



HEP - Transmission System Operator, Ltd.

annual report
summary

2006

Member of HEP Group

2006

Mission



The mission of the HEP - Transmission System Operator (HEP-OPS) is to operate the power system of the Republic of Croatia, to transmit electricity and to maintain and develop the transmission network with the aim of reliable electricity supply and trade at lowest cost.

Within restructuring of the electric power sector, company "HEP-Operator prijenosnog sustava" (HEP-Transmission System Operator) was established. Company's mission is pursuing the activity of electric power transmission within the Croatian electricity market. It started its operation on 4 April 2005, conducting its mission in accordance with the Energy Act - the Act amending Energy Act and the Electricity Market Act.

HEP-TSO is the sole transmission system operator in Croatia, licensed to perform the activity of electricity transmission as a public service, and is doing so independently and in accordance with the Companies Act.

HEP-TSO is a member of the HEP Group as a daughter company of Hrvatska elektroprivreda d.d.



2006

Foreword



Miroslav Mesić, B.Sc.



Dr. Dubravko Sabolić

During 2006, HEP TSO has been consciously performed its duty of operating and monitoring the Croatian electric power system and developing, constructing and maintaining of the transmission network in accordance with its legal obligations.

The year 2006 can be evaluated as a calm one in terms of operation, because there were no significant events with serious consequences for the power system.

During 2006, the construction of transmission facilities of the “Split Program” and TS 110/20 Dunat on the island of Krk were finalised. The construction of “Banovina Program”, 2×220 kV line Plomin-Vodnjan and TS 110/35 Krapina continues, while a large number of replacements and reconstructions took place in transforming stations and high voltage power lines.

Last year was marked by an active contribution of HEP-TSO in the process of

the Croatian electric power sector reform and participation in development and implementation of by-laws important for electricity market liberalization. HEP-TSO is particularly involved in the activities of international associations dealing with electricity transmission as well as environmental protection.

A high degree of reliability and availability was achieved in 2006, which has contributed to overall system security of the Croatian electricity system, and the Company has in that sense successfully performed its basic task in the chain of supplying the customers with electricity within the HEP Group.

Note: during the report time-frame, from 1 January 2006 to 31 December 2006, CEO of HEP-TSO was Miroslav Mesić. Since 4 April 2007 the CEO is Dr. Dubravko Sabolić.

2006

220 kV and 400 kV network



* enlarged cross-section



General overview

In 2006, the activities of HEP-TSO have continued in accordance with the organization set on 1 November 2005. Activities of HEP-TSO are electricity transmission; system operation and control; providing system services, construction, operation and maintenance of the transmission network, generation and trade of reactive power, development, construction, oversight and governing of measurement devices and billing of transmitted electricity and services.

Transmission demand in 2006 was 16.3 TWh, which is a 3,5% increase over transmission demand in 2005 (15,75 TWh). Transmission network losses of 544 GWh are lower by 2,9% compared to 2005 (560 GWh) and amounting to 3,2% of the total electricity demand at transmission network level. Electricity transit in 2006 through the Croatian system was 2,6 TWh, which is 10%

less compared to the transit in 2005 (2,9 TWh). The maximum load at transmission network level in 2006 occurred on 25 January and amounted to 3036 MW, which is 4,7% more compared to the year before (2900 MW).

Total number of employees on 31 December 2006 was 1201, and the year before 1208.

Energy indicators

Demand (GWh)	16299
Transit (GWh)	2600
Maximum load (MW)	3036
Network losses (GWh)	544
Undelivered energy (MWh)	786

Business indicators (millions of Kuna)

Total income	927
Total expenses	865
Profit before taxation	62
Profit after taxation	49

Basic infrastructure data

Description	400 kV	220 kV	110 kV	Total
Overhead lines (km)	1159	1234	4782	7175
Transforming stations (pcs)	5	6	102	113
Transforming stations installed power (MVA)	4100	2100	4681	10881



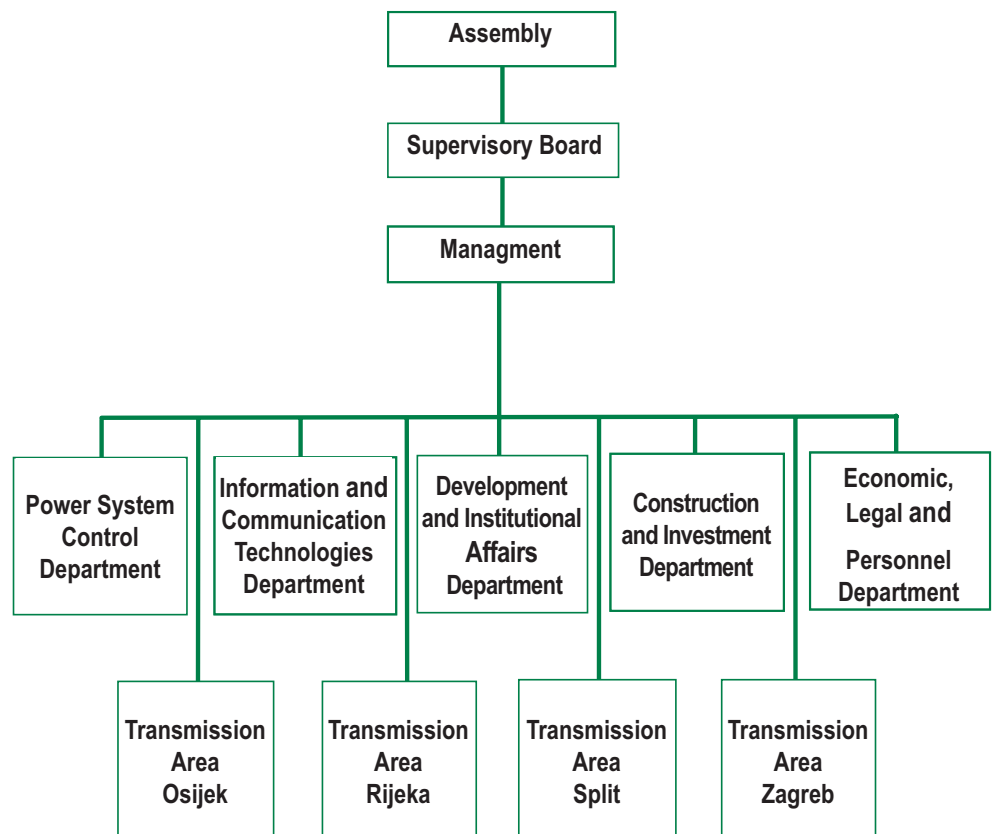
Organization

The Power System Control Department provides electricity transmission services, system services and ancillary system services. The Information and Communication Technologies Department is responsible for coordination, standardization and development of the entire ICT system needed for power system operation.

The Development and Institutional Affairs Department consolidates the functions of transmission network development, HEP-OPS international cooperation and relations with relevant institutions. The Construction

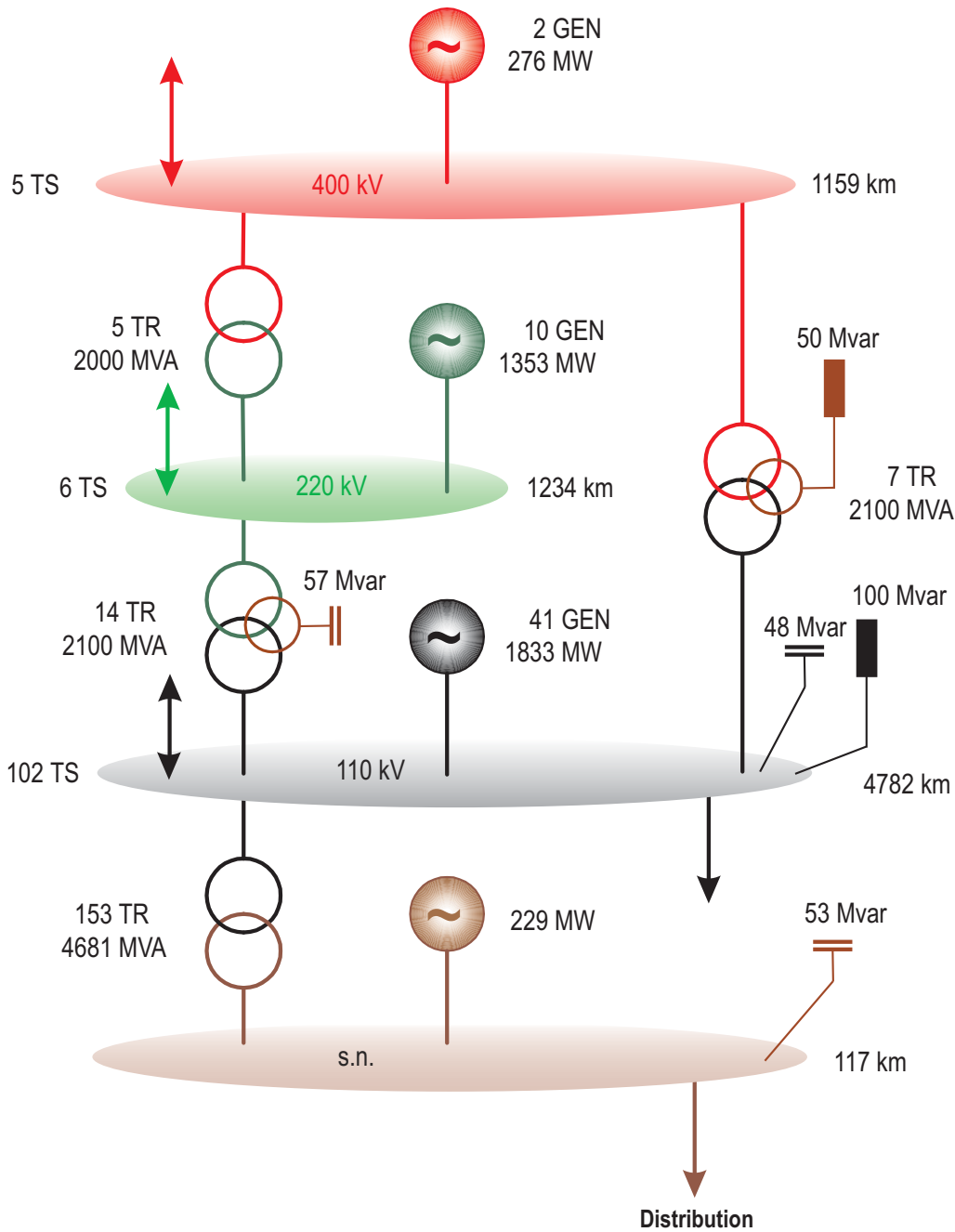
and Investment Department coordinates plans and manages all investments of HEP-OPS, prepares and manages construction of transmission projects. The Economic, Legal and Personnel Department provides economic/financial, legal and administrative services.

The Transmission Areas are transmission units responsible for operation, monitoring, control, maintenance and improvements of primary equipment and secondary systems in their respective transmission facilities.



2006

Transmission system scheme



2006

Continuation of the electric power sector reform



In 2006 HEP-TSO passed following regulations, in accordance with the Electricity Market Act:

- Program setting out and ensuring the application of the principles of transparency and non-discrimination in its operation,
- Rules on allocation and use of cross-border transfer capacity,
- Rules on balancing the electric power system.

During 2006, relevant national authorities passed the following by-laws related to the electric power sector:

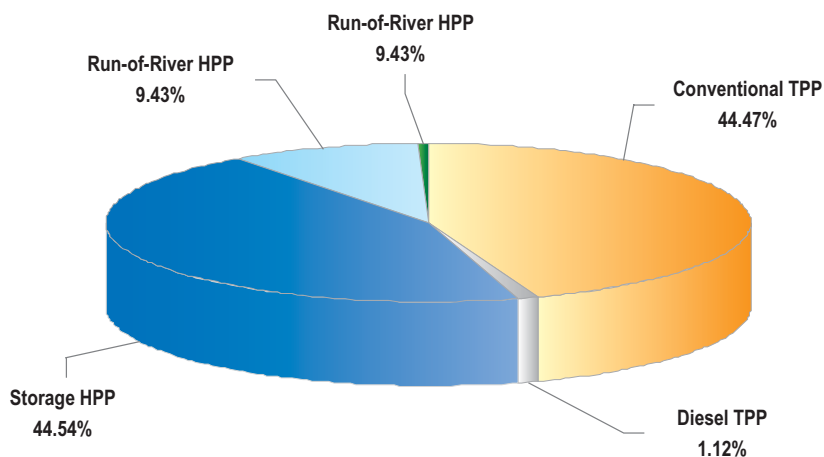
- General conditions of electricity supply,
- Regulations on charge for the usage of service of electricity transit through the transmission electricity network and increasing connecting power,
- Grid Code of the electric power system,

- Decision on charge for the usage of service of electricity transit through the transmission network and increasing connecting power,
- Methodology on providing balancing energy services in the electric power system,
- Electricity market rules,
- Tariff systems without the amount of tariff items: for transmission of electricity, distribution of electricity and tariff systems for electricity generation and supply, with the exception of eligible customers.

From 1 July 2006, the status of eligible customer is gained by those customers which annually consume more than 9 GWh of electricity. Until then, eligible customers were those who annually consumed over 20 GWh electricity.

HEP-TSO web page was put on-line on 1 June 2006: www.hep.hr/ops

Installed power in Croatian electric system is 3779 MW





Transmission network

First 110 kV facility in highly integrated design was commissioned – TS 110/6 kV Koromačno, owned by the cement factory Koromačno. TS 110/20 kV Dunat has been commissioned and the entire medium-voltage network of Krk island has shifted to nominal voltage of 20 kV. Construction of facilities of the Banovina program is continuing, as well as the 2x220 kV line Plomin-Vodnjan, while the construction of TS 110/35 kV Krapina in the phase of finalisation. After trial operation of TS 110/10(20) kV Dobri at the end of 2005, a formal celebration of the completion of the Split program took place at the end of 2006. It included construction of TS 110/10(20) kV Dobri, upgrading TS Vrboran, reconstruction of TS Sućidar and TS Kaštela and laying 110 kV cables Vrboran-Sućidar-Dobri-Kaštela. Removal of overhead lines started in December: 2x110 kV Vrboran-Pujanke, 110 kV Pujanke-Split and KS 110 kV Pujanke.

Construction of operation facilities next to TS 400/220/110 kV Žerjavinec were completed, and equipment and employees were transferred to that location. Construction works on Network Center Žerjavinec were also completed.

A number of transformers were replaced by new ones of greater nominal voltage, in transforming stations: Gračac, Krk, Bilice, Sinj, Zadar and Novalja. Second phase of

TS Raša reconstruction was completed. Transformer bays on both sides of the 150 MVA transformer in TS 220/110 kV Đakovo were reconstructed. Circuit breakers were replaced in 110 kV TS Virovitica, and the busbar reconstruction in 110 kV TS Resnik was completed. 400 kV switchyard reconstruction in TS 400/220/110 kV Konjsko began and also the replacement of 220 kV circuit breakers. A number of instrument transformers were replaced and there were a couple of power transformer relocations.

Wires of 110 kV overhead lines Senj-Crikvenica and Vinodol-Gojak were replaced, and restoration of war damages and corridor demining in Rijeka area was completed. Wires of 110 kV overhead lines Osijek 1 – Osijek 3 and Osijek 2 – Osijek 3 were also replaced. Ground wire replacements were performed on a number of 110 kV overhead lines using the new ones with optic fibers (OPGW).

A reconstruction of several energy measurement subsystems, local and remote control was performed – processing systems and numerous protection devices were replaced by the new ones and subsystems of DC supply were reconstructed. Intensive upgrades of the telecommunications network were performed using fiber optic cables and microwave links, and 4 new UKV-relays were put in operation.

Network availability

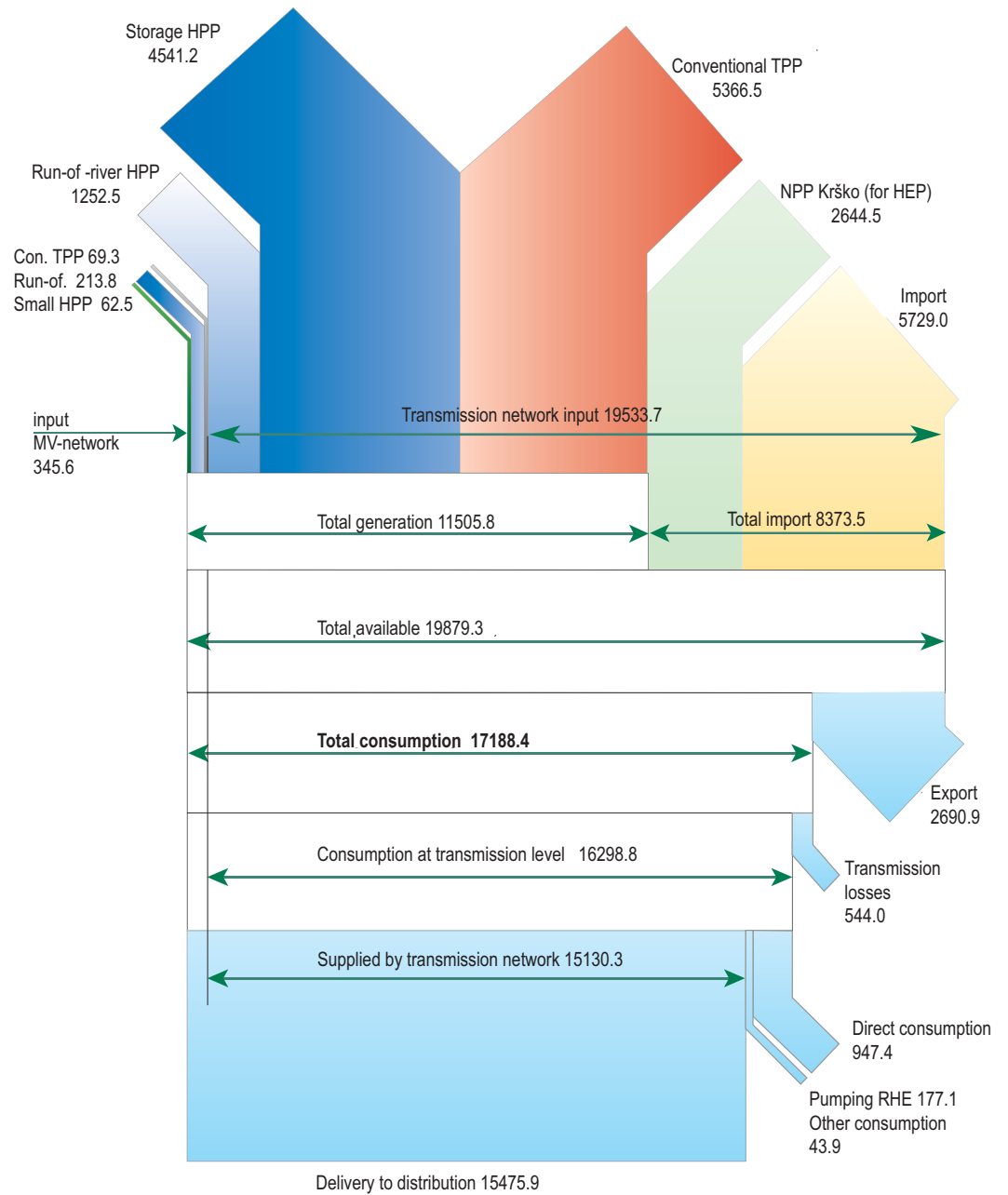
Year	2002	2003	2004	2005	2006
Network availability (%)	99,991	99,979	99,992	99,996	99,995

Network availability = $100 - \text{Undelivered energy} / \text{Consumption} * 100$

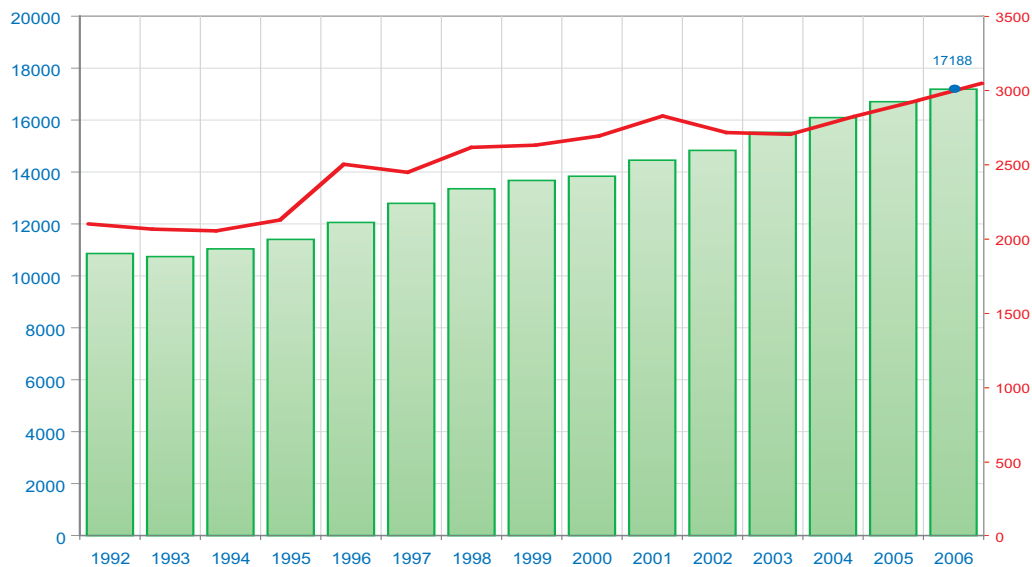
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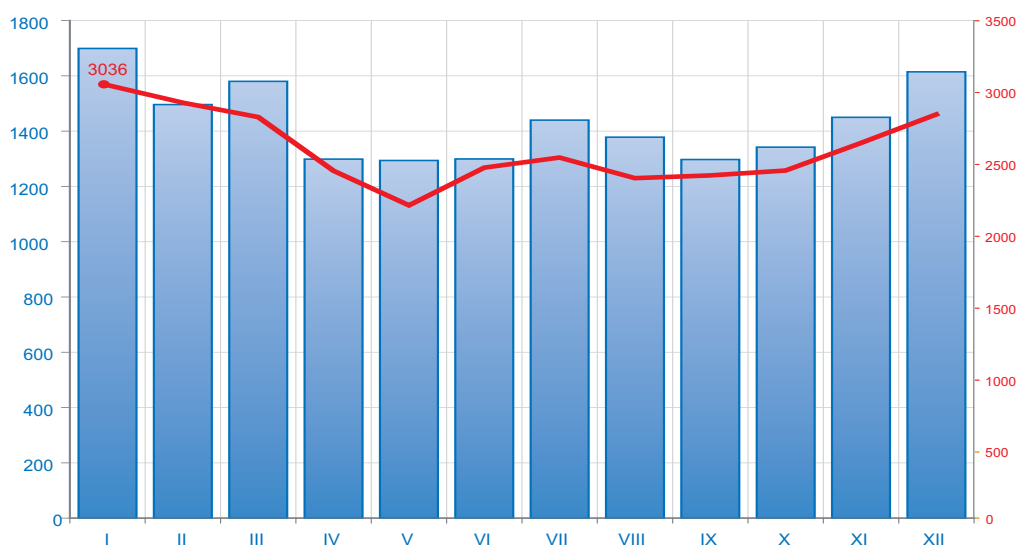
Energy balance (GWh)



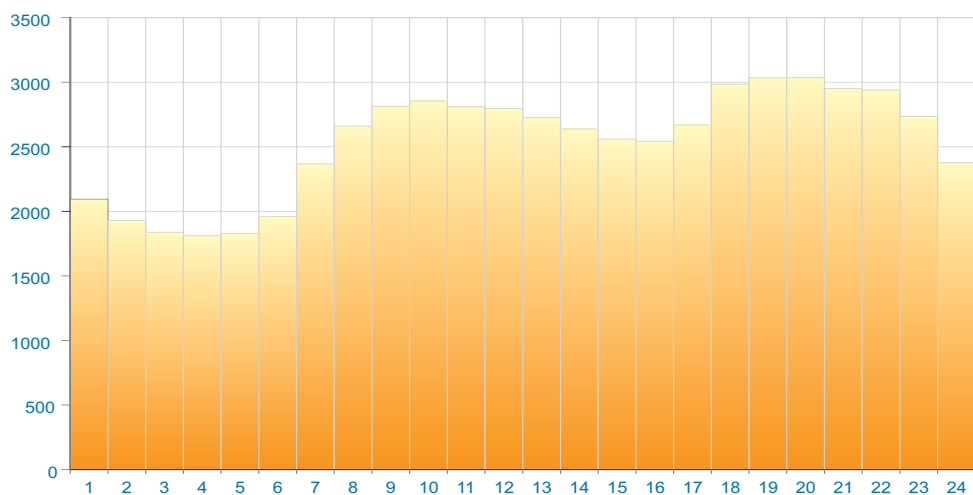
Annual electricity consumption (GWh) and peak loads (MW) 1992-2006



Monthly consumption (GWh) and peak loads (MW) in 2006



Daily load diagram of a representative Wednesday, 20 December 2006 (MWh/h)



2006

2006



Operational events

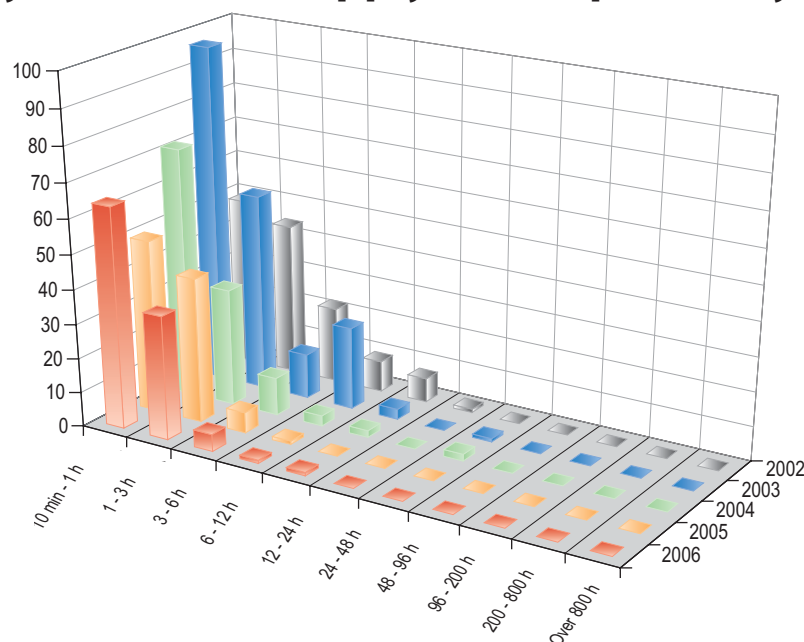
There were no significant operational events with severe consequences to the system. Due to severe winds and brine in January, February and December interruptions in supply of electricity occurred on the area of Pag island, city of Nin and Hvar island, and due to thunder storms in May, June and July electricity supply interruptions occurred on Brač island and city of Ston. Supply interruptions in Istria at the beginning of March in 110 kV facility in Plomin actualized the need to reconstruct the facility.

A big disturbance occurred on 4 November 2006 in the European power grid, beginning in Germany and spreading throughout Europe. In the period from 22:05 to 24:00 several million people were left without

electricity, and the European system in Croatia had split in two segments. In the Croatian electric power system, in spite of outages on a part of 400 kV interconnection lines endured the disturbance well, and besides a few glitches in transformers and lines in the northwest Croatia and undelivered energy amounting to 100 MWh, there were no other consequences.

During the year, no forest fires were caused by the transmission grid. Among the significant operational events worth mentioning is the internal malfunction of 220/110 kV, 150 MVA transformer No. 2 in TS Đakovo, which put that transformer at the end of its lifetime. It will be written off since it was manufactured in 1966.

Number of disturbances and planned outages by duration of supply interruption (1/year)





Environmental protection

Within the usual environmental protection activities associated with the work of the Team for coordination and standardization of operational procedures in the area of environmental protection, operational plans for action in case of environmental pollution were developed, as well as Rules on operation and maintenance of facilities for drainage and waste water processing. The Plans and Rules for waste management were updated and other documents required by relevant legislation were developed. During 2006, the inspectors of Ministry

for environmental protection performed a regular inspectional survey in eight facilities of HEP-TSO.

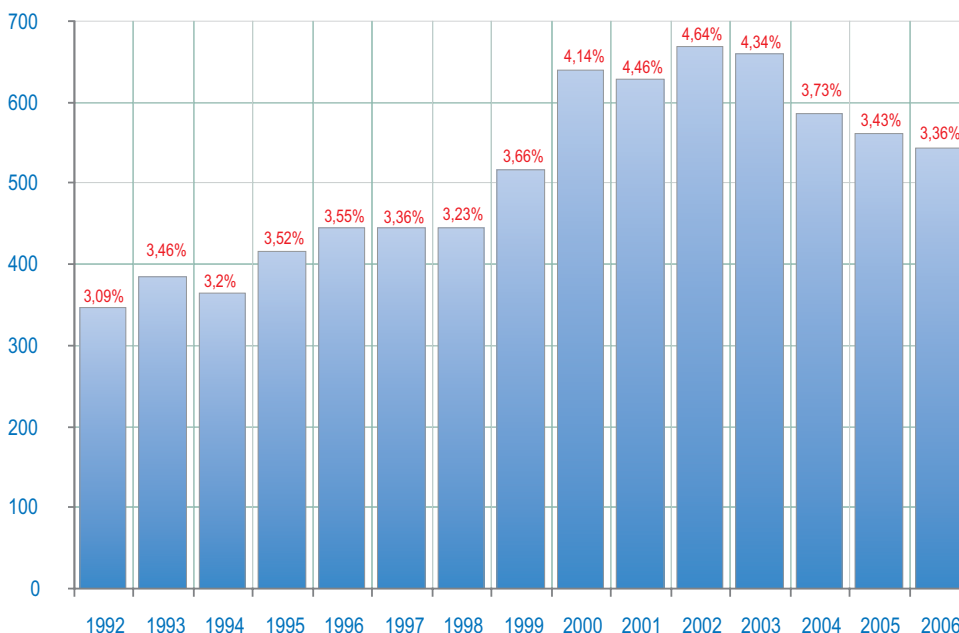
The temporary landfills have been continually equipped with the appropriate containers and equipment and all hazardous and non-hazardous waste was managed according to the Act on waste.

The introduction of environmental management system according to ISO 14001 has started.

Remote control of the electric power system

Description	Pcs.	Number of connected facilities
Remote control centres	3	56
Network centres	3	71
National dispatching centre	1	118

Transmission network losses (GWh)



International activities



Within international activities, the year 2006 is marked by a great engagement of HEP-TSO within international associations dealing with electricity transmission, especially UCTE, further development of relations with neighbouring TSOs, participation in activities in accordance with the Treaty establishing Energy Community (entered into force on 1 July 2006), and final preparations for performing monthly auctions on all Croatian borders which began at the beginning of 2007.

In accordance with an earlier agreement and approval of HERA, on 1 July 2006 began joint Union monthly auctions of interconnection capacity on the border of Croatia – Hungary began, between HEP-TSO and MAVIR (Hungarian TSO).

After successful previous contacts, HEP-TSO signed in Ljubljana on 6 June 2006 an agreement on mutual cooperation with Slovenian TSO (ELES).

In Zagreb, on 17 November 2006, at a celebration of the second year of successful

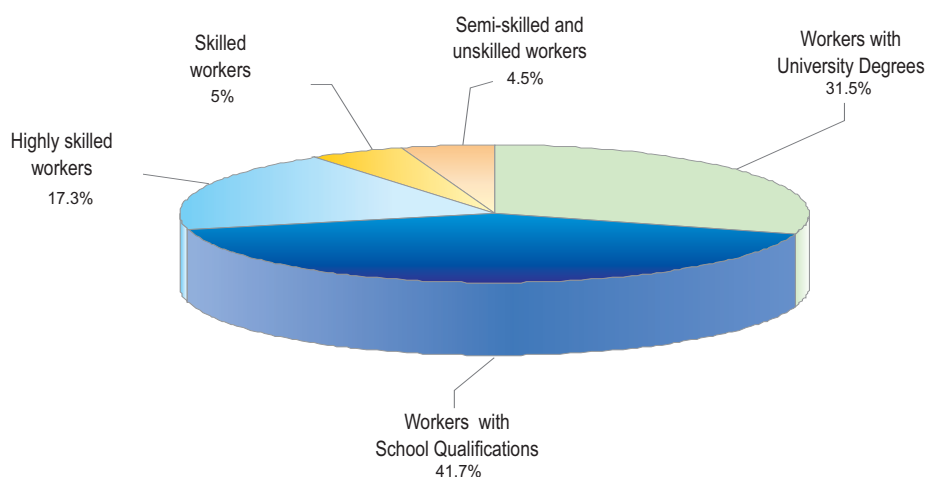
reconnection of 1st and 2nd synchronous UCTE zones, HEP-TSO and MAVIR signed an Joint Position Paper for construction of 400 kV interconnection line Ernestinovo-Pecs, and with TERN (Italian TSO) a Joint Statement on Intents for HVDC cable between transmission grids of Italy and Croatia.

Of great importance to HEP-TSO and even broader is the active participation of its representatives in working groups on chapters 15 (energy) and 21 (Trans-european networks) in preparations of negotiations for Croatian accession to the European Union.

During 2006, anniversary of Nikola Tesla's birth was celebrated in various occasions. The most important conference on the national level was held on 28 and 29 June 2006 in Zagreb, where a paper of a group of authors from HEP-TSO was presented.

On the central UNESCO's celebration of that global event in Paris in September was also marked by the report from the president of the Supervisory Board, Ivica Toljan, M.Sc.

Human resources





2006

Conclusion

The main activities and results in 2006 are: were achieving a high portion of the general plan of operation and investment, a large role in developing by-laws, executing a reform of the energy sector and restructuring of HEP, and a large engagement in work of international associations in the field of electricity transmission, especially UCTE. A 2nd anniversary celebration of reconnection of 1st and 2nd synchronous zone was organized successfully and relations with neighbouring TSOs were formalized. The work of HEP-TSO's has been made public through the Internet. HEP-TSO actively participated in negotiations between Croatia and European Union in the field of energy. Letters of intent signed for development of

new interconnection projects with Hungary and Italy. Since 1 July 2006 monthly auctions for interconnection capacities on the Croatia-Hungarian border have been performed, and the preparations for monthly auctions on other Croatian borders were finalised as of 1 January 2007.

A reliable and secure operation and a high availability of the network were accomplished as a result of overall operation of the high voltage 400/220/110 kV grid over the entire territory of Croatia and also of integrated functions of operation and control of the electric power system as well as the transmission of electricity in HEP-TSO.

Business data (millions of Kuna)

Description	2005	2006
Network use fee income	851	906
Other income	8	21
Total income	859	927
Amortization	270	282
Gross wages	133	142
Network maintenance costs	113	105
Network loss costs	140	150
Other costs	174	186
Total expenses	830	865
Profit before tax	29	62
Profit after tax	23	49
Purchase value of primary resources	8693	9140
Current value of primary resources	3443	3641
Amortization of primary resources (%)	60.4	60.2

Data source: HEP-TSO financial report (independently audited)



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