Hrvatska Elektroprivreda and the Environment

2005 - 2006

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In its Annual Reports, Hrvatska Elektroprivreda regularly publishes data on its environmental activities. Being aware of the impact that our generating plants and facilities have on the environment, and respecting the right of general public to have access to such information, we have decided, in 1999, to release a biannual report titled "HEP and the Environment", to provide an overview of environmental activities carried out in HEP Group.

The fifth issue of the report "HEP and the Environment" is marked by the opening of the negotiations for the accession of the Republic of Croatia to European Union and active participation of HEP's representatives in the activities of Negotiating Teams with regard to Chapter 15 – Energy, and Chapter 21 – Trans-European Networks.

We are also aware that the process of approximation of the Croatian environmental laws with those of the EU will bring about significant changes in HEP Group's business operations. Some provisions of Croatian laws will be amended, as a rule they will become more stringent, and legislative framework will be set for still unregulated fields. The analysis of the effect that the implementation of EU's environmental legislation will have on the operation of HEP Group's power plants, which was carried out in 2005, has shown that the provisions of Directives 88/609/ECC; 2001/80/EC –Large Combustion Plants – LCP, and Directive 96/61/EC – Integrated Pollution Prevention and Control – IPPC, will have the greatest impact on our operations.

practice to systematically improve onmental protection system, and n the years to come as one of key usiness operations of our company.

The Directive concerning large combustion plants lays down air emission limits for the combustion plants, the rated thermal capacity of which is greater than 50 MW. The implementation of provisions of the aforementioned Directive will influence the decision-making on the life cycle of individual thermal power plants of HEP and construction planning of new ones.

The Directive concerning integrated pollution prevention and control and applying to all industrial plants, including HEP's large combustion plants, lays down measures designed to reduce emissions to air, water and soil and the generation of waste, measures to improve energy efficiency and water use, and measures to prevent accidents that have adverse impact on the environment, applying best available techniques (BAT). In the period to come our objective is to create conditions that enable full implementation and adherence to the provisions of the above Directive, i.e. to obtain integrated environmental permits for all thermal power plants. Due to aged generating facilities, significant financial investments will be required in order to fulfill this objective.

Upon the accession of the Republic of Croatia to the EU, HEP Group's operations will be influenced by the Kyoto Protocol, too, which limits total greenhouse emissions. It is expected that the acquis communautaire of the EU in the field of climate change will be successfully transposed into the Croatian legislation by the end of 2008. For that reason, HEP commenced preparatory activities for the alignment with national policy measures to prevent climate change, such as the introduction a carbon dioxide fee (CO_2) and joining the EU Greenhouse Gas Emission Trading Scheme (ETS). During the period covered by the fifth report "HEP and the Environment", HEP continued to invest in environmental emission reduction systems and to promote energy efficiency and use of renewable energy sources.

As one of significant activities carried out during this period I would like to highlight the implementation of the environmental management system to ISO 14001:2004 standard in HEP's plants and facilities, the improvement of waste management system and the establishment of company HEP-Renewable Energy Sources (HEP-Obnovljivi izvori energije d.o.o).

President of the Management Board

Ivan Mravak, M. Sc.

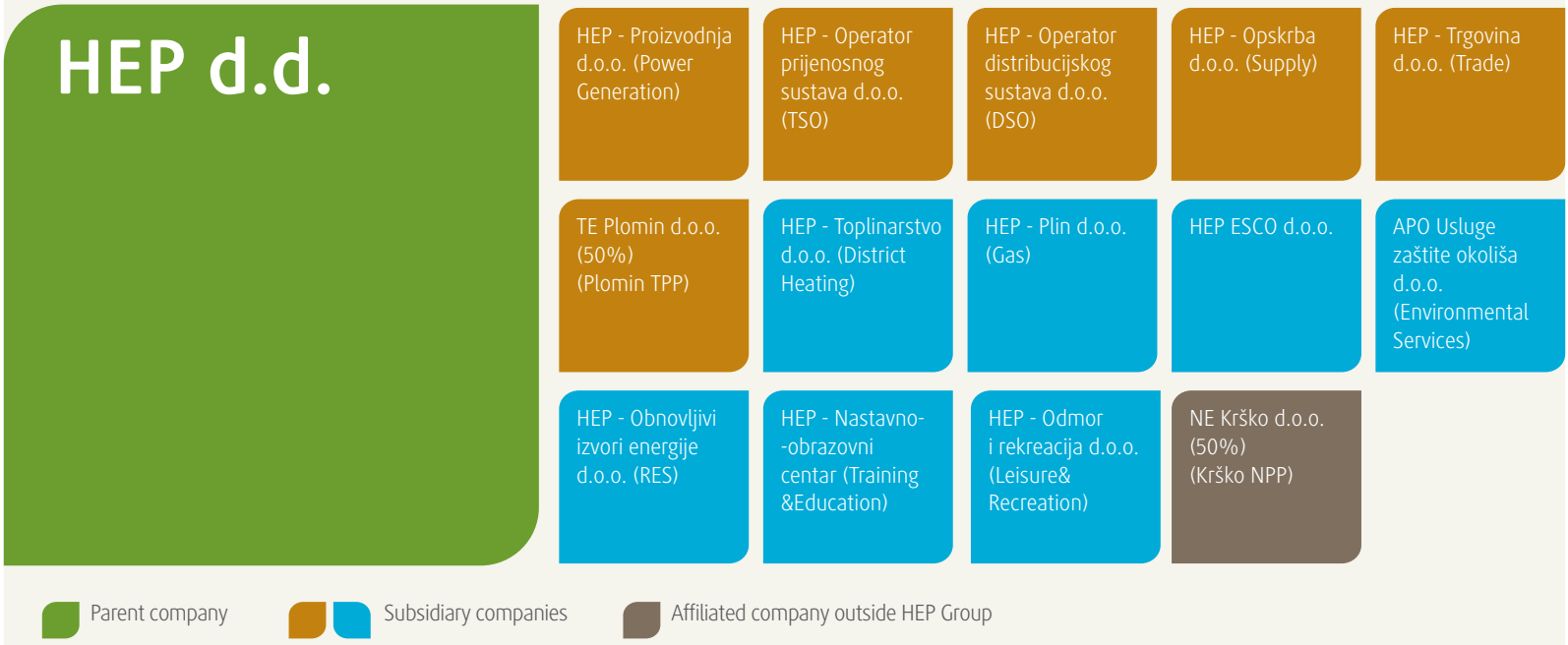
Company Profile

Hrvatska Elektroprivreda (HEP Group) is a state-owned energy company carrying out the activities of electricity generation, transmission and distribution for over a century now. Over last several decades the company also supplies heat and natural gas to its customers.

Figure 1 of the graphical attachment to the publication shows the Croatian electric power system, and Figures 2 and 3 as well as Tables 1, 2a and 2b give basic data on electricity generation and electricity generation and transmission capacities.

In December 2004, the legislation regulating the power sector has been harmonized with new EU regulations. Based on a new legal framework, companies HEP - Transmission System Operator (HEP Operator Prijenosnog Sustava d.o.o.) and Croatian Energy Market Operator (Hrvatski Operator Tržišta Energije d.o.o. - HROTE) were founded in April 2005. In the period covered by the Report, the later company underwent the process of divestment from HEP Group so as to become a fully independent state-owned company. HEP- Distribution System Operator (HEP Operator Distribucijskog Sustava d.o.o.) has been founded at the end of 2005, and HEP-Supply (HEP Opskrba d.o.o.) took over the activities of electricity supply to eligible customers. HEP-Distribution System Operator d.o.o. carries out the activities of electricity distribution and supply to tariff customers. Yet another new company was founded in October 2006, HEP-Renewable Energy Sources d.o.o., engaged in the preparation, construction and use of renewable energy sources.

Schematic presentation of HEP Group's subsidiary companies (status as of 1 June 2007)



Within the scope of HEP's business restructuring carried out in 2006, the number of employees within HEP Group was cut down as a result of the policy of incentivized retirement and the implementation of HEP Group companies' reorganization pursuant to the provisions of the Electricity Market Act. Data on the number of employees are given in Table 3, in the graphical attachment to the publication.

Environmental Protection in Management Board's Business Plan

All subsidiary companies of HEP Group have recognized environmental protection as an important component of their business operations, both in the function of development and strategic planning and in operative work of electric power plants and facilities. Therefore, the following key objectives were outlined in the Business Plan of Hrvatska Elektroprivreda's Management Board for the Period 2004 through 2008:

- to encourage the construction of renewable power sources through "public- private partnership" (PPP) between HEP Group and private investors
- to promote energy efficiency projects via HEP-ESCO company
- to establish HEP Group's environmental information system
- to implement environmental management systems to ISO 14001:2004 standard and quality management systems to ISO 9001:2000 standard in HEP's operating units

Organization of Environmental Protection in HEP

The Development Department* of HEP d.d. plays key role in the organization and monitoring of activities related to environmental protection at HEP Group's level, and the operational implementation is trusted with the employees of HEP Group's operating units.

In 2001, by the Decision of the President of the Management Board, the Team for Coordination and Standardization of Business Procedures in the field of Environmental Protection was established (hereinafter referred to as the Team), with an aim to improve the organization of environmental activities and communication and cooperation among employees engaged in environmental protection activities. The Team is composed of HEP d.d. employees, employees of core businesses: HEP-Generation, HEP-Transmission System Operator and HEP-Distribution System Operator, and other businesses: HEP-District Heating, HEP-Gas, HEP-Renewable Energy Sources and APO Environmental Services d.o.o. Another decision of the President of the Management Board reached in 2006, defined tasks and responsibilities of the Team for the forthcoming period, of which the most significant ones are: participation in the projects of construction and refurbishment of power plants and facilities the operation of which has a significant impact on the environment, and pro-active participation in enacting new regulations in the field of environmental protection that have impact on the operation and development of the electric power system.

The company APO Environmental Services d.o.o. (APO) provides professional aid to the Team and the employees of HEP's operating units that operationalize environmental activities. APO is a member of HEP Group and is specialized in environmental, consulting and engineering activities. Detailed information on the company APO could be found at www.apo.hr.

* As of March 2007 - Corporate Development and Strategy Division

Renewable Energy Sources

Over the period of past thirteen years HEP has, of own free will, promoted the development of renewable energy sources projects in Croatia. Buy-out prices for electricity generated in small hydro power plants (up to 5 MW) were contracted that were significantly higher than those of own generation. In addition to energy generated in small hydro power plants, HEP takes over the electricity generated in a small natural gas-fired cogeneration plant sTPF Pliva Savski Marof, small landfill gas-fired thermal power facility sTPF Jakuševac and wind power plants WPP Ravna 1 on the island Pag and WPP Trtar near the town of Šibenik.

A set of new laws and secondary legislation are about to be passed, pursuant to which the Croatian Energy Market Operator (HROTE) will be in charge of promoting the development of renewable energy sources projects. It has been anticipated that, among other things, new regulations would set feed-in tariffs for electricity generation per type of renewable source, which actually happened in 2007. Adapting to new circumstances, HEP has recognized its opportunity to get involved in projects of renewable energy sources as an investor. For this reason, a subsidiary company of HEP Group - HEP Renewable Energy Sources d.o.o. was founded in October 2006, for the purpose of grouping and supporting renewable energy projects. The planned projects include the construction of wind farms, biomass fired power plants, geothermal power plants, small hydro (of installed capacity below 10 MWe) and solar power plants. The majority of such projects will be realized through joint ventures with reputable domestic and foreign companies, and local community will play an important role as a partner. Targeted investments will be made into projects situated in the vicinity of electricity consumption centers which, considering their size and wider socio-economic characteristics, contribute to the security of electricity supply and sustainable regional development in the Republic of Croatia.

Detailed information on the projects launched by HEP Renewable Energy Sources could be found at www.hep.hr/oie.

Energy efficiency projects include the reconstruction and refurbishment of existing plants and facilities with an aim to improve technical solutions and rationalize energy consumption, on presumption that the invested funds will be paid back through energy savings. Increased energy efficiency lowers pollutant emission into the environment and waste quantities.

HEP recognized the opportunity to increase energy efficiency both of its own power plants and facilities and marketwise, and founded a company HEP ESCO d.o.o. The company is a key market creator for energy efficiency projects but also renders services in the energy sector and develops, implements and funds energy efficiency projects on market-based principles. The company is an implementing agency for the Energy Efficiency Project in Croatia and is currently leading over fifty projects in the field of street lighting, buildings, industry and energy supply system. Detailed information on ESCO Projects in Croatia could be found at www.hepesco.hr.

In 2006, the first plant of Hrvatska Elektroprivreda, TE-TO Zagreb CHP, has been awarded a certificate for implemented Environmental Management System to ISO 14001:2004 standard. Hydro power plants of the Production Area North and Production Area West have certified Environmental Management Systems, as well as certified Quality Management Systems to ISO 9001:2000 standard.

Preparations were made in EL-TO Zagreb CHP and Jertovec CCHP for the certification of both systems In the period to come, and in line with the Business Plan adopted by the Management Board, the certification of other plants and operating units within HEP Generation has been planned.

At the end of 2006, other companies within HEP Group, i.e. HEP Transmission System Operator and HEP Distribution System Operator, have started preparations to implement Environmental Management System to ISO 14001:2004 standard.

All HEP's hydro power plants hold certificates for electricity generation from renewable sources, which fact places HEP Generation among large certified producers of renewable energy in Europe.


CERTIFIKAT

Over the period covered by the Report, operating units of Hrvatska Elektroprivreda operated in line with obtained permits and effective legislation.

Emission monitoring from thermal power plants continued, aided by Central Information System for Pollutant Emission Monitoring (CISEM). Air quality monitoring also continued at imission stations located in the vicinity of EL-TO Zagreb CHP and Plomin TPP. Data on the quantity of industrial waste generated in the period 2005 through 2006 in HEP's plants and facilities were entered in the database of Industrial Waste Cadastre that has been kept in HEP since 1997.

In 2006, the second phase of the project Environmental Data Management Information System (INFOZO) was completed in HEP, resulting in the elaboration of an interface. The subject matter of the third and the last phase of the project is the elaboration of databases for all environmental components that will, among other things, serve to provide timely information to the stakeholders on all important environmental activities being carried out in HEP, and will foster and simplify the exchange of information between HEP and national bodies engaged in environmental protection.

In continuation there is an overview of key activities per environmental component that were carried out in 2005 and 2006 in HEP's operating units.

Air Protection

In order to improve fuel combustion and reduce pollutant emission to air from thermal power plants, preparations were made in EL-TO Zagreb CHP to replace a burner system and regulation on high pressure boilers, and in Rijeka TPP burner system was replaced on the main boiler and new low NOx burners installed.

Operating units of HEP District Heating - four boiler houses in the Zagreb city district of Gajnice and fourteen boiler houses in Dubrava and Ferenščica city districts, were connected to the central district heating system. In this way, energy efficiency has been significantly increased and the number of potential air polluting hot spots cut down.

Pursuant to the requirements of the Implementation Plan of the Stabilization and Association Agreement, Croatia committed itself to replace five percent of conventional fuels used for transport with biodiesel by the year 2007 (Directive 2003/30/EC). In order to lower pollutant emission to air and for HEP to actively participate in fulfilling the requirements set by the Agreement, the analysis was carried out in 2006, of the possibilities and the feasibility of biodiesel use in fueling the motor pool at HEP's headquarters. As a results of the analysis carried out by the Agronomy Faculty of the University of Zagreb, a diesel-engine driven business vehicle was chosen for HEP, the operation of which will be monitored over a period of one year in cooperation with its manufacturer, national scientific institutions and laboratories. Based on the obtained results an insight will be provided in the feasibility and profitability of use of biodiesel at HEP Group level.

Water Protection

In order to safeguard their own facilities and improve overall water quality, generating plants and facilities of Hrvatska Elektroprivreda have for a number of years been removing and managing mixed waste that accumulates on intake structures and trash racks of power plants during flood waters. According to analyses carried out in HEP, it has been established that between 2,500 tons and 4,500 tons of waste settles on trash racks of generating plants and facilities. The removal and management of such waste calls for significant financial investment. Although generating plants and facilities do not generate such waste, and without any legal obligation to do so, Hrvatska Elektroprivreda finances its removal from water flows and its subsequent treatment.

Over the period covered by the Report, HEP has invested in wastewater quantity reduction systems and wastewater treatment systems. For example, in TE-TO Zagreb CHP preparations were made for the reconstruction and upgrade of the wastewater drainage system, creating conditions for the connection of sanitary, process and cooling water systems to a public sewage system.

Left: Temporary debris storage site at Čakovec HPP - classified woody debris

Center: Dubrava HPP - Floating debris cleaner

Right: Flap gate at Senj HPP - underwater grass from the Gacka river flow and from grass mowing at Gusić Polje

In Rijeka TPP project has been completed to separate wastewaters produced in the process of washing filters on which mechanical dirt from the condensate was accumulated, from oily wastewater. The separation of oily wastewater and wastewater containing cellulose prevented the creation of hazardous waste.

The installation of two water demineralization lines in TE-TO Osijek CHP has not only raised dematerialized water production capacity, but also lessened the use of chemicals for line regeneration, thus improving the quality of wastewater and reducing its quantity by sixty percent.

In Velebit RHPP project was launched of the construction of a device for biological wastewater treatment to purify wastewaters generated by the power plant. Consistent with the reached agreement, Jaruga HPP will be connected to the device for biological wastewater treatment, which treats wastewater from the National Park Krka.

Waste Management

The waste management system in HEP has been significantly upgraded in 2005 and 2006. Temporary waste disposal sites and secondary raw material storages have been built in the majority of plants or their construction is now in progress. Such facilities are being equipped with containers for separate waste collection.

The management of waste oils of categories 1 and 2 continued in HEP's thermal power plants and commercial utilization continued of coal combustion by-products from the second unit of Plomin TPP (fly ash, gypsum, slag) in the Holcim cement works located in Koromačno. The utilization of such by-products as raw material for the production of cement has considerably reduced the quantity of waste that needs to be disposed on the disposal site at the location of Plomin thermal power plants. The upgrading of the hydrant network on the ash disposal site enabled more efficient moisturizing of disposal site's surface and reduction in dust quantity in the vicinity of Plomin TPP.

Upgraded waste management system at Velika Gorica operating unit (Elektra Zagreb, HEP ODS)

Preservation of Biodiversity

In cooperation with local sports and fishing societies, generating plants belonging to Hydro-Production Area North, West and South have for years been ranching river flows and reservoirs on which they had been built in order to restore the fish stock and preserve biodiversity.

The insulation of medium voltage connections of power transformers and medium and low voltage connections of auxiliary transformers carried out by HEP Transmission System Operator over past several years, prevented animal injuries caused by short-circuits.

In 2005 and 2006, the implementation of measures continued to preserve a protected species white stork (Ciconia ciconia L.), in cooperation with the Ministry of Culture, the Nature Park Lonjsko Polje and the Ornithology Institute of the Croatian Academy of Arts and Sciences.

Cleaner Production Projects

The third Cleaner Production Project was completed in TE-TO Zagreb CHP. The project comprises the installation of a new drainage and discharge system that enabled hot condensate re-use in the hot water line feeding system or within the main condensate cycle (condensate used to be cooled off and discharged into the sewer, thus creating heat losses). This project resulted in heat savings, both regarding condensate and fuel.

To cut down water consumption and the quantity of produced wastewater, implementation started at Sisak TPP of the project of recirculation of clarified de-carbonized water released in the process of washing sand filters of the chemical water treatment plant, and its re-use in plant's operation for decarbonization purposes.

HEP continuously monitors and analyzes the environmental impact of its business activities. The most significant indicators of such impacts are pollutant emissions to air and water, and the quantity of generated industrial waste. These quantities are given in the continuation of this Report.

Impact on Air

Total and specific emissions of carbon dioxide and particulates in 2005 and 2006 did not significantly differ. Total emissions of sulphur dioxide and nitric oxide in 2006 were by approximately six percent lower as compared to 2005, while specific emissions were kept at the same level.

Pollutant emissions released by HEP's plants and facilities to air are shown in tables and figures given in the graphical attachment to the publication.

Impact on Water

In 2005 and 2006, wastewaters from HEP's generating plants were discharged in line with the provisions laid down in water permits and water regulations.

Data on the use, treatment and monitoring of wastewater in HEP's thermal power plants are presented in the graphical attachment, tables 8 through 10.

Waste

In 2005 and 2006, the management of waste generated in HEP was consistent with the effective legislation. In 2005, HEP's power plants and facilities generated a total of 124,820 tons of non-hazardous and a total of 1,209 tons of hazardous waste. In 2006, a total of 134,435 tons of non-hazardous and 1,576 tons of hazardous waste were generated.

Data on the quantity and type of waste generated in HEP's plants and facilities are given in the graphical attachment, figures 11 through 14.

In accordance with the adopted business policy, HEP carried out its operations during the subject period in line with legal provisions and the code of business ethics, on the principles of sustainable development and corporate social responsibility.

Out of a number of HEP's activities relating to the development of corporate social responsibility, several specific projects could be emphasized:

- Student Prize
- The Year of Nikola Tesla
- Eco-School Project
- Organization of educational visits for secondary school students to Krško nuclear power plant
- Sponsorship of top Croatian sports
- Implementation of program to improve utility infrastructure and economic and entrepreneurial environment in local communities neighboring HEP's plants and facilities.

In addition to the aforementioned activities, HEP's employees participated on regular basis in professional forums held to inform representatives of environmental organizations, general public, the media and government representatives of the activities carried out in HEP's plants and facilities, aimed at protecting the environment and creating a friendly environment.

Data on environmental impacts of HEP's plants and facilities continued to be systematically collected and published in HEP's Annual Report, periodic publication HEP and the Environment and on HEP's web page, and presented in numerous professional meetings. HEP Distribution System Operator was about to open its web page* to provide its customers with timely information on its business operations, enable them to forward actual meter readings and get acquainted with all regulations and news relating to electricity supply and distribution.

* Since 2007 - http://ods.hep.hr

Environmental Costs and Investments

Since 2004, Hrvatska Elektroprivreda has been implementing the Environmental Cost Accounting Project (the RETZOK Project), which enables the monitoring and planning of regular expenditures and investments in environmental protection and timely reporting thereof to relevant institutions.

In 2005, according to RETZOK data, costs of ordinary operations in the field of environmental protection amounted to HRK 108,798,486 and investments amounted to HRK 25,765,018.

Of 2005 investments, the most significant ones were the investments made in nature and landscape protection - HRK 24.8 million, and in waste management - HRK 18.4 million. Cost should also be mentioned that relate to soil and groundwater protection, totaling ca HRK 10.1 million.

In 2006, the most significant investments relate to waste management - HRK 8.6 million, and nature and landscape protection - HRK 7.1 million.

An overview of environmental expenditures (costs and investments) per environmental medium is given in the graphical attachment, figures 15 through 17.

HEP's Environmental Plans

Hrvatska Elektroprivreda will pursue its business policy of paying systematic and diligent attention to environmental issues. Investments will continue into the existing plants and facilities to prevent and mitigate adverse impacts on the environment. To meet the above objectives, HEP plans to build further the competences of all employees and improve their environmental awareness.

In the subject period, HEP began an investment cycle to build new power plants. All new plants and facilities will incorporate the best environmental protection technologies available, which guarantee compliance with all the regulations of the European Union in the field of environmental protection.

In view of the negotiations on the accession of the Republic of Croatia to European Union, it should be emphasized that HEP will continue to promote and transpose fundamental values of the European Union in the field of energy, which include the security of supply and operation on the principles of sustainable and environmentally friendly development.

Figure 1: **Croatian electric power system in 2006**

The map shows only generating capacities and 400 kV and 220 kV transmission network. To make the map more comprehensible, 110 kV network has not been presented.

Figure 2: **Structure of generating capacities in 2006**

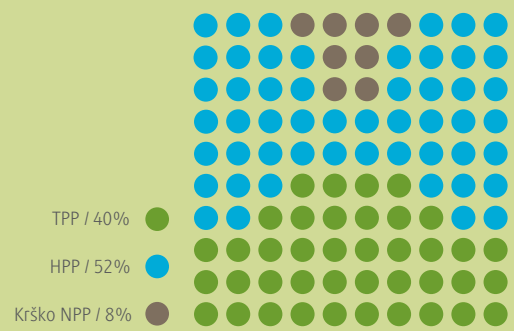


Table 1: **Croatian electric power system in 2006**

Voltage level	Switchyards No.	Switchyards MVA
400/x kV	6	4400
220/110 kV	11	3000
110/x kV	127	6734.5
HEP's property	105	5651
35(30)/10(20) kV	355	4150
10(20)/0.4 kV	23,991	7073.4
High voltage (400, 220, 110 kV)	144	14,134.5
Medium & low voltage	24,346	11,223.4
HEP's property		
High voltage (400, 220, 110 kV)	122	13,051
Medium & low voltage	24,346	11,223.4

Voltage (kV)	Lines (km) Total	Overhead	Cable
400 kV	1158.9	1158.9	
220 kV	1144.5	1144.5	
110 kV	4658.7	4540.4	118.3
35, 20, 10 kV	38,359	27,354	11,025
0.4 kV	90,141	69,009	21,132
High voltage	6962.1	6843.8	118.3
Medium & low voltage	128,500	96,363	32,137

Figure 3: **Electricity generation by fuel type** (GWh)

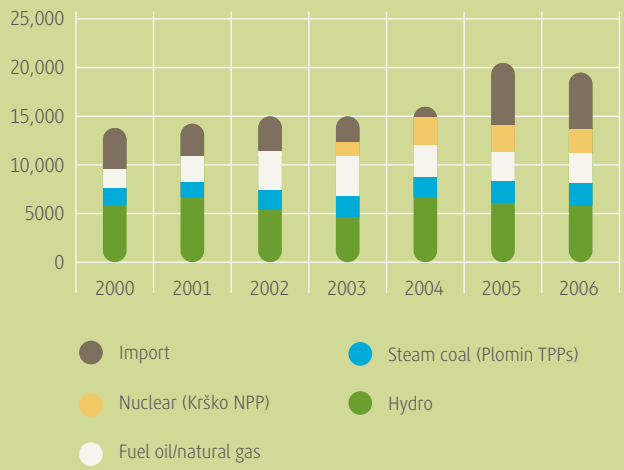


Table 2a: **Generating capacities owned by Hrvatska Elektroprivreda - hydro power plants**

Hydro power plants	Total available capacity (MW)	Type of plant
Storage HPPs		
Senj HPP	216	S
Sklope HPP	22.5	S
Vinodol HPP	84	S
Lepenica PSP	1.4 / (-1.25)	S
Fužine PSP	4 / (-4.8)	S
Peruča HPP	41.6	S
Orlovac HPP	237	S
Buško Blato PSP	11.4 / (-10.3)	S
Zakučac HPP	486	S
Velebit RPT	276 / (-240)	S
Dubrovnik HPP	216	S
Đale HPP	40.8	S
Kraljevac HPP	46.4	S
Total	**1689.1 / (-256.25)**	
Run-of-River HPPs		
Rijeka HPP	36	RoR
Miljacka HPP	24	RoR
Golubić HPP	6.54	RoR
Gojak HPP	48	RoR
Varaždin HPP	86	RoR
Čakovec HPP	80.6	RoR
Dubrava HPP	80.6	RoR
Total	**361.74**	
Small HPPs		
Zeleni Vir HPP	1.7	S
Jaruga HPP	7.2	RoR
Ozalj HPP	5.5	RoR
Zavrelje HPP	2	S
Krčić HPP	0.34	RoR
Total	**16.22**	
Mini HPPs		
Varaždin HPP	0.46	BMGS
Čakovec HPP	1.1 / (0.34)	BMGS/SH
Dubrava HPP	1.1 / (0.68)	BMGS/SH
Total	**3.68**	
Total HPPs	**2058.72 / (-255.33)**	

HPP - hydro power plant
PSP - pump-storage plant
RPT - reversible pump turbine
BMGS - biological minimum generator set
S - storage power plant
SH - small hydro power plant
RoR - run-of-river power plant

Table 2b: **Generating capacities owned by Hrvatska Elektroprivreda - thermal power plants**

Thermal power plants	Available net capacity (MW)	Fuel
Plomin 1 TPP	98	steam coal
Plomin 2 TPP	192	steam coal
Rijeka TPP	303	FO
Sisak TPP	396	FO/NG
TE-TO Zagreb CHP	135	FO / NG
TE-TO Zagreb CHP, Unit K	202	NG / ELFO
EL-TO Zagreb CHP	40	FO / NG
EL-TO Zagreb CHP, Unit H	2x25	NG
Jertovec CCGT	83	NG / ELFO
TE-TO Osijek CHP	42	FO / NG
TE-TO Osijek B CHP	48	NG / ELFO
Total TPPs	**1589**	
Krško NPP (50%)	338	UO_2
Emergency diesel (4), stand-by	29	D2
Emergency gas-fired*	16.5	D2
Total TPPs + Krško NPP	**1927**	

* unavailable for operation

TPP - thermal power plant
NG - natural gas
FO - fuel oil
ELFO - extra light fuel oil
UO_2 - uranium oxide
D2 - special fuel oils for the operation of emergency power plants

Table 3: **Data on employees**

HEP Group Member	No. of employees 2005	2006
HEP d.d.	425	426
HEP Proizvodnja d.o.o. (Power Generation)	2399	2391
HEP Operator prijenosnog sustava d.o.o. (TSO)	1208	1202
HEP Operator distribucijskog sustava d.o.o. (DSO)	10,162	9721
HEP Toplinarstvo d.o.o. (District Heating)	378	378
HEP Plin d.o.o. (Gas)	132	135
Hrvatski operator tržišta energije d.o.o. (Market Operator)*	12	12
HEP ESCO d.o.o.	10	12
HEP Toplinarstvo Sisak d.o.o. (Sisak District Heating)	4	3
APO Usluge zaštite okoliša d.o.o. (Environmental Services)	20	20
HEP Opskrba d.o.o. (Supply)		5
HEP Nastavno-obrazovni centar Velika (Training & Educational Centre Velika)		10
HEP Obnovljivi izvori energije d.o.o. (Renewable Energy Sources)		1
Total HEP - Group	**14,772**	**14,336**

* undergoing the process of divestment from HEP Group

Table 4: **Operational characteristics and air emissions from thermal power plants in 2005**

	OUTPUT		EMISSION			
HEP's TPPs in 2005	Electricity (GWh)	Heat (TJ)	SO_2 (t)	NOx (t)	Particu. (t)	CO_2 (kt)
PLOMIN 1	641		4069	2225	85	647
PLOMIN 2	1458		612	1547	78	1413
RIJEKA	697		6415	1138	154	535
SISAK	523		3189	920	176	434
TE-TO ZAGREB	1389	551	1709	422	19	824
EL-TO ZAGREB	459	393	1592	1023	153	404
TE-TO OSIJEK	107	126	1182	286	46	174
JERTOVEC	1		1	3		1
Total	**5275**	**1071**	**18,768**	**7564**	**710**	**4432**

Operational unit / fuel consumption in 2005	Coal (t)	Sulphur (%)	Liquid fuel (t)	Sulphur (%)	Natural gas (10^3 m^3)
PLOMIN 1	288,123	0.54	673	0.2	
PLOMIN 2	626,984	0.54	1181	0.2	
RIJEKA			174,958	2.3	
SISAK			110,818	2.12	48,211
TE-TO ZAGREB			72,460	0.85-2.8	324,303
EL-TO ZAGREB			52,294	1.74	140,385
TE-TO OSIJEK			47,012	1.2	14,282
JERTOVEC			90		
Total	**915,107**		**459,485**		**527,181**

Table 5: **Operational characteristics and air emissions from thermal power plants in 2006**

	OUTPUT		EMISSION			
HEP's TPPs in 2006	Electricity (GWh)	Heat (TJ)	SO_2 (t)	NOx (t)	Particu. (t)	CO_2 (kt)
PLOMIN 1	452		1950	1378	140	454
PLOMIN 2	1576		581	1434	60	1458
RIJEKA	825		6392	1240	171	616
SISAK	741		3592	1049	255	573
TE-TO ZAGREB	1374	481	2829	705	25	825
EL-TO ZAGREB	333	332	1259	900	19	355
TE-TO OSIJEK	114	115	1062	320	35	160
JERTOVEC	20			19		13
Total	**5435**	**928**	**17,664**	**7044**	**704**	**4454**

Operational unit / fuel consumption in 2006	Coal (t)	Sulphur (%)	Liquid fuel (t)	Sulphur (%)	Natural gas (10^3 m^3)
PLOMIN 1	198,454	0.54	431	0.2	
PLOMIN 2	637,924	0.54	367	0.2	
RIJEKA			199,735	2.2	
SISAK			111,591	1.79	121,459
TE-TO ZAGREB			80,423	0.85-2.8	308,502
EL-TO ZAGREB			38,982	2.1	125,879
TE-TO OSIJEK			36,668	1.1	24,337
JERTOVEC					6646
Total	**836,378**		**468,197**		**586,823**

Figure 4: **HEP's share in total SO_2 emissions in Croatia** (t)

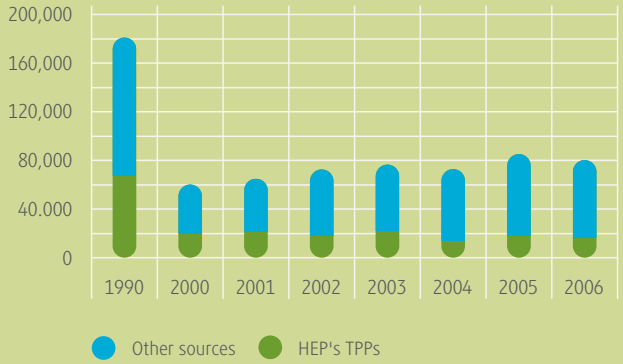


Figure 5: **HEP's share in total NOx emissions in Croatia** (t)

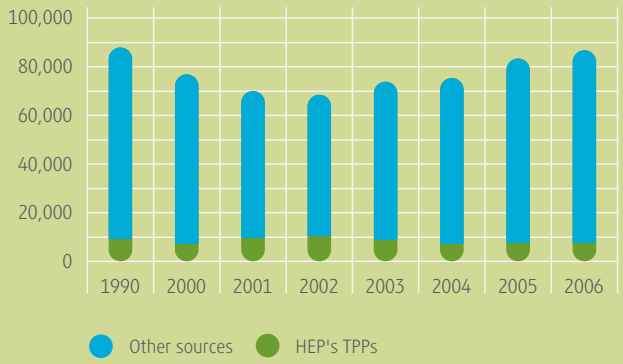
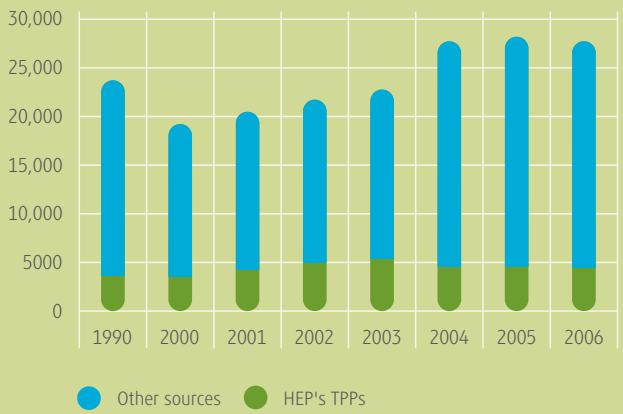


Figure 6: **HEP's share in total CO_2 emissions in Croatia** (kt)



* Emission balances for Croatia for the year 2006 are preliminary balances

Figure 7: **Pollutant emissions to air from HEP's thermal power plants - SO_2**

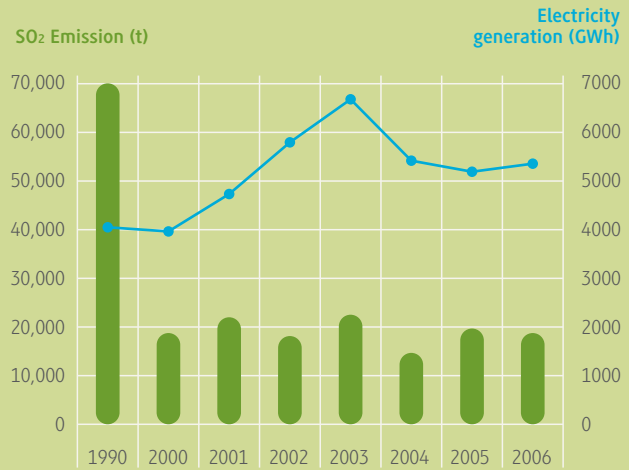


Figure 8: **Pollutant emissions to air from HEP's thermal power plants - NOx**

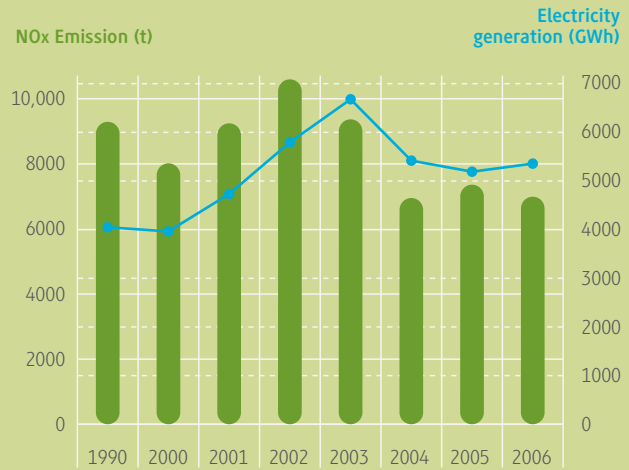


Figure 9: **Pollutant emissions to air from HEP's thermal power plants - CO_2**

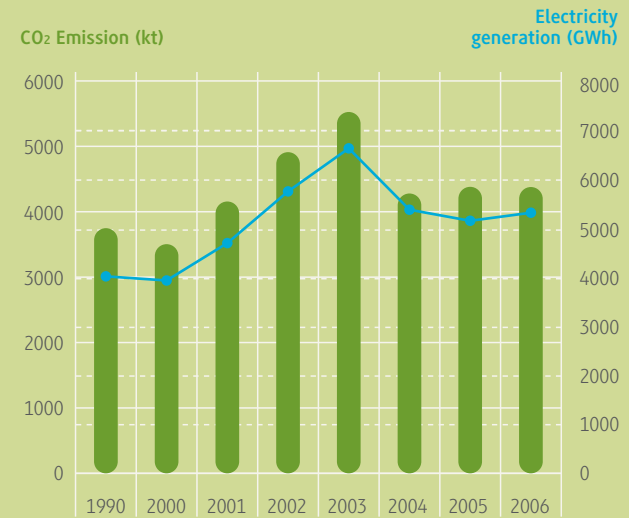


Figure 10: **Pollutant emissions to air from HEP's thermal power plants - particulates**

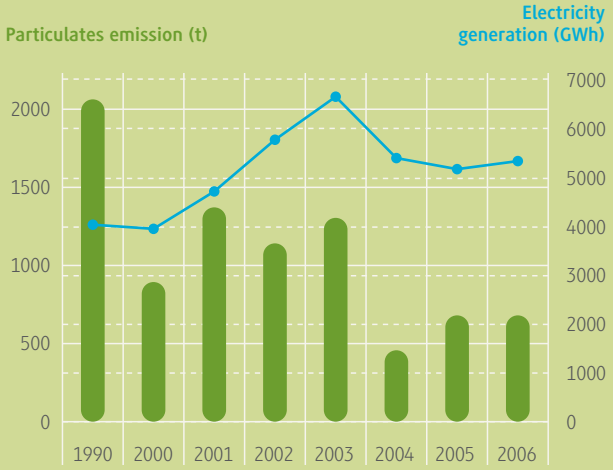


Table 6: **Pollutant emissions to air from HEP's thermal power plants in the period from 1990 to 2006**

	SO_2 (t)	NOx (t)	CO_2 (kt)	Particu. (t)	Electricity generated in thermal power plants (GWh)
1990	69,402	9248	3750	2031	4030
2000	17,827	7975	3522	885	3958
2001	21,669	9222	4199	1382	4713
2002	17,248	10,544	4900	1135	5899
2003	20,892	9391	5476	1283	6703
2004	12,715	6927	4320	472	5402
2005	18,768	7564	4432	710	5275
2006	17,664	7044	4454	704	5435

Table 7: **Specific SO_2, NOx, CO_2 and particulates emission from HEP's generating facilities in the period from 1990 to 2006**

SPECIFIC EMISSION (g/kWh)	SO_2	NOx	CO_2	Particu.
1990	8.98	1.20	485	0.26
2000	1.88	0.84	371	0.09
2001	1.92	0.82	373	0.12
2002	1.53	0.94	435	0.10
2003	1.84	0.81	472	0.13
2004	1.06	0.57	350	0.06
2005	1.46	0.52	376	0.06
2006	1.49	0.61	328	0.08

Table 8: **Water intake per individual TPP in 2005**

Water intake (m^3) by source

2005	Own wells	Public water supply system	Cooling water	
			Sea	Surface waterflow
Plomin 1 & 2 TPP	1,162,665	18,013	389,480,220	
Rijeka TPP		213,047	154,160,000	
Sisak TPP		26,107		81,029,750
TE-TO Zagreb	1,143,521	19,020		121,612,000
EL-TO Zagreb	1,978,000*	22,000		
TE-TO Osijek		2,797		656,721
Jertovec CCGT		4,734		17,890
Total	**4,284,186**	**305,718**	**543,640,220**	**203,316,361**

* Including cooling water for cooling towers

Table 9: **Water intake per individual TPP in 2006**

Water intake (m^3) by source

2006	Own wells	Public water supply system	Cooling water	
			Sea	Surface waterflow
Plomin 1 & 2 TPP	1,022,520	15,409	365,921,820	
Rijeka TPP		163,040	144,360,000	
Sisak TPP		16,761		145,423,762
TE-TO Zagreb	1,217,457	35,881		120,661,400
EL-TO Zagreb	1,745,085*	12,490		
TE-TO Osijek		2,798		615,058
Jertovec CCGT		3,987		44,000
Total	**3,985,062**	**250,366**	**510,281,820**	**266,744,220**

* Including cooling water for cooling towers

Table 10: **Water discharge** ('000 m^3/year) **in 2005 and 2006**

2005	Sanitary	Cooling	Process	Storm water
TPPs	27.15	468,128.10	763.96*	251.01
HPPs	13.21	7290.92		
Total	**40.36**	**475,419.02**	**763.96**	**251.01**

2006	Sanitary	Cooling	Process	Storm water
TPPs	12.964**	442,170.27**	1913.313	228,94
HPPs	17.087***	5830.54		9,64
Total	**30.051**	**448,000.81**	**1913.313**	**238,58**

* In Jertovec CCGT, TE-TO Osijek CHP, Plomin 1 TPP, Sisak TPP and EL-TO Zagreb CHP, process waters are discharged in a mixed outfall

** The figures stated do not include a part of wastewater discharged together with process water as mixed wastewater

*** Some plants have septic tanks, and sanitary wastewaters from Rijeka HPP are discharged into a municipal sewage system

Table 11: **Wastewater management in HEP's thermal power plants**

HEP's TPPs	Water source	Type of wastewater	Treatment system	Outfall	Wastewater quality control
Plomin 1 & 2 TPP	Bubić Jama	process water	wastewater and process water treatment system	the Čepić Canal to the Plomin Bay	The dynamics of measurement was defined in the Ordinance on Limit Values of Indicators of Hazardous Substances in Wastewater (Official Gazette No. 40/99, 6/01, 14/01) and water use permits. Common analytical parameters for all TPPs are: total suspended solids, mineral oil, COD, BOD-5, and in the majority of other cases measurements are taken of oil and grease, dissolved salts, ammonia ions and Ni, Cu, Zn, Mn, Fe, nitrites and nitrates.
		storm water from coal depot	lamellar sedimentation system		
	Bubić Jama (reserve - public water supply system)	oily water	oil separation		
		sanitary water	BIO-device		
	the sea	cooling water	no treatment		
Rijeka TPP	public water supply system	process water	pre-treatment system	submarine outfalls	
		oily water	oil separation		
		sanitary water	BIO-devices		
	the sea	cooling water	no treatment	surface outfall into the sea	
Sisak TPP	the Sava River	process water	pre-treatment system	storm water sewer system to the Sava River	
		oily water	oil separation		
	public water supply system	sanitary water	no treatment		
	the Sava River	cooling water	no treatment	the Sava River	
TE-TO Zagreb CHP	wells (at TE-TO Zagreb location)	process water from CWP	neutralization and sedimentation	the Sava River	
		other process water	pre-treatment system	the Savica River	
		oily water	oil separator + mechanical barriers with added oil coagulators		
		sanitary and storm water	no treatment		
	the Sava River	cooling water	no treatment	the Sava River	
EL-TO Zagreb CHP	public water supply system	sanitary water	no treatment	municipal sewage system	
	wells	process water	pre-treatment system	municipal sewage system	
		oily water	oil separation		
		cooling water for towers	cooling and re-circulation		
Jertovec CCGT	the Krapina River	process water	pre-treatment system	an open canal to the Jertovec Creek (the Krapina River tributary)	
		oily water	separation and activated-coal filters		
	public water supply system	sanitary and faecal water	BIO-device		
	the Krapina River	cooling water for towers	cooling and re-circulation		
CCGT & TE-TO Osijek CHP	the Drava River	wastewater from CWP	neutralization and sedimentation	municipal sewage system	
		other wastewater	sedimentation pools		
		oily water	oil separation	the Palčić Canal to the Drava River	
		storm water from uncontaminated surfaces	no treatment		
		cooling water for towers	cooling and re-circulation		
	public water supply system	sanitary water	no treatment	municipal sewage system	

Figure 11: **Total quantity of waste generated in HEP** (t)

Figure 12: **Total quantity of non-hazardous waste generated in HEP** (t)

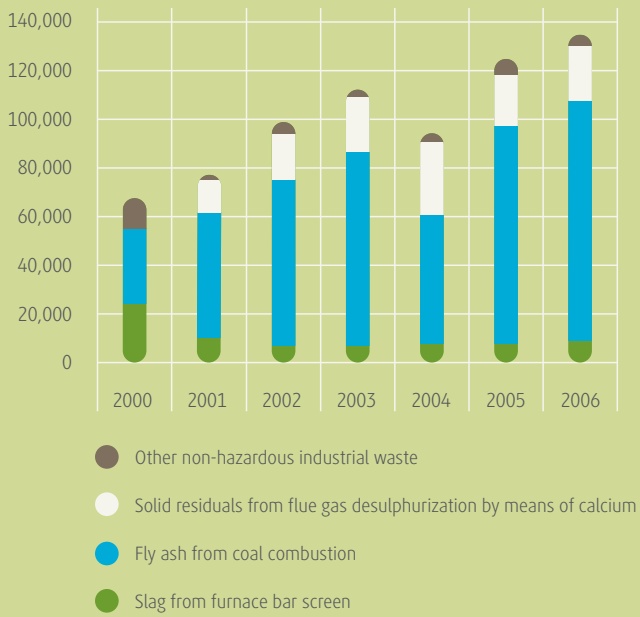


Figure 13: **Total quantity of hazardous waste generated in HEP** (t)

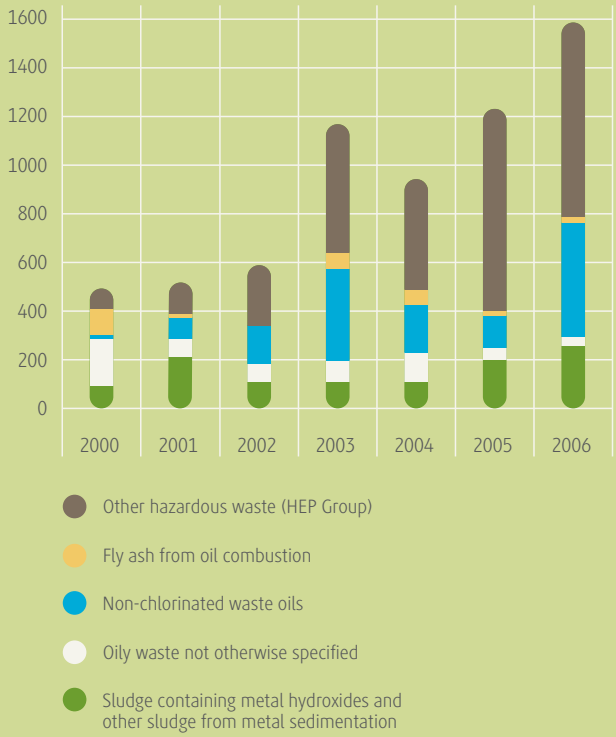


Figure 14: **Management of PCB- and PCT-containing equipment** (t)

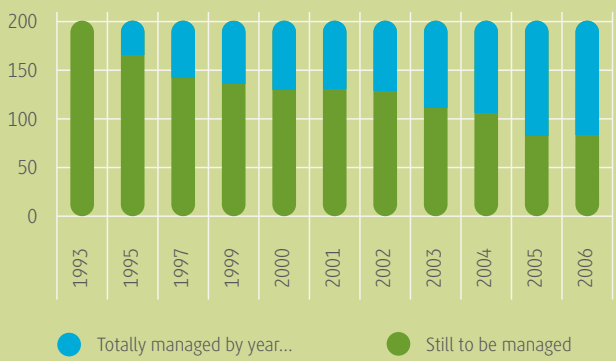


Figure 15: **Total environmental expenditures in the period from 2000 to 2006** (HRK million)

Note: Data up until the year 2003 were calculated on the basis of available data, a questionnaire and an informed estimate, and data for other years were obtained from the RETZOK system.

Figure 16: **Environmental expenditures in HEP Group in 2005, according to RETZOK reports** (HRK million)

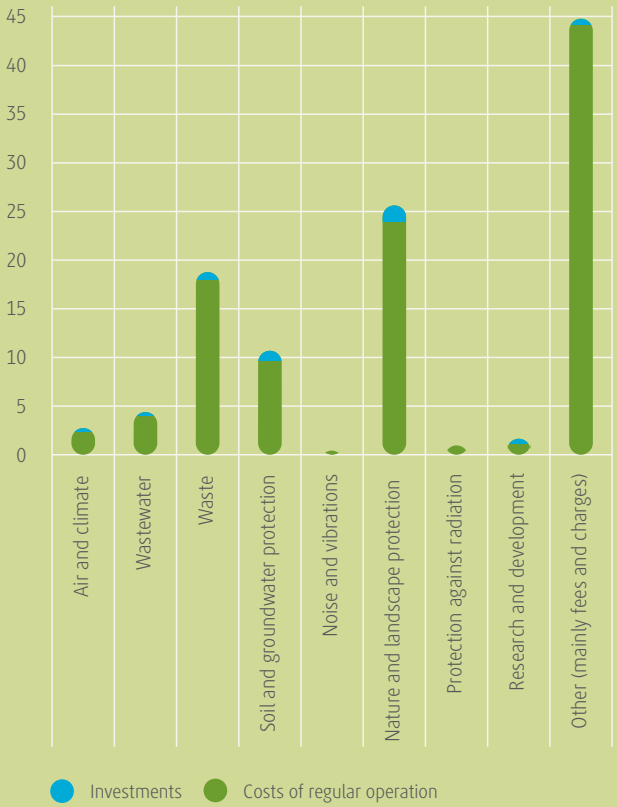
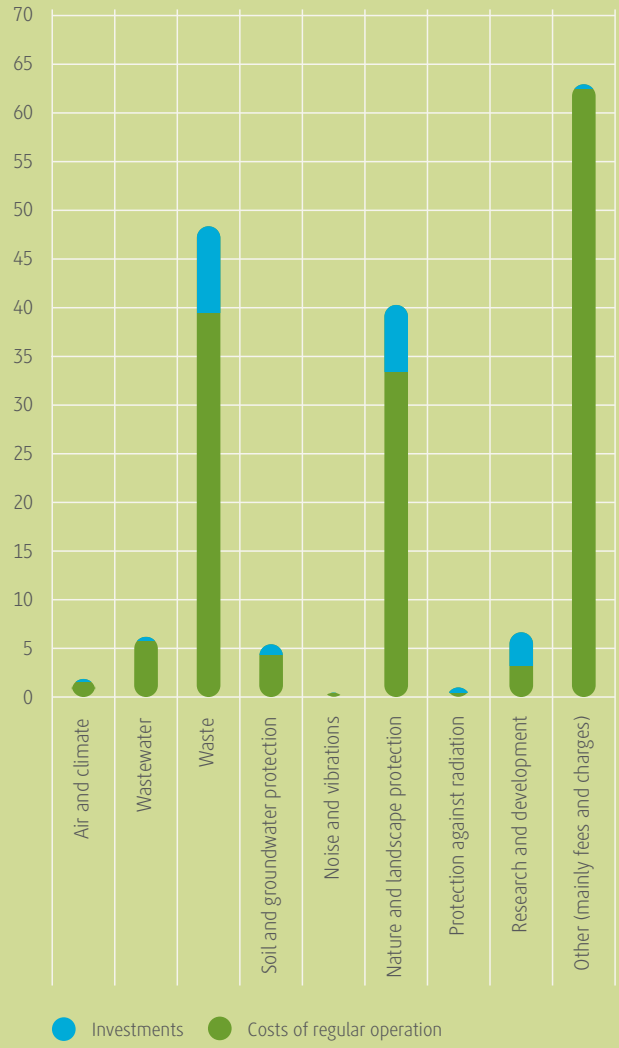


Figure 17: **Environmental expenditures in HEP Group in 2006, according to RETZOK reports** (HRK million)



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