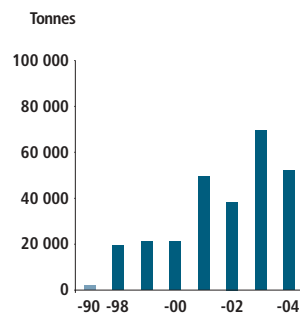
Specific emissions of particles



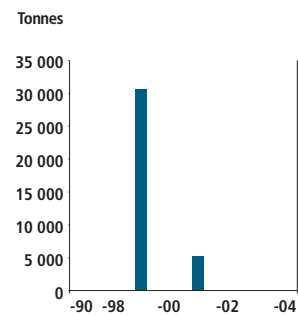
Accumulation of ash



Use of fly ash

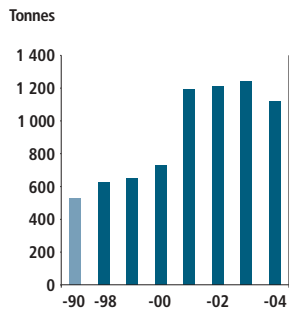


Disposal of ash

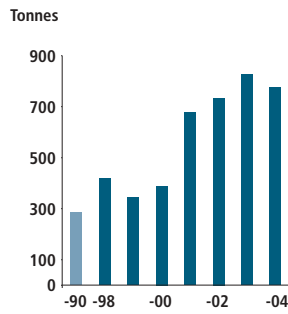


Pohjolan Voima's plant-specific data • Seinäjoki

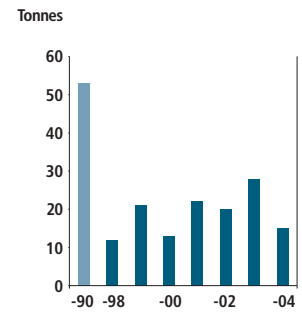
Sulfur dioxide emissions



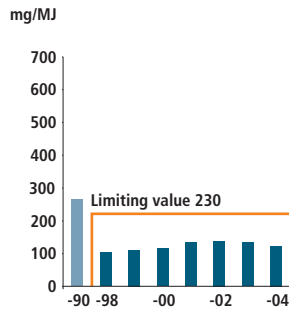
Nitrogen oxide emissions



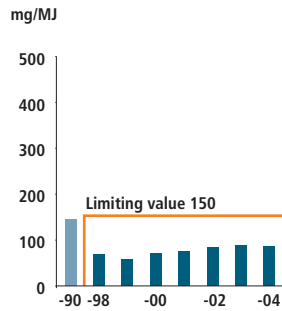
Particle emissions



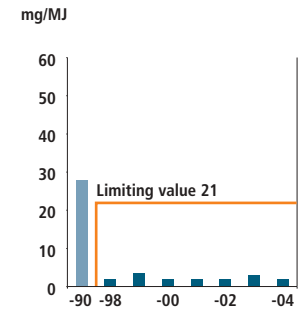
Specific emissions of sulfur dioxide



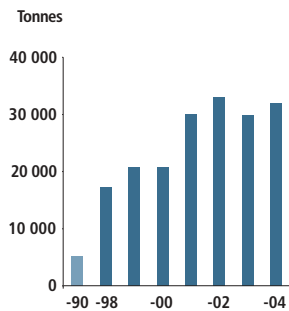
Specific emissions of nitrogen oxides



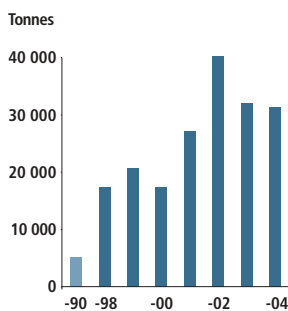
Specific emissions of particles



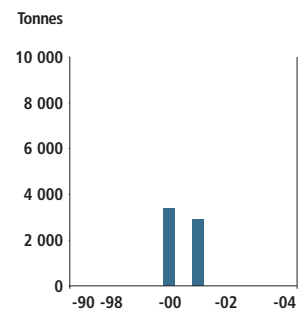
Accumulation of ash



Use of fly ash

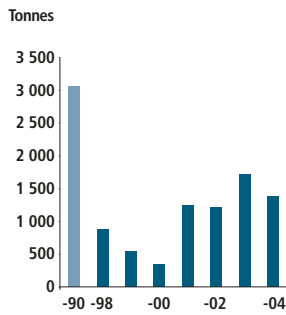


Disposal of ash

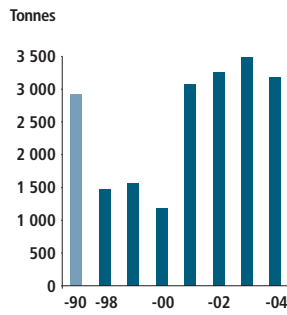


Pohjolan Voima's plant-specific data • Vaskiluoto

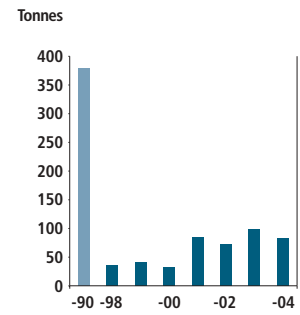
Sulfur dioxide emissions



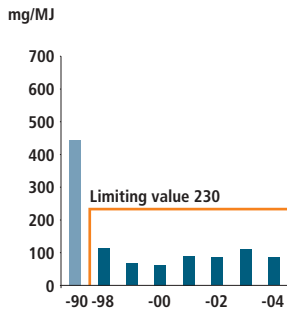
Nitrogen oxide emissions



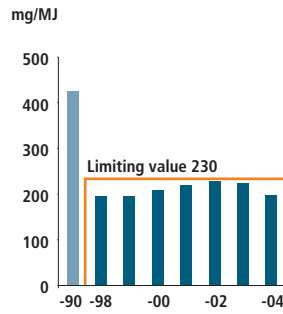
Particle emissions



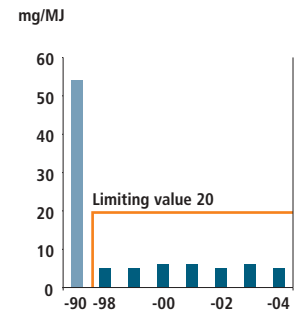
Specific emissions of sulfur dioxide



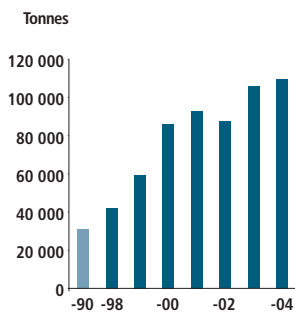
Specific emissions of nitrogen oxides



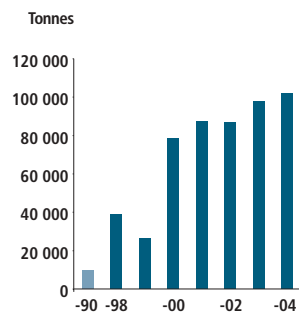
Specific emissions of particles



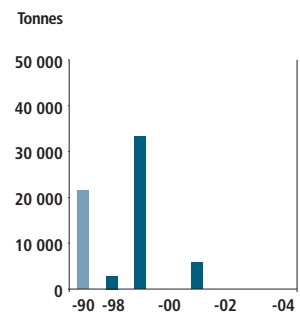
Accumulation of ash



Use of fly ash

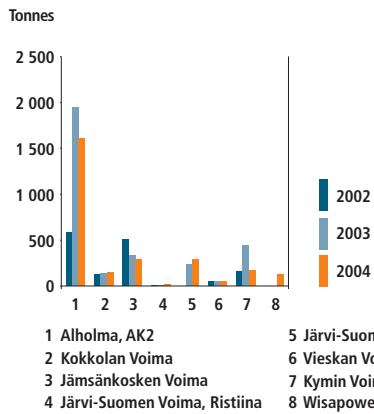


Disposal of ash

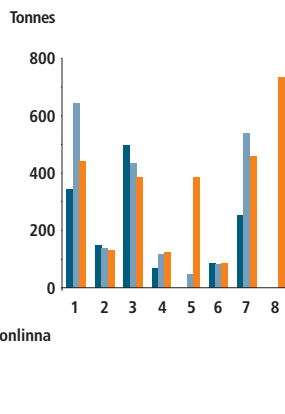


Pohjolan Voima's plant-specific data • new CHP plants

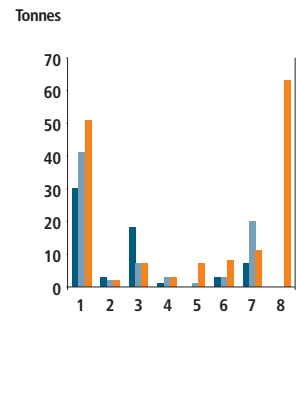
Sulfur dioxide emissions



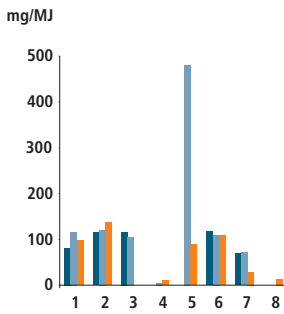
Nitrogen oxide emissions



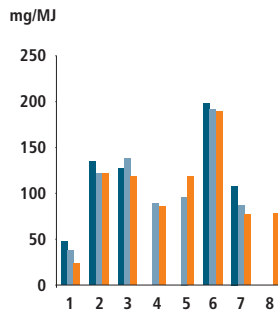
Particle emissions



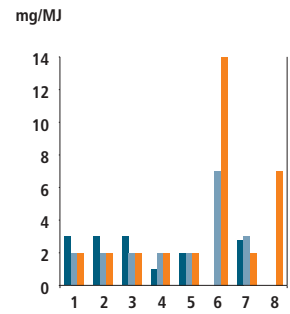
Specific emissions of sulfur dioxide



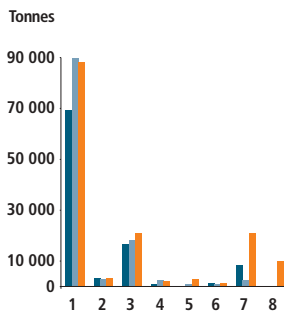
Specific emissions of nitrogen oxides



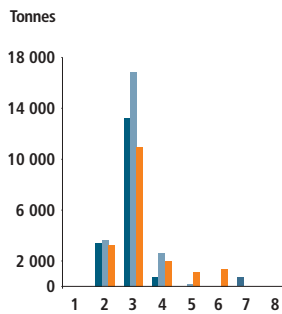
Specific emissions of particles



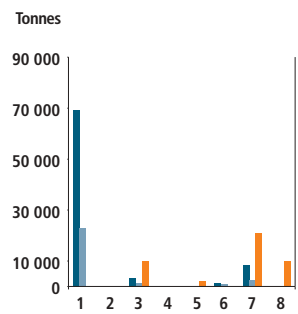
Accumulation of ash



Use of fly ash



Disposal of ash



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