

## **KOZLODUY NPP plc**

## **ANNUAL REPORT**

2004

#### Dear Readers,

Summing up all the significant events and important achievements that made the year for Kozloduy NPP in particular and the Bulgarian nuclear energy sector as a whole, we should say 2004 was highly successful.

The celebrations of Kozloduy NPP 30<sup>th</sup> anniversary coincided with the 50<sup>th</sup> jubilee of nuclear energy utilization worldwide. Now 30 years later we can take pride in the respect accorded to us in nuclear industry today. These three decades, often fraught with difficulties and professional challenges which have all been overcome thanks to the dedication and efforts



of all Bulgarian nuclear specialists witnessed a series of undeniable achievements and well deserved success.

The safe and reliable operation of the Plant, the continuous upgrades and modernizations implemented during all these long years as well as the appraisals of the dozens of international missions and reviews have won the strong support of the most influential and most competent organizations and experts in the realm of nuclear power in the world.

The conscientious efforts of all staff have ensured that 2004 was a year of important achievements. Over the year there were no events that had a negative influence over safety, thus confirming the high KNPP appraisals by international peer reviews of the last years.

I am especially proud of the fact that in 2004 the nuclear power plant entered the Bulgarian liberalized energy market as the first officially registered commercial participant in the producer category. By the end of the year, the privileged consumer supply schedules were successfully fulfilled. Simultaneously, the nuclear power plant continued to reliably supply the National Electric Company. The planned annual electricity production was reached on 20<sup>th</sup> of December and by the end of the year a total of 16,814,773 MWh had been generated.

Providing 40.43% of the country's electricity in 2004, KNPP once again confirmed its position as a major electricity producer, ensuring the security of energy supplies for Bulgaria and the Balkan region.

The high safety level and the proved contribution to environmental protection enable us to successfully continue using nuclear energy as a sustainable solution to the climate change problem. Today, when we are facing the unfavorable consequences of temperature increase and drought in the region, nuclear power plants are the only realistic alternative for combating effects of global warming.

IORDAN KOSTADINOV

**EXECUTIVE DIRECTOR** 



## GENERATION

### Sustainable and Efficient Electricity Generation

In 2004, Kozloduy NPP was the main electricity producer in Bulgaria, providing 40.43% of the total national electricity generation and operating its nuclear facilities in full compliance with the nuclear safety and radiation protection requirements of Bulgarian legislation.

With the high reliability of electricity generation combined with the low cost, Kozloduy NPP significantly contributed to meet electricity demands both in Bulgaria and the Balkan region as a whole.

The main restrictions were imposed by the grid demands within the country and by the duration of the planned Unit outages for annual maintenance, refueling, modernization and reconstruction activities. 2004 share of Kozloduy NPP in the gross national electricity generation



### Annual Production Programme

The gross amount of electricity generated throughout the year reached 16,814,773 MWh, which was 104.6% of the amount planned. The 2004 production targets were exceeded thanks to the Units' operation at a higher load in winter months and the minimized duration of planned annual outages.



#### Load diagram of Kozloduy NPP for 2004

Legend:

1 Change in outage schedule

2 Dispatch Center restriction mode

3 Reactor scram

4 Unplanned load reduction

5 Unplanned shut down6 Planned load reduction7 Planned shut down

#### **Electricity sales**



The electricity delivered by Kozloduy NPP to the national grid was 15,576,077 MWh, which was by 4.77% higher than the amount planned. Thus, a tendency of exceeding the production schedule has been established over the course of the last few years. Another significant event of the year 2004 was the successful start of Kozloduy NPP plc's participation in the Bulgarian liberalized electricity market.

### Kozloduy NPP at the Liberalized Electricity Market



After the relevant legislation became effective in August last year, our company appeared to be the first registered participant in the "producer" category of the liberalized electricity market. Under the market quota amounting to 200,000 MWh for the second semester of 2004, as specified by the State Commission for Energy Regulation (SCER), Kozloduy NPP signed contracts with three privileged customers.

On September 18<sup>th</sup>, 2004, the Company completed its first successful negotiations for the sale of electricity on the open market. By the end of December 2004, KNPP had delivered to the privileged customers all contracted electricity totaling 178,080 MWh. Thus, the market quota of 89.04% was accomplished without affecting power supplied to the National Electric Company.

Strictly keeping to supply schedules and thanks to accumulated expertise Kozloduy NPP plc became a trustworthy partner and is ready to face the challenges of the new economic environment after the opening of the electricity market in 2007.

#### Maintenance Programme

According to technological and design requirements, all four operating Units of Kozloduy NPP were subject to planned annual maintenance and refueling in 2004.

Safe and reliable operation of equipment and facilities was guaranteed by the full-scope implementation of the planned maintenance activities. In 2004, the investments in the maintenance programme amounted to BGN 48.761 million. During the outage, a number of reconstruction and modernization safety measures were implemented. A general overhaul, as well as partial and current maintenance of primary and secondary circuit equipment was performed. Electrical and I&C equipments of normal operation and safety systems were repaired. Switch Gear Yard (SGY) 400 kV disconnectors were replaced according to schedule and an emergency automation system of international leads at the SGY was commissioned.

A programme that incorporated in-service inspection of safety critical equipment, specialized



inspection of main equipment – eddy current inspection of steam generators for Units 3, 5 and 6 and ultrasound inspection for the reactor pressure vessel of Unit 3 - was implemented.

Due to the efficient organization and the high quality of the work, the outage schedule was met, and in spite of the large scope of implemented activities, some of them were completed even ahead of schedule.



#### Outage campaign 2004

#### Availability



The availability contract with the National Electric Company was signed in the middle of 2000. The duration of the planned outages for the implementation of Units 5 and 6 Modernization Programme resulted in a certain reduction of availability in 2003 and 2004. Nevertheless, availability was still within the limits as stipulated in the contracts signed.

In 2004, the availability of Kozloduy NPP generat-

Load Factor (%)



ing capacities (18,108,556 MWh) was 0.7% beyond that planned for the year. The reduction, which was achieved in the outage duration, provided additional availability.

As a result of the improved overall operational activity of Kozloduy NPP in recent years the load factor of the capacities has been increased and is now close to world trends (>70%).



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## Thermal Energy Production



The thermal energy generated by the plant satisfies both the demands of the town of Kozloduy and plant-in-house demands. In 2004, an amount of



# Distribution of the thermal energy generated by Kozloduy NPP in 2004

163,258 MWh thermal energy was produced by the boiler installations of Units 5 and 6.

In accordance with the energy efficiency priority, Kozloduy NPP implemented a large-scale programme aiming to enhance the heating supply efficiency, both in the town of Kozloduy and the plant. The existing consumers' substations were replaced, a modern dispatch system for remote control of heat supplies parameters was installed and the actual heat loss on the grid was measured. Engineering methods are being used for monitoring and calculation.

As a result of this programme of measures for improving the quality of heating supply, the public sector consumers have the opportunity to effectively control and manage the consumption of thermal energy.



## SAFETY

### Modern Legislation and Highest of Standards

The continuous and consistent enhancement of nuclear safety is of highest priority for Kozloduy NPP plc management.

All activities performed on the plant site comply with the requirements specified in the licenses and permissions issued by the authorized regulatory bodies.

In 2004, the licensing procedures of the Kozloduy NPP nuclear installations were finalised. This process is in compliance with the Safe Use of Nuclear Energy Act that reflects contemporary world tendencies in the realm of nuclear safety legislation, including legislative practices in EU member states.

In 2003, the Nuclear Regulatory Agency (NRA) issued long-term operating licenses for Units 3, 4, 5 and 6. On January 15<sup>th</sup> and 20<sup>th</sup>, 2004, Units 2 and 1, respectively, received five year "zero-power" operating licenses, for the activities limited to the storage and cooling of irradiated and spent nuclear fuel in the reactor pools with no fuel in the reactor core. This mode allows the Units to be maintained in a safe operational condition during the long-term period necessary for the fuel to cool.

In 2004, through the joint efforts of the Nuclear Regulatory Agency and Kozloduy NPP experts, the Third National Report was prepared on the fulfillment of the obligations of the Republic of Bulgaria under the Convention on Nuclear Safety. This report was submitted to the International Atomic Energy Agency in Vienna on October 8<sup>th</sup>, 2004.

The report presents a comprehensive review of the developments in the area of nuclear safety



within the period following the second discussion of national reports. The status of the nuclear installations at the Kozloduy NPP site is circumstantially presented in this report. Special attention was paid to the new design status of Units 3 and 4, which was achieved upon the completion of a series of modernization projects. Based on the modernization, the Main Designer has issued a new technical certificate, that re-qualifies Units 3 and 4 as a new model – B-209M, with principle differences from the original B-230 design.

In order to ensure the different safety aspects, KNPP personnel strive to implement all activities in full compliance with, and strictly observing the principles of standards and criteria promulgated by Bulgarian legislation, the recommendations of the International Atomic Energy Agency, as well as the good practices of countries with highly developed nuclear programmes.

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### Nuclear safety

One of the indicators that demonstrates the stability and safety of the nuclear installations is the number of reactor emergency automatic trips (scram). A record long continuous operation without scram was registered on December 22<sup>nd</sup>, 2004 at Unit 6, with the completion of 8 years without an unplanned scram. According to WANO (World Association of Nuclear Operators) criteria, one scram per two cycles is indicative for high safety and reliability of operation.

The low values of the coefficient of unplanned scrams in recent years rank Kozloduy NPP among the most reliable nuclear power plants in the world. Unplanned reactor scram at 7000 hours





### Events

There were no events in the year 2004 that resulted in radioactive contamination on KNPP site or the environment, nor any that resulted in excess radiation doses to personnel.

All operational events registered throughout the year have been reported to the Nuclear Regulatory Agency (NRA) and subjected to analysis. The total number of events reported to the NRA according to the criteria of the relevant Regulation in force, was 74. One of these was rated level "1" according to the International Nuclear Event Scale (INES), 56 events were rated INES level "0" – below the scale, while the rest of the events proved to be "out" of INES.

As a result of the implementation of the best international practices and our growing operational feedback, the number of events per Unit rated above the INES level "0" shows a steadily decreasing tendency.

Nevertheless, the number of events reported to the Regulator in the recent years has been comparatively high, demonstrating the systematic implementation of a policy of openness and transparency. In order to take preventive measures the number of registered and reported near misses (a series of actions that do not lead to a real event) that are analyzed is steadily increasing.

#### Registered events with classification according to INES





### **Radiation Protection**

In order to comply with the radiation protection standards established in Bulgaria and to keep pace with the ever-growing international safety standards, KNPP personnel endeavor to constantly increase the level of radiation protection. The main efforts aim at achieving the best international practices in reducing the individual and the collective dose of personnel and the population, implementing the ALARA principle and the recommendations of the International Radiation Protection Commission, as well as enhancing the qualifications of specialists.

As a result of these systematic measures, no case of exceeding the annual radiation dose limit of 20 mSv has been registered in the last four years. Nor has there been a case of exceeding the annual individual occupational effective dose limit of 50 mSv during the last eight years. The average personnel individual dose for 2004 is 0.80 mSv, while the highest individual dose equals only 40% of the annual limit, specified in the Basic Safety Standards for Radiation Protection-2004.

For 2004, the personnel collective dose averaged per operated Units was 0.71 manSv/Unit. This value coincides with the averaged value of this indicator for 255 reactors of the PWR type used in KNPP and worldwide.

Irrespective of the considerably longer outages (in comparison with those of 2003) as well as modernizations implemented on Units 5 and 6, a large increase in the collective dose did not occur.

No variations of the radiation levels in the Controlled Access Area premises were registered during the year 2004. The gamma radiation dose rate at the plant site boundary is within the range of the natural radiation background for the region.





#### Collective dose per Unit

### Management of radioactive waste and spent nuclear fuel

In compliance with world nuclear industry standards of radioactive waste (RAW) and spent nuclear fuel (SNF) management, Kozloduy NPP concentrates its efforts upon minimizing the impact of the radioactive wastes and spent nuclear fuel on the population and environment. The guiding principles of RAW and SNF management conform to the requirements of the Joint Convention on Safety of RAW Management and Safety of SNF Management, Safe Use of Nuclear Energy Act and the National Strategy for Safe Management of SNF and RAW.

#### Radioactive Wastes

During the plant operation solid and liquid RAW are generated and treated in the Facility for the treatment, conditioning and storage of low-level and intermediate level liquid and solid RAW. The Facility has been constructed on Kozloduy NPP site with the financial support of the European Commission. The Facility commissioning gave a permanent solution of the issue of reliable storage of RAW, providing human health and environmental protection.

The solid RAW volume reduction factor achieved in 2004 was 7. After treatment and conditioning, the liquid RAW was prepared for final disposal at a surface-type storage facility.

All the RAW generated in 2004 by Kozloduy NPP were treated. Related to the electricity produced, the RAW volume generated by a nuclear power plant is tens of thousands times less than the volume of wastes generated by a conventional power plant using fossil fuel.



#### Spent Nuclear Fuel

The SNF is stored on the KNPP site under strict compliance with safety requirements. After storage in the at-reactor spent fuel pools, the fuel assemblies are removed to the Spent Fuel Storage Facility (of the pool type) located on the plant site. The Facility capacity allows the storage of SNF assemblies being discharged now and in future years until the commissioning of the new Dry Spent Fuel Storage Facility. In May 2004, a contract was signed with a consortium of German companies for the design and construction of a facility for the dry storage of SNF, using casks. Kozloduy International Decommissioning Support Fund finances the project, which will provide conditions for safe storage of VVER-440 assemblies for over 50 years.



the plant site, along with the existing arrangements for SNF transportation for treatment and long term storage in Russia, provide a modern and safe solution of the issue of Kozloduy NPP SNF management.

The conditions created for safe SNF storage on

### Physical protection and emergency planning

The structured programme of Kozloduy NPP physical protection utilizes the best methods available and state-of-the-art equipment.

The nuclear power plant observes all measures, envisaged in the Programme for protection of nuclear facilities and nuclear material from encroachment. A specialized police department provides physical protection. The access to the plant is controlled by technical security systems and organizational measures. The coordination between Kozloduy NPP plc and the National Police, Border Police and the National Security Service is optimized.

In compliance with the normative regulations and international security, safety and reliability standards for nuclear power plants, Kozloduy NPP has developed an Emergency Plan that is being updated each year. The Plan provides a system of measures to organize and maintain constant readiness for response in case of emergency. All necessary equipment and well-trained specialists are available in order to cope with all responses envisaged in the plan, so that any emergency could be handled and the consequences for the personnel, population and environment are minimized.

In order to maintain and check the personnel readiness for action in case of emergency, as well as to master implementation of the envisaged measures, the Emergency Plan encompasses specific drills. Exchange of information is maintained between the Emergency Control Center of Kozloduy NPP, the NRA Emergency Center and the Permanent Commission for Protection of the Population in case of Disasters and Accidents.

The emergency drill performed in 2004 demonstrated a high level of personnel preparedness, good interaction and coordination between Kozloduy NPP, the regional and national emergency response authorities.

### Environmental protection

In all aspects of its activities Kozloduy NPP strictly complies with the norms and requirements for population and environmental protection. The environmental protection control is performed under a complex programme of measures including monitoring of the environment, control of releases into the atmosphere and the hydrosphere and the treatment and storage of radioactive and conventional wastes.

### Gaseous, Aerosol and Liquid Releases

Gaseous, aerosol and liquid radioactive releases are constantly under control and the results are being compared to the admissible values, permitted by the NRA and coordinated with the Ministry of Health and the Ministry of Environment and Waters. The registered gaseous, aerosol and liquid releases in the recent years show quantities significantly below the limits, varying up to 1.2% of the allowable values. The low release values are indicators of effective and safe operation of the plant.







Total activity of the gaseous, aerosol /RNG, LLA and lodine-131/ and liquid releases in % of the allowable average annual value



The total and specific radioactivity recorded in the water released by Kozloduy NPP into the Danube River in 2004 was considerably below the limits of allowable values. The data obtained confirms the

effectiveness and normal operation of the systems and equipment for special treatment and purification of waters from the NPP technological cycle.

#### Radio-Ecological Monitoring

The radiation impact of Kozloduy NPP on the environment has been continuously subjected to precise and systematic studies during all 30 years of the plant's operation. Ever since the NPP was commissioned, the radiation level in the radiologically controlled area has been within the limits of its characteristic natural values of  $0.06 - 0.16 \,\mu$ Sv/h, with no deviations registered in 2004.

The continuous radiation monitoring within the 3 km area around the plant is performed by an automated information system in the plant that is integrated into the National Radiation Monitoring System. Within the 100 km surveillance area around Kozloduy NPP samples of air, soil and flora are taken and analyzed as well as water samples from the Danube River and drinking water sources. The background gamma radiation is measured on a regular basis.

The utility radiation monitoring results are annually verified by independent radio-ecological studies of parallel programmes – of MEW and the National

#### Public Exposure Monitoring

The additional exposure of the public within the 30 km area resulting from Kozloduy NNP operations over the last decade has been less than 0.1% of the natural background radiation and the 1 mSv limit set by the Basic Norms for Radiation Protection-2004. Traditionally good results were again obtained in 2004.

The normalized collective effective dose of the population from gaseous aerosol effluents is

#### **Conventional Wastes**

The management of all non-radioactive conventional wastes is in compliance with the Act for Restriction of the Harmful Impact of Wastes on the Environment. The separate collection of conventional wastes at Kozloduy NPP is regulated by specific rules for management of conventional wastes. Wastes to recycle or utilize have been consigned to licensed companies.



Center on Radiobiology and Radiation Protection.

The radiation parameters of the ecological components are within the normal limits of values typical for the region. Compliance of the radio-ecological status of the environment around the NPP with the requirements of the Bulgarian radiation and environmental protection legislation in force has been established.

completely comparable to the average value for the reactors of the same type worldwide, according to data of the Scientific Committee for Investigation of Atomic Radiation at the UNO, 2000. The values of dose rates, registered in recent years, concerning some indicators for radioactive noble gases and iodine-131, are lower than world averages. Public exposure to plant liquid effluents is also negligibly low.

For three years now, Kozloduy NNP has operated its own plant repository for conventional domestic and industrial wastes that was constructed in line with the contemporary requirements for environmental protection. Since April 2002, when the waste management process was optimized, all wastes within the protected area of Kozloduy NPP have been treated at this repository.



Superficial waters from the Danube River, as well as underground water from our own water sources, have been used in accordance with the requirements of the Water Act.

Two programmes for non-radiation monitoring have been implemented in Kozloduy NPP – that of the repository for conventional wastes and of the effluents into waters. The annual reports, reflecting the results of their implementation, have been submitted to the Executive Agency on the Environment and the Regional Inspectorate on Environment and Waters.

#### Clean Energy

The accumulation of enormous quantities of toxic industrial wastes, along with the atmospheric emissions of carbon dioxide and ozone destructive industrial gases, result in the unfavorable consequences of environmental pollution and greenhouse effects. Climate change has become a factor of life, bringing mankind face-to-face with the necessity of taking immediate actions to address the issue of rising temperatures on the Earth.

The electricity production of NPPs is free from emissions of greenhouse gases. This defines the key role of nuclear power in meeting the climate change challenges. Along with the renewable energy sources, nuclear energy proves to be the only realistic energy source allowing the reduction of greenhouse gas emissions.

Since its commissioning in 1974 till the end of 2004 Kozloduy NPP has generated electricity saving the harmful effects of about 630 million tons of basic greenhouse gases of  $(CO_2)$ -equivalent, over 23 million tons of sulphur dioxide and almost 1 million tons of dust of natural radioactivity.

## **INVESTMENT PROJECTS**

Each year Kozloduy NPP implements an investment programme of its own to finance projects related to the safe and efficient operation of the Units.

In 2004, an investment programme of BGN 138.070 million was implemented. Kozloduy NPP plc's own funding amounted to BGN 126.005 million and the remaining BGN 12.065 million were contributed by the EU PHARE Programme and the National Safe Storage of Radioactive Waste Fund.

The main measures within the 2004 investment programme targeted safety enhancement and were included in the long term modernization programmes: activities within Units 3 and 4 modernization programmes; implementation of stage 2 of Units 5 and 6 Modernization Programme; modernization of the radiation control system at the Spent Fuel Storage Facility; measures for improving safety and reliability of hydro-technical facilities; and measures for enhancing the physical protection level in KNPP, according to the programmes' annual update.

The 2004 investment programme envisaged additional expenditures on analyses and assessment of existing systems as well as development of safety analysis reports, instructions and research work.

Regardless of the fact that all international missions of recent years assessed the safety level of Kozloduy NPP as high new technical upgrades are being implemented in all four operating Units.



### Modernization of 440 MW Units 3 and 4

After more than 10 years of systematic modernization of the VVER-440 Units of Kozloduy NPP, implemented in cooperation with the leading companies in the nuclear industry under the surveillance of the IAEA and western regulatory bodies, the present safety level of Units 3 and 4 is comparable with those of the same age in western countries.

In 2004, more than BGN 17 million was invested in the modernization programmes, and at each Kozloduy Unit more than 35 technical improvements were implemented.

After installing the jet-vortex condensers in Units 3 and 4 confinement in 2003, the second stage of the Accident Localization System modernization was implemented in 2004. The activities within the second stage were related to the implementation of means and systems for severe accident management. A hydrogen measurement and recombination system was installed in the confinement, as well as the main equipment of the filtering system for post-accident confinement ventilation. During 2004, the development of Severe Accident Management Guidelines was completed.

Additional modernization activities at Units 3 and 4 were targeted to increase the reliability of control and management systems: modernization of the refuelling machine, system for leak tightness control of fuel elements, computer system for operator support; replacement of I&C equipment of the systems important to safety; modernization of the systems for reliable supply – 1st category, modernization of the diagram of the high pressure safety injection system for filling and overflowing the emergency make-up reservoir.

Measures were implemented to decrease the risk of fire and optimise Units' fire alarm systems as a result of the probabilistic fire analysis as well as within the seismic qualification programme for buildings and equipment.

The 2004 activities confirmed the dedication to the continuous safety and the enhancement of the reliability of the Kozloduy VVER–440 Units, providing the best argument for their continued operation.









By the end of 2004, more than 73% of the total scope of Units 5 and 6 Modernization Programme had been completed.

The total number of measures implemented rose from 98 at the end of 2003 to 155 at the end of 2004. Since the beginning of the Programme, investments in the modernization of equipment have reached EUR 385 million. Over 20% of this amount, or about EUR 81 million, was financed by Kozloduy NPP plc. In 2004, the implementation of four major measures amounting to EUR 59 million (12% of the estimated Programme budget) was completed at Unit 5. The measures included the replacement of condenser modules and the installation of an auxiliary diesel generator, a new system for reactor internal control and an "Ovation"-based computer information system.

The new computer information system contains codes for monitoring the main equipment basic parameters that facilitate the operators' work.

#### Implementation Status of Units 5 and 6 Modernization Programme by the end of 2004



Completed 73.1%

The replacement of the reactor internal control system provides for enhanced accuracy, speed of action and reliability of the core control and gives valuable information to support operator decisions. In 2004, the European Consortium Kozloduy started the implementation of measures for reinforcing the high energy pipelines of the Secondary Circuit against local mechanical impacts. Another important measure was the installation of Unit filter ventilation systems designed to prevent the loss of the containment leak tightness and to minimize radioactive releases in case of 'beyond design basis' accident. The replacement of the Automated Turbine Control System of Unit 6 was successfully completed by Westinghouse.

Now, three years after the start of the Modernization Programme, Units 5 and 6 have been outfitted with new, more reliable equipment, ensuring safer work and better operational conditions.

The results of the Programme were achieved thanks to the close cooperation of Kozloduy specialists and their colleagues from the European Consortium, the American company Westinghouse and the consultants from Parsons E&C and prove the effectiveness of the international partnership to put Units 5 and 6 in full compliance with modern safety standards.





# FINANCIAL STATUS

The 2004 financial results of Kozloduy NPP plc proved the company's stability and steadfast development in the ever-changing conditions of the dynamic economic environment and electricity market liberalization.

The financial policy targeting strict revenue management and expenditure optimisation created the prerequisites needed to fulfil all measures planned to provide the implementation of the production, maintenance and safety enhancement programmes, and enabled Kozloduy NPP to fulfil its obligations to personnel and the State.

Kozloduy NPP plc has met the 2004 obligations to social insurance, staff re-qualification, unem-

ployment, medical insurance funds etc., paying a total of BGN 29.496 million. Additional insurance costs amounted to BGN 4.928 million. The taxes due to the State Budget totalled BGN 137.055 million were 2.29% of all State tax revenues.

After the vesting of Kozloduy NPP plc as an independent entity in 2000, the company has contributed, on a regular basis to the National Fund for Nuclear Facilities Decommissioning and Safe Management of Radioactive Waste. In 2004, the plant contributions to these funds amounted to BGN 127.380 million, or 8% of the State non-taxation revenues.



## Structure of 2004 expenditures



## Financial status by 31.12.2004

	2004	2003
ASSETS	(BGN, thousands)	(BGN, thousands)
Long term assets – total, incl.:	1,483,461	1,363,919
Long-term material assets	1,410,884	1,282,635
Long-term immaterial assets	72,221	80,970
Long-term financial assets	272	147
Expenditures on future periods	84	167
Short-term assets – total, incl.:	438,943	513,784
Material reserves	185,504	221,943
Short-term accounts receivable	123,601	171,333
Financial resources	126,054	115,372
Expenditures on future periods	3,784	5,136
Assets holdings - total:	1,922,404	1,877,703
LIABILITIES		
Own capital – total, incl.:	1,110,507	1,074,000
Fixed capital stock	101,716	35,631
Reserves	1,004,447	1,017,269
Financial result	4,344	21,100
Long-term liabilities – total, incl.:	626,458	547,576
Long-term obligations	558,980	485,840
Incomes for future periods and financing	67,478	61,736
Short-term liabilities	185,439	256,127
Short-term liabilities	185,125	255,567
Incomes for future periods and financing	314	560
Liabilities holding – total:	1,922,404	1,877,703

2004	2003
(BGN, thousands)	(BGN, thousands)
697,381	741,141
688,553	712,506
8,828	28,635
4,857	18,967
3,971	9,668
	2004 (BGN, thousands) 697,381 688,553 8,828 4,857 3,971

## HUMAN RESOURCES MANAGEMENT

Human potential development and personnel motivation are among the top priorities of Kozloduy NPP plc management. These priorities are prompted by the acknowledgement of the key role the personnel have in regards to the plant operational safety, as well as in meeting the requirements of the Bulgarian Nuclear Regulatory Agency and the IAEA.

## Personnel Structure

After the vesting of Kozloduy NPP plc as an independent entity in 2000, measures have been undertaken to reduce the number of personnel in accordance with established world practices and the economic requirements of the day.

The developed recruiting system enables the plant management to employ specialists with appropriate qualification and professional experience.

Measures have been undertaken over the last 4 years to reduce staffing levels, including encouragement of employees of retirement age to take retirement as well as tendering non-essential activities to external companies. By the end of 2004 this resulted in a 20% reduction in the total number of Kozloduy NPP employees to 5,219.

The system applied to recruit personnel grants equal opportunities to both Kozloduy NPP employees and other applicants and facilitates Staff educational structure of the personnel in KNPP



well-qualified and experienced specialists to be employed. The main feature of KNPP staff is the high educational status: 34% of the personnel are university graduates and 61% in possession of vocational training and secondary school diplomas.

Due to the high criteria and targeted selection, the number of employees with primary education has a decreasing tendency, with their present share being below 5% of the total number of plant employees.

### Work Conditions

Providing a safe and healthy working environment through the elimination, or strict limitation of existing hazards, is one of the basic goals of Kozloduy NPP plc management. In compliance with Bulgarian normative requirements, which were harmonized with the European legal framework on safety and health, a risk assessment of the work place was made and corrective measures were implemented. The data from the last few years supported the effectiveness of the efforts made in this direction.

There have been no industrial fatality or disability safety accidents in the recent years.





### Remuneration and Insurance

As an enterprise with more than 50% of the shares belonging to the State Kozloduy NPP plc cannot go above a fixed upper limit when paying salaries. Nevertheless, an increasing tendency was observed in the minimum and average salary in Kozloduy NPP, as compared to the average salary in the country in recent years. Salaries were increased



owing to the joint efforts of all employees in the safe achievement of production objectives. In order to maintain and keep up personnel motivation, Kozloduy NPP plc allocates considerable funds to additional voluntary medical and pension insurance, mandatory medical examinations, free meals, sports and recreation facilities, etc.

The Trade Unions have negotiated numerous social benefits within the possibilities provided by the Bulgarian labour legislation. Each year considerable sums are being paid to social funds, the priorities of which are determined by the General Assembly of KNPP employees.

In 2004, the company allotted BGN 8.2 million to social and cultural funds. Kozloduy NPP maintains two recreational facilities, a Cultural Center and a sport facility with two swimming pools in the town of Kozloduy as well as a variety of other opportunities for sports and relaxation.

# PERSONNEL TRAINING

The opportunities made available for KNPP personnel to permanently improve and keep up their general as well as specific qualification manifest the deep belief and understanding of KNPP management of the crucial importance of each and every individual to the reliable and safe operation of the nuclear power plant.

In Kozloduy NPP plc, the overall training process and control of personnel qualification are based on the Systematic Approach to Training, which is widely implemented in all nuclear power plants as a standard methodology of the IAEA. A system for quality management of the training process has been established in compliance with the ISO 9001:2000 requirements.

For improving and maintaining staff qualification, four different types of training are applied – initial, continuous, remediation, and re-qualification. More than 90 basic and specialized training courses have been developed and over 80 scenarios for simulator training sessions have been prepared. In 2004, 17,716 trainees of Kozloduy NPP plc and its contractors have passed training courses held at the plant Training Center.

The training of the plant personnel is carried out under individual programs, developed on the basis of standard training programs. Training is also provided for positions in which licensing is required by the Nuclear Regulatory Agency or other regulatory organizations.

Special attention is paid to the simulator training. A modern simulator training facility was equipped at the plant Training Center, ensuring adequate training for licensed operators and line managers as well as the performance of a number of engineering tasks and analyses. At present two simulators, VVER-1000 Full Scope Simulator (FSS-1000) and VVER-440 Multi-Functional Simulator (MFS), are being used. Current modernization programmes are being implemented on the simulators, aiming to maintain their conformity with the reference units.

A mandatory licensing of the instructors conducting the NPP personnel training has been established in accordance with a relevant Regulation under the Safe Use of Nuclear Energy Act.

In line with the practices of the world nuclear industry, the training organization takes into consideration the links and interactions with the national educational system, aging and gradual replacement of the work force, knowledge management and younger generation involvement.







# INTERNATIONAL COOPERATION

In 2004, Kozloduy NPP continued its long-term participation in the exchange of information and operational practices with IAEA, World Association of Nuclear Operators (WANO) and a number of other international organizations and leading nuclear energy companies.

Kozloduy NPP is intensively working on a number of regional and technical cooperative projects of IAEA and WANO. The PHARE Nuclear Safety Programme, the Nuclear Safety Programme of the UK Department of Trade and Industry and a number of bilateral cooperation programmes, complement the plant international cooperation framework.

In 2004, a project was completed on event analysis and the development of guidelines for severe accident management. The PHARE Nuclear Safety Programme funded the project.

Under the Nuclear Safety Programme of the UK Department of Trade and Industry, several important projects related to human factors were initiated in 2004. An action plan is to be prepared to maintain personnel motivation in the approach to units' closure and during decommissioning. Assessment of internal antecedents will be performed at Kozloduy NPP as well. Another project envisages the development and implementation of procedures for human error data collection and human reliability analysis. A project concerning the development of training materials and the implementation of a pilot course on human factor issues was successfully implemented during the year.

Kozloduy NPP specialists are actively engaged in the work of the World Nuclear Association, European Nuclear Society and European Atomic Forum FORATOM (through BULATOM) and follow the nuclear industry development and present achievements of the Bulgarian nuclear energy sector to the international nuclear community and the European Union institutions.

In May 2004, Kozloduy NPP hosted an expert mission of the IAEA, which conducted a review of Unit 6 seismic monitoring system. The international team of experts gave a favorable assessment of the implemented seismic reinforcement measures.

The highly satisfactory results of the safety enhancement process in Kozloduy NPP prove the efficiency of applying the best international practices. This is an excellent example of successful international cooperation in an atmosphere of openness, transparency and partnership.









# PUBLIC RELATIONS

In response to the growing expectations of society to obtain objective and unbiased information as well as to raise public support for Kozloduy NPP, in 2004 the plant management continued its policy of open, honest, and reliable information.

Press conferences, briefings and meetings furnished journalists with first-hand information on the management and operation of Kozloduy NPP. The press releases of the plant Information Center covered all the significant events and activities.

2004 was a jubilee year for Kozloduy NPP and elapsed under the motto "30 Years Clean Energy". The celebration of these memorable days of the plant's history reunited former and present day Bulgarian and foreign partners. All specialists that have considerably contributed to the construction and operation of the nuclear power plant in the past merited jubilee plaques and diplomas. Numerous sport and cultural events accompanied the celebrations and enjoyed enormous interest.

The clearly defined growing public interest of recent years was undoubtedly reaffirmed by the doubled number of visitors to KNPP, as compared to 2003, most of them taking advantage of the Open Door Days. About 60% of the plant guests were representatives of the younger generation— pupils and students.

The plant was visited by a number of politicians, diplomats and high-ranking representatives of international expert organizations - Gerald Grandey, President of the World Nuclear Association; Jury Sokoloff, Deputy Executive Director of IAEA and Head of the Nuclear Energy Department; Gordon Adam, Member in the European Parliament, etc.

The growing public interest resulted in a 45% increase of our web-site visitors, as compared to 2003. Summarized information about current events and operational status of nuclear installations is to be found on KNPP site. Printed materials, published by the plant Information Center, such as the annual reports, the bimonthly magazine "Parva atomna", handouts, brochures, etc. have been distributed to a wide circle of addressees amidst the plant business counterparts in Bulgaria and abroad, national and international institutions, non-governmental organizations, colleges and high schools, etc. All information materials available can be found on KNPP web site: www.kznpp.org.





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