

ANNUAL REPORT

2007



KOZLODUY NPP PLC



## INTRODUCTION



After the shutdown of the two 440 MW Units 3 & 4 on December 31<sup>st</sup> 2006, this year 2007 brought us to face the challenges of the first year the nuclear power plant was constrained to operate the 1000 MW Units 5 & 6 solely. The new circumstances have set even greater responsibilities concerning, not only the economic stability of Kozloduy NPP, but the security of supplies to the national energy system.

Now that the 2007 results are already available I can declare with confidence that we have managed quite successfully. Units 5 and 6 achieved the highest annual amount of power produced throughout all the years of their history with the planned annual output being fulfilled as early as mid-December. The resolute participation of the Nuclear power plant on the deregulated electricity market resulted in its further recognition as a major factor among the economic realities in the country. Owing to all this, the Company concluded the business year in a stable financial condition.

In the last days of 2007 we marked 11 years without scram at Unit 6, this being the next consecutive evidence that the 1000 MW Kozloduy NPP units rank amongst the most reliable and safe electric power production facilities in the world.

The celebration of a very important event for all KNPP employees – the 20<sup>th</sup> anniversary of Unit 5 connection to the power grid of the country, gave us one more reason to consider the results of our efforts and take pride in our achievements.

I would like to specially express my gratitude to my colleagues for their commitment to Kozloduy NPP, for their excellence in performance throughout the year and to point out that the high production results, compliance with all safety requirements and standards as well as the considerable contribution to environmental protection present the best warranty for a bright future in store for Kozloduy NPP!

IVAN GENOV  
EXECUTIVE DIRECTOR  
KOZLODUY NPP Plc

A handwritten signature in black ink, appearing to be 'Ivan Genov', written over a vertical line.

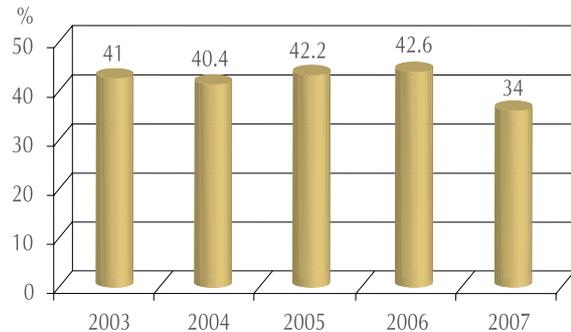


The performance of the dispatcher's electricity generation schedule during the year was ensured due to the reliable and effective operation of nuclear facilities in optimal operational modes.

Earlier closure of Units 3 and 4 at the end of 2006 caused a sharp decrease of the generation of the nuclear power plant. After the record amount of electricity generated in 2006 with four nuclear units in operation (almost 20 million MWh), or about 43% of the total electricity generated in the country, in 2007 the share of Kozloduy NPP in the national electricity generation was 33.98 %.

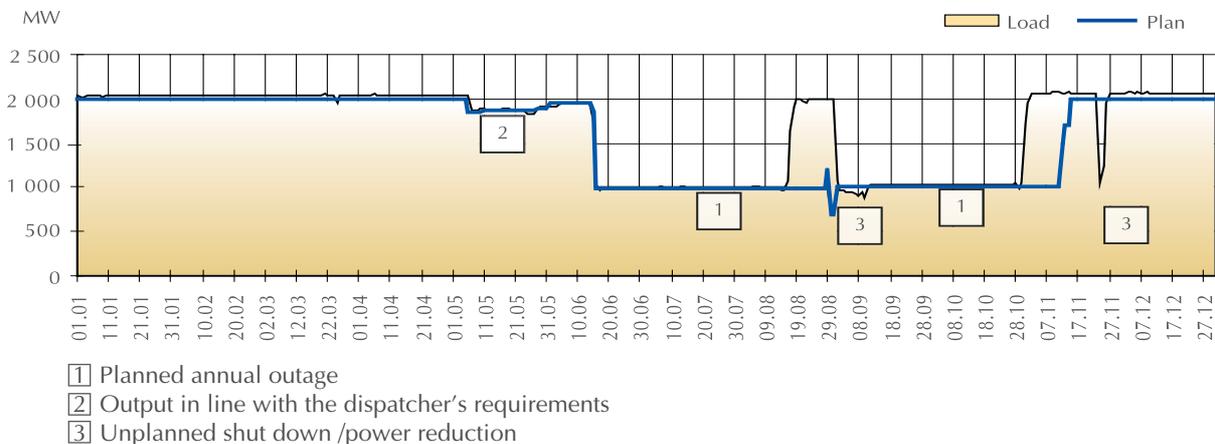
In spite of the reduced generation

Share of Kozloduy NPP generation in the national electricity generation (%)



capacity the nuclear power plant was still the leading, preferred and major supplier of electricity in Bulgaria during the last year.

Kozloduy NPP Load schedule for 2007



## ELECTRICITY GENERATION (GROSS)

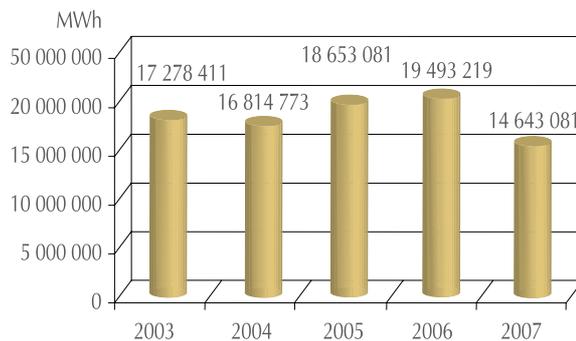
The gross electricity generation for 2007 amounts to 14 643 081 MWh. Compared to 2006, when the two 440 MW Units 3 and 4 were in operation, the generation of Kozloduy NPP is 25% lower.

However, the electricity generated by units 5 and 6 in the last year is 15% more (almost 2 million MWh) more compared to 2006, and it is the highest generation ever achieved by these units.



The record generation of the two 1000 MW Units is a result of their effective and accident-free operation, optimization of equipment operation and maintenance activities, reduced duration of planned outages, minimal downtimes except for the planned outage and the professionalism of the NPP personnel.

Electricity generated



Electricity generated by Units 5 and 6



The total electricity generation planned for 2007 in accordance with the load schedule assigned, was reached on 14<sup>th</sup> December. By the end of the year, Kozloduy NPP reached 106.31% of that required by the dispatcher. The share of Unit 5 in the total generation of the plant was 49% and of Unit 6 was 51%.



## ELECTRICITY SOLD (NET)

The electricity sold by Kozloduy NPP in 2007 was 6% more than the planned amount. The net actual electricity exported by the NPP for the electricity grid of the country was 13 692 642 MWh.

In comparison to 2006, the active net electricity supplied for the demand and consumption in the country, after the earlier closure of Units 3 and 4, is 4 437 532 MWh less.

For the regulated market, under a contract with the National Electricity Company (NEK), Kozloduy NPP has supplied 9 603 441 MWh. This is 70.1% out of the total net generation of the country.

The net electricity supply for the deregulated market in 2007 has doubled compared to 2006. Being a reliable and demanded trade participant, the plant has supplied electricity under bilateral contracts to eligible consumers

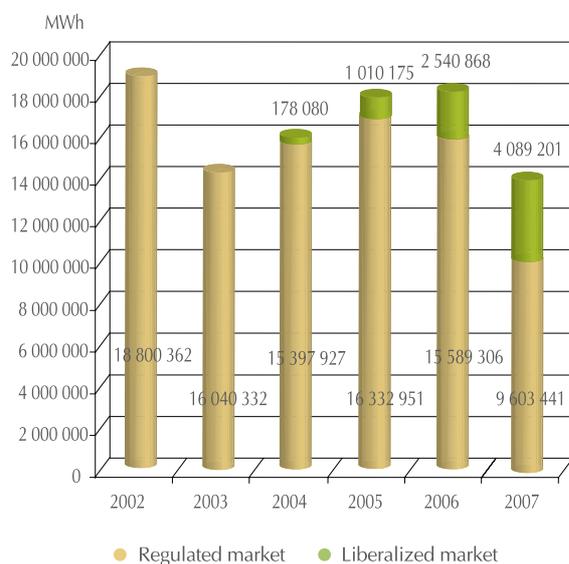
and sellers on the liberalized market amounting to 4 089 201 MWh, that is 29.90% of the electricity sold by Kozloduy NPP.

The total amount of the active net electricity sold on the liberalized market and supplied by the plant for 2007 was about 95% of the total on this market. The nuclear power plant is again the only electricity generating company that fully implements the market quota for the first six months of 2007, imposed by the State Energy and Water Regulatory Commission (SEWRC).

Because of the amendments of the Energy Act, since July 2007 the principle for participation of the electricity generating companies on the market has been changed. SEWRC determines the obligatory generation quotas to satisfy the demand and the consumption on the regulated market with regulated prices of the so called protected consumers, and the rest of the net electricity generation can be sold on the liberalized market.

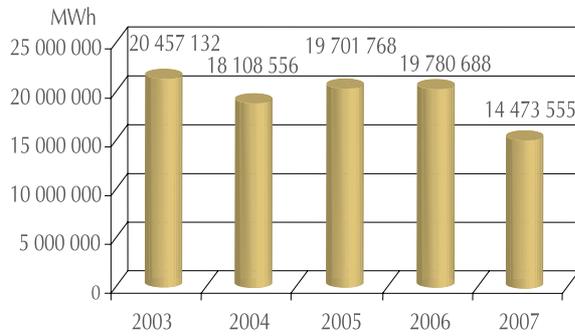
This legal change stimulates more the efforts for optimizing the operation of nuclear facilities and enhancing the effectiveness of the operation of the plant as a way of partially mitigating the negative consequences from the earlier closure of the 440 MW Units.

Electricity sale by Kozloduy NPP on the regulated and on the deregulated market in the country



## AVAILABILITY

### Availability



Along with the net active electricity for satisfying the demand in the country, and for the need of the control and security of the electrical power system, throughout the year the availability of Kozloduy NPP generating facilities amounts to 14 473 555 MWh. This was 4.24% more than the planned amount.

## LOAD FACTOR

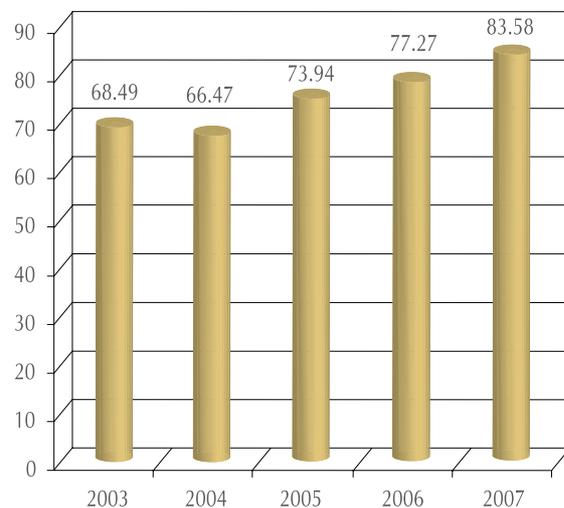
As a result of the optimal operation of Units 5 and 6, in 2007 the load factor of the operating facilities in Kozloduy NPP was 83.58%. That was 6.31% higher compared to 2006.

The load factor is a complex indicator for the assessment of the effectiveness of operation. It reflects the high degree of operational reliability of nuclear

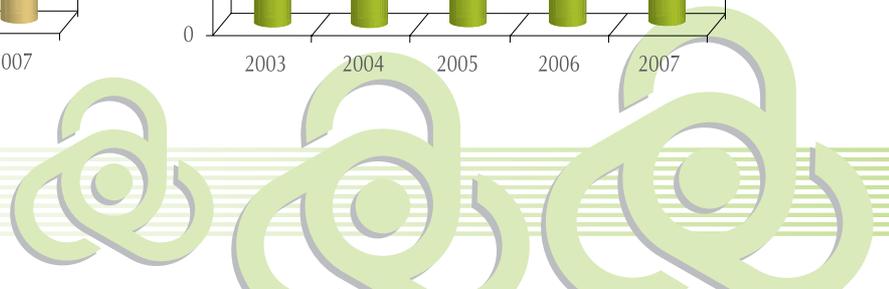
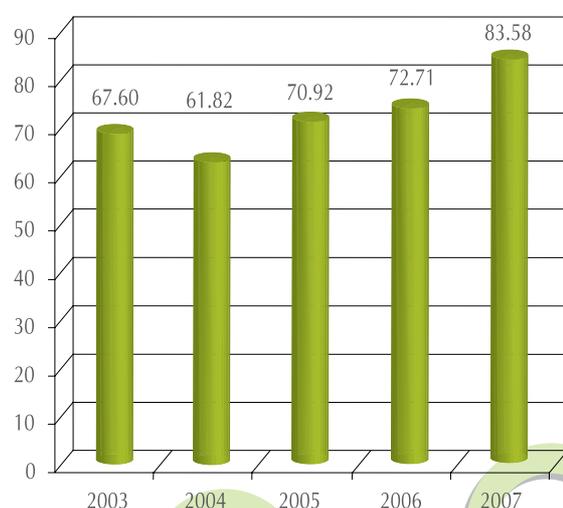
power units, the effect achieved by the modernization implemented as well as the improved organization of maintenance and other activities in the plant. In view of this, the load factor of units 5 and 6 for 2007 that has increased almost 11% compared to 2006 is completely in line with world trends and is an explicit evidence of the success achieved during the year.

5

### Load factor (%)



### Load factor for Units 5 and 6 (%)





All activities planned were implemented within the approved annual maintenance schedule in 2007. Within the scheduled downtimes, the planned outages of units and facilities common for the plant, were conducted as well as routine repairs of

facilities, specialized control of safety related equipment and refuelling of reactors with fresh fuel.

For a successive time the approach of implementing certain maintenance activities to pieces of equipment that can be repaired while the units are in operation is used without compromising and reducing safety and reliability.

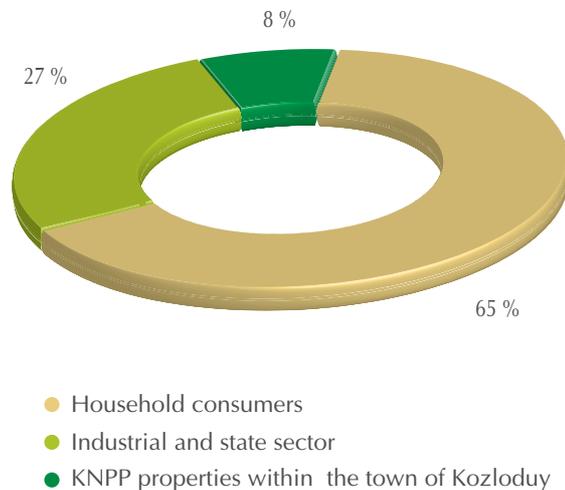
As a result of the optimization of the maintenance activities and finalization of a significant part of the Modernization Program of Units 5 and 6 in 2006, the scheduled outages for the last year are implemented in shorter terms. All activities are implemented within the planned amount and with high quality, which is a prerequisite for improving the effectiveness and lifetime of facilities and equipment.

## HEAT GENERATION

In 2007 the heat generated was 237 166 MWh, that is 50% more than in 2006. The major part of it was used for the plant-in-house demands including the closed Units 1-4. The amount of heat provided for the households, public and commercial sector of the town of Kozloduy has not been changed – 70 159 MWh.

The structure of the heat consumption is the same – the largest share was by the households 65%, followed by the industrial and state organizations within the town.

Distribution of heat for the town of Kozloduy (per consumer type)





The development of modern nuclear power engineering meets the unconditional requirement for continuous safety enhancement.

This priority is the basis both for the management policy of Kozloduy NPP as a whole and the independent state surveillance on behalf of the Nuclear Regulatory Agency (NRA) at the Council of Ministers of the Republic of Bulgaria, the Ministry of Environment and Water and the Ministry of Health.

#### LICENSES

Since January 1<sup>st</sup> 2007 the amended licenses for operation of Units 3 and 4 have come into effect. In accordance with the new conditions, the scope of activities permitted is restricted to operation of nuclear facilities in E-mode, determined in the technological regulation of the corresponding unit (a mode in which the nuclear fuel is removed from the reactor core and is stored in at-the-reactor in compliance with all the requirements for safe operation).

Throughout the year the process of licensing of the newly built Stationary laboratory for radiation defectoscopy at the NDT Center. In compliance with Safe Use of Nuclear Energy Act and with

the Regulation for the arrangement of issuance of licenses and permissions for safe use of nuclear energy, the following documents were issued by NRA to Kozloduy NPP:

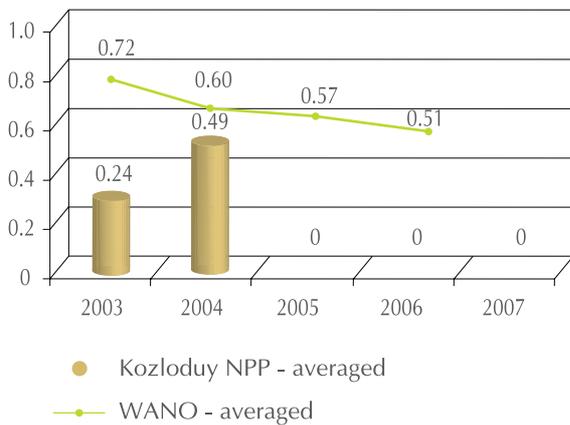
- Order for amending the operating license of the NDT Centre for using ionizing emissions for commercial purposes – performing non-destructive testing with radiation methods;
- Permission for temporary storage of gamma defectoscopy in the Stationary laboratory for radiation defectoscopy.

The licensing of the Safe storage of spent nuclear fuel, in NRA Revision N<sup>o</sup>5 of the Interim report for analysis of project safety and independent review of this revision by an external organization, aimed at issuing an order for approving the technical design. An approval for the implementation of preparatory activities was received from NRA, prior to the issuance of permission for construction of the facility, for compensating the delay in the project implementation. At the end of 2007 an application was submitted to NRA for issuing permission for construction of the Storage Facility. 44 permissions for implementing engineering solutions were issued by NRA in 2007.



For a third successive year there is no reactor scram at Kozloduy NPP units. The criteria accepted by the World Association of Nuclear Operators (WANO) determine one scram per two years as an indicator of high level of safety and reliability of operation.

Scrams per reactor for 7000 hours of operation

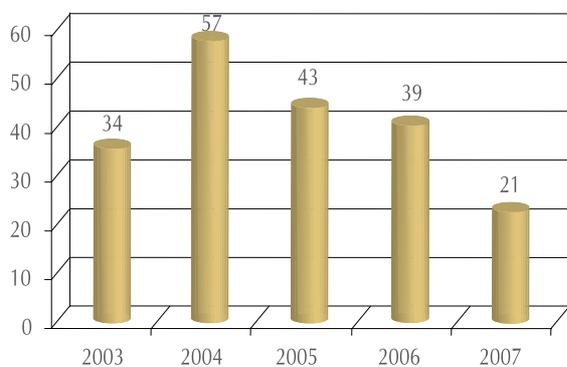


In 2007 the nuclear operators of 1000 MW units improved their own record in terms of a continuous period of operation without reactor scram – eleven years without reactor scram at Unit 6 were celebrated at the end of 2007.

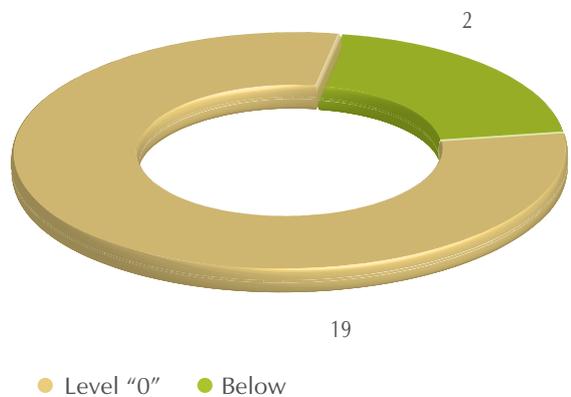
The total number of operational events recorded during the year is 21 and is significantly lower compared to the previous years. All events are reported to the Nuclear Regulatory Agency and the Ministry of Economy and Energy.

According to the International Nuclear Events Scale – INES, 2 of the operational events reported were below the scale, and 19 were ranked level “0” (deviation)-below INES scale. No events ranked level “1” (anomaly) or higher were recorded.

INES events reported to the Nuclear Regulatory Agency



Distribution of events in accordance with INES scale

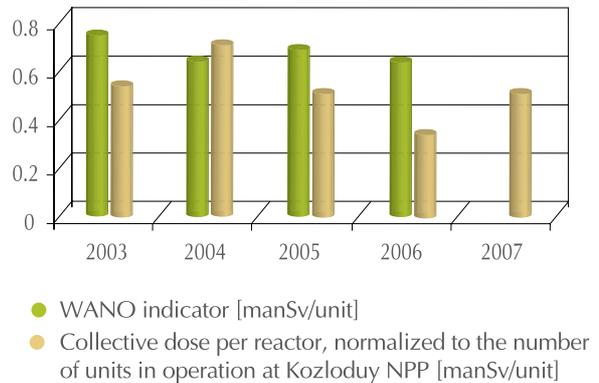


The values of the annual limit of the effective dose of occupational radiation exposure of 50 mSv, as well as the limit of 100 mSv for 5 consecutive years, as specified in the Basic Norms for Radiation Protection – 2004, have not been exceeded in 2007.

The maximal individual effective dose for the year does not go beyond the 17% of the annual normative limit. The collective effective dose in Kozloduy NPP for 2007 follows the steady trend of reduction established in the last 11 years. The collective dose per unit, normalized to the number of units in operation at Kozloduy NPP for 2007 is 0.53 manSv/unit. In accordance with WANO 2006 Performance Indicators Report, the average value of indicators for reactors PWR type (analogous to the VVER) in 2006 is 0.60 manSv/unit.

The results achieved in the area of radiation protection are due to the strict dosimetry control, the good organization during the performance of maintenance activities and the systematic implementation of the ALARA principle

Collective dose per reactor



to minimize exposure dose loads. In compliance with the Regulations for Conducting ALARA Councils, there were six meetings conducted in 2007 as the minimal mandatory requirement is to have 3.

The levels recorded from the measurement of the gamma-background at the radiation control points on the industrial site during the year are within the limits 0.07 - 0.19  $\mu$ Sv/h and there are no deviations from the natural values specific for the region of 0.21  $\mu$ Sv/h.



In compliance with the Additional Protocol to the Agreement between Bulgaria and the IAEA, ratified in 2000 on the implementation of the safeguards to be observed, concerning the Non-Proliferation Treaty, all nuclear facilities at the power station are subject to permanent control by IAEA. The control is performed through periodic inspections organized in cooperation with NRA. Fifteen routine inspections were conducted in 2007 to review compliance with The Non-Proliferation Treaty, 4 inspections were performed by Euratom inspectors. Neither violations nor non-compliances were found concerning amounts of nuclear materials declared and available during the reviews.

In compliance with Regulation 302/2005/ EURATOM, the total number of 60 reports was sent to Luxembourg in 2007 for inventory changes of nuclear materials – Inventory Change Report

(ICR), and for the annual inventory of nuclear materials – Physical Inventory Listing (PIL) and Material Balance Report (MBR), in Kozloduy NPP. 12 reports for inventory changes of nuclear materials were sent to NRA (ICR), and 18 reports for the annual inventory of nuclear materials (PIL and MBR).

After signing the trilateral agreement between Bulgaria, Russia and the Ukraine in 2007, the transportation of Spent Nuclear Fuel (SNF) from Bulgaria to Russia was facilitated. There were successful transportations of SF from VVER-440 (Units 3 and 4) and VVER-1000 (Units 5 and 6).

All low and medium radioactive waste, generated in the process of operation of the nuclear power plant were reprocessed by the Specialized company “Radioactive wastes-Kozloduy” being part of the state-owned enterprise “Radioactive wastes”.

11

## PHYSICAL PROTECTION AND EMERGENCY PLANNING



The concept of physical protection established in Kozloduy NPP completely meets the requirements for Design Basis Threat counteracting and of normative documents as well. Continuous engineering improvements of the existing security and telecommunication systems are made, thus ensuring compliance with the current criteria.



The status of the physical protection and the actions of the personnel engaged with the security of the nuclear power plant are controlled periodically by NRA and by the Ministry of Interior. The main conclusions from the reviews performed in 2007 confirm that the physical protection system of Kozloduy NPP adequately performs its functions and ensures the necessary protection against the Design Basis Threat.

A new revision of the internal Emergency Plan (EP) of Kozloduy NPP was approved in 2007 and it reflects all requirements of new or amended normative acts, regulations by NRA and the Ministry of state policy in disasters and accidents. In order to enhance the Emergency organization and to ensure high level of emergency preparedness along with the updating of all emergency instructions and procedures, maintenance of emergency equipment and having

emergency personnel on duty, the EP envisages the conducting of common emergency drills on the Kozloduy NPP site.

The training scenario in 2007 was related to a fire in the Spent Fuel Storage Facility and passing through different emergency states. For the first time during this exercise a specialized medical aid using air transport was trained. Teams from the Plant Medical Service, Regional Fire Protection and Population Protection Department, the Regional Police Department at the plant and the Voluntary First Aid Service were included. The overall coordination was performed by the Emergency Response groups and teams at the Emergency Control Center. The analysis of the results confirmed the preparedness for response and adequate implementation of activities planned.





## FIRE PREVENTION

In order to maintain a high level of fire prevention, Kozloduy NPP has developed a set of organizational and engineering events that ensure reliable protection of facilities and is targeted at minimizing the possibility for conflagration within the plant site.

As a part of the measures of the modernization programs implemented in recent years at Kozloduy NPP, the fire-alarm and fire-extinguishing systems have been upgraded and their efficiency enhanced. As a result the fire hazard is

reduced and as a whole a higher level of fire safety is achieved.

Three inspections are performed during the year by the Head Directorate and the Regional Directorate on Fire Safety and Population Protection Service that control the status of fire safety of the nuclear power plant. The conclusions of the inspectors confirm the high level of preparedness of the fire-alarm and emergency rescue activities of the personnel working in the Regional Fire Safety and Population Protection Service at Kozloduy NPP.



An indispensable part of the Kozloduy NPP strategic objectives is to warrant the sustainable development of the region and to prevent negative impacts on the environment.

### RADIOECOLOGICAL MONITORING

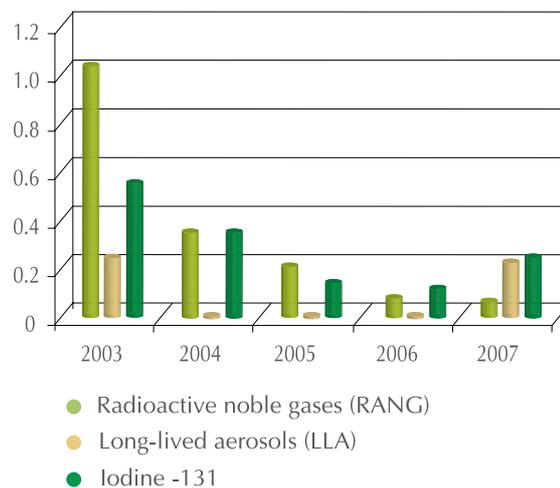
The parameters of the radioecological monitoring at Kozloduy NPP are in compliance with the requirements of the national legislation and are in line with Article 35 of the Euratom Treaty. The good international practices of countries with well developed nuclear power are applied.

The 3 870 analyses and 2 398 samples taken from various sites of the environment (air, water, soil, vegetation, milk, fish, cultivated crops etc.) throughout the year did not indicate any diversions from the radiation indicators above the admissible norms.

Man-made activity in the atmosphere air is about 100 000 times below the norms as specified in the Basic Norms for Radiation Protection - 2004. Long-lived total beta activity varies within the natural limits with the average value of 0.53 mBq/m<sup>3</sup>.



Total activity of gaseous aerosol (RANG, LLA, Iodine-131) releases in % of the admissible mean annual value



The results of the total beta activity of the atmospheric sedimentations in the area under control around Kozloduy NPP varies within the scope from 0.034 to 2.12 Bq/(m<sup>2</sup>.d), the mean yearly value of 0.41 Bq/(m<sup>2</sup>.d). Data do not differ compared with those of previous years.

The total beta activity, as measured in the water of the open water basins of the Ogosta and Tsibritsa rivers as well as the Kozloduy dam is within the limits of 0.027 to 0.16 Bq/l, this being 21% of the norm determined of 0.75 Bq/l. As far as the Danube River water is concerned the highest maximum value measured is 0.15 Bq/l. All values measured are much less than the admissible norms.

The analyses of the drinking water samples in the region adjacent to Kozloduy NPP show the total beta activity varies within the limits of 0.043 to 0.15 Bq/l, those being much less than the admissible norms on drinking water as determined by Regulation N<sup>o</sup>9/16.03.2001 (2 Bq/l total beta activity and 100 Bq/l for tritium).

No man-made activity was registered in soil within the 100 km monitored area generated by Kozloduy NPP.

Content of  $^{137}\text{Cs}$  in vegetation at the control sites within the 100 km area in proximity to Kozloduy NPP varies in normal limits from 5.35 Bq/kg, and for  $^{90}\text{Sr}$  – to 2.75 Bq/kg (dry weight). These data are close to values of previous years.

Milk from three farms is examined on a monthly basis in the region (the town of Kozloduy, town of Oryahovo and Harlets settlement), fish from the Danube River, cereals and forage crops, grown in the region. Results show the absence of impact on main food products and the ichthyofauna in the region induced by Kozloduy NPP.

The high quality of the radioecological monitoring performed at Kozloduy NPP was confirmed with five successful participations in the year into renowned international laboratory comparisons, organized by ALMERA – IAEA and BfS – Germany.

### GASEOUS AND LIQUID RADIOACTIVE RELEASES

In 2007 the gas aerosol releases into the

atmosphere were considerably lower (below 2%) of the admissible values for safe operation, as determined by the NRA.

The Danube River water total beta activity measured in Kozloduy NPP region presents values that are characteristic for natural water basins, this confirming the efficiency of the special water treatment and purification processes of the technological cycle of the Kozloduy NPP. As a result the summarized and specific activity of the water fed to the Danube River continues to be with values below the admissible limits, determined by the NRA and agreed on by the Ministry of Health and the Ministry of the Environment and Water.

### POPULATION DOSE LOAD CONTROL

To assess the dose load of the population, verified and validated models are applied, based on those adopted by the European commission CREAM methodology. The maximum assessed individual effective yearly dose on public, summarized from gaseous aerosol and liquid NPP releases into the environment totals to 4.6  $\mu\text{Sv/a}$ .



This is only 0.2% of the yearly natural irradiation background for the country (2.4 mSv), below 0.5% from norm adopted for public (1 mSv) according to the BNRP 2004 and about 50 times below the limit of 0.25 mSv/a for irradiation by NPP radioactive releases. The maximum dose value is below the limit for release of control – 10  $\mu$ Sv/a (BNRP 2004).

The normalized collective effective dose of public from gaseous aerosol effluents in the region does not deviate from the worldwide trend for reactors of this type (according to data from the Scientific

Committee on Nuclear Radiation Impact Studies of the UN, 2000).

### CONTRIBUTION TO REDUCTION OF GREEN HOUSE GASES

Electric power production by NPPs contributes considerably to the preservation of the environment due to the lack of green house effect gases. With the electricity generated only in 2007 Kozloduy NPP has saved the harmful impact of over 20 million tons of carbon dioxide (CO<sub>2</sub>), more than 1 million tons of sulphur dioxide (SO<sub>2</sub>), about 60 thousand tons of nitrogen oxides (NO<sub>x</sub>) and 40 thousand tons of ashes, containing natural radioactivity.

## NON-RADIATION ASPECTS OF ENVIRONMENTAL PROTECTION

The non-radiation aspects of Kozloduy NPP impact on the environment are managed in compliance with the requirements of the normative regulations in force in the country.

Assessments on implementation of the activities envisaged in the programs on non-radiation monitoring of the NPP are conducted on regular basis. Items of control, according to these programs are the Non-radioactive wastes repository and the status of waste and underground water. Sampling and the physicochemical examinations are performed by an independent accredited external laboratory. Internal control is provided on application of requirements, concerning environmental protection by means of the scheduled and out-of-schedule checks and walkdowns. The practice of separate collection of non-radioactive wastes goes far back into the

past years. The recyclable wastes are submitted for reprocessing to licensed organizations.

The results of the analyses conducted in 2007 confirm that the activities, related to environmental protection at Kozloduy NPP are in line with the national legislation on ecology and are adequate to the present day good practices in this area.

In compliance with the Water Act, in 2007 the Company received permissions to discharge waste water. An application has been submitted for operation under the provisions of Article 104 of the Environmental Protection Act.

The implementation of the environmental programs enters the records of the periodical reports submitted to supervising authorities as well as other interested parties.



In order to maintain compliance of the nuclear facilities with up-to-date requirements, concerning safety, reliability and efficiency, Kozloduy NPP plans and ensures the implementation of a series of activities on an annual basis funded by own resources, aids or credits.

Within the frame of the Investment program (IP) as approved, 116 783 thousand BGN was invested in 2007. Some 57 173 thousand BGN was financed from Kozloduy's own resources, while, 44 752 thousand BGN came from the Kozloduy NPP units 1 to 4 International Decommissioning Support Fund and the Nuclear Facilities Decommissioning Fund as well as 14 858 thousand BGN loans related to Units 5 and 6 Modernization Program.

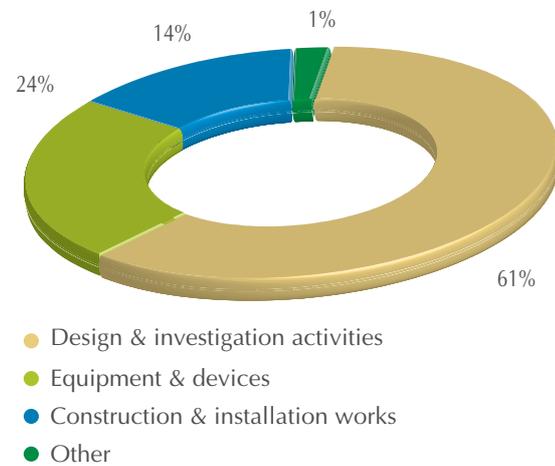
The major part of the expenses were designated to finance measures on the continuous improvement of operational safety and reliability of the 1000 MW Units 5 and 6 as well as to finalize the last measures of Units 5 and 6 Modernization Program.

The scope of overall implementation of the Program by the end of the year reached almost a 100% (99.1%). Of the 212 measures, as included in the Program, 210 have been already completed and the other 2 measures are in progress. In activities, related to the Units 5 & 6 Modernization Program in 2007 the total of 20 905 thousand BGN from our own resources as well as loans were invested. Thus the planned investment reached the total of 477.5 million Euro.

The major measures, implemented in 2007 are:

- Introduction of a system for control of

Structure of expenses on IP



critical parameters in emergency and post-emergency circumstances;

- Replacement of YKTS (Unified complex of technical means) in Unit 5 secondary circuit;
- Defining and specifying grounds for the frequency of tests and maintenance periods and the time on outages of the safety systems;
- Development of a system on daily assessment of operational risk;
- Quantitative analysis on reliability of power supply redundancy systems (II category);
- Analysis on probabilities to bypass the containment;
- Studies on possible causes for leakage from primary to the secondary circuit and solutions to locate the faults;
- Qualification of equipment, in accordance with the resource and development of a system to calculate residual lifetime;
- Installation of an automated radiation control system on each safety system channel;
- Development of symptom oriented emergency procedures.



The Investment Program was also to provide for safety important activities such as:

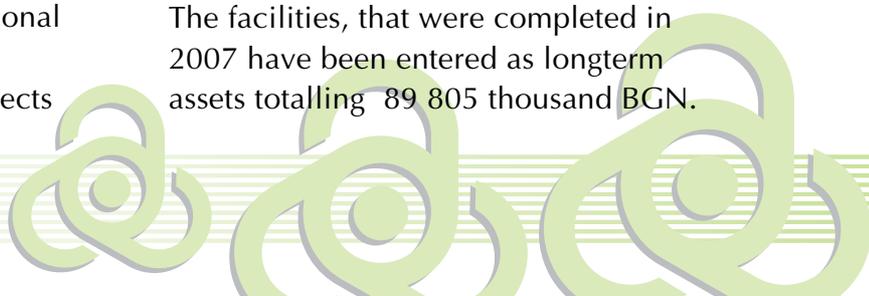
- Improvement of Spent Fuel Storage Facility safety and observation the implementation of licence provisions;
- Measures to maintain and enhance security and physical protection of the NPP;
- Modernization of equipment, related to the Program on reliability enhancement of the Openyard switchgear, including continuation of the step-by-step modernization of the control measurement transformers in the SG, imposed by the requirements for higher precision in power measurement;
- Completion of the replacement of the relay protection systems by new generation micro-processor protection systems;
- Completion of activities, related to delivery, design and installation of 400 kV disconnectors etc.

By means of resources from the Kozloduy NPP Units 1 to 4 International Decommissioning Support Fund the implementation of a number of projects

was ensured, such as: Activities on the Design and Construction of the Spent Fuel Dry Storage facility Contract; Supply of equipment for liquid radioactive wastes treatment; Activities on radiological inspections; Optimization of the liquid and gaseous releases monitoring system etc.

The Investment program included measures on reconstruction and modernization of equipment and devices as well as activities not directly related to power production or safety – measures, related to improvement of quality and efficiency of heat supply to the town of Kozloduy and the NPP; improvement of the environmental parameters in accordance with the Program on rendering Kozloduy NPP activities in compliance with the norms and standards concerning the environment; activities, related to the social sphere – reconstruction of hostels and recreation facilities, property of the NPP, etc.

The facilities, that were completed in 2007 have been entered as longterm assets totalling 89 805 thousand BGN.



In 2007, after the earlier closure of the 440 MW Units 3 and 4, the efforts of the management were aimed to maintain the economic stability of the Company. In spite of the unfavourable consequences from the closure of the two units, the financial aspects of 2007 for Kozloduy NPP Plc were successful and ended up with profit amounting to 3 459 thousand BGN (after taxation).

The key factors for the economic stability in the past year are the surplus electricity generation and increased amount sold on the deregulated market. Due to the above-mentioned, there are additional revenues amounting to 57 089 thousand BGN more than the planned amount. In 2007 KNPP sold about 30% of its annual net generation on the deregulated market and at freely negotiated prices which increased the revenues from the liberalized market by 78% in comparison with 2006.

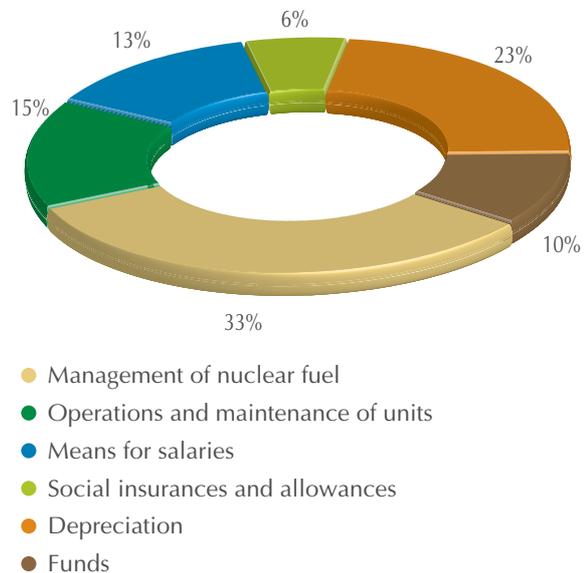
The revenues of the company are totalling 634 157 thousand BGN. Due to these revenues the company ensured its solvency and provided financial resources for all financial obligations related to the plant activities.

The costs for the plant activities in 2007 amount to 630 113 thousand BGN. The major part of them is regulated by law, which restricts the possibilities to reduce them.

The largest share is the expenditure for nuclear fuel management, followed by depreciation, operation and maintenance of units.

Kozloduy NPP fulfilled its obligations concerning spent fuel management in compliance with the Strategy for Safe

Structure of Kozloduy NPP expenditures in 2007



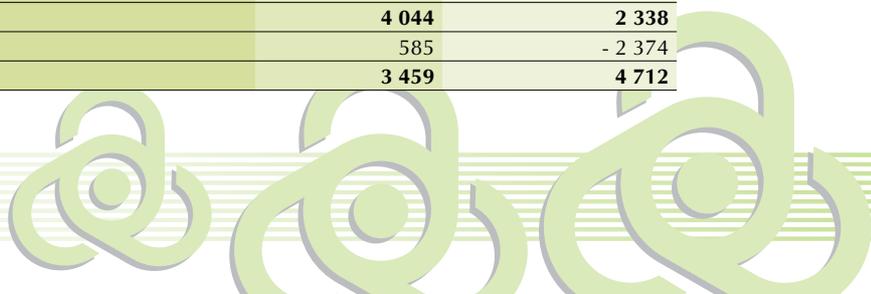
Radioactive Waste Management adopted by the Council of Ministers.

All commitments to the personnel, related to labour and social legislation are fulfilled and all legal requirements are strictly observed. The total amount of 25 387 thousand BGN were paid for 2007 to the social funds, including for social insurances, requalification and unemployment funds and health insurance.

All taxes and fees due to the State Budget totalling 196 839 thousand BGN, including 66 330 thousand BGN contributions to the Safe Management of Radioactive Waste Fund and Nuclear Facilities Decommissioning Fund. The deductions to these funds constitute 10% of the expenses.

The balance sheet and report on revenues reflect the summarized proprietary and financial status of the company.

<b>BALANCE SHEET OF KOZLODUY NPP PLC, KOZLODUY as per 31 December 2007</b>	<b>2007 (thousand BGN)</b>	<b>2006 (thousand BGN)</b>
<b>ASSETS</b>		
<b>Non-current assets, incl.:</b>		
Tangible fixed assets	1 234 755	1 273 874
Intangible assets	32 580	45 538
Financial assets	232	75
Investments in associates	1 229	1 229
Expenses for future periods	-	20
Other non-current assets	114 632	99 207
<b>Total sum of non-current assets</b>	<b>1 383 428</b>	<b>1 419 943</b>
<b>Current assets, incl.:</b>		
Inventories	199 901	147 732
Trade debtors and other receivables	94 355	105 473
Cash and cash equivalents	169 283	145 916
Current tax receivables	5	1 105
Expenses for future periods	4 456	4 276
<b>Total sum of current assets</b>	<b>468 000</b>	<b>404 502</b>
<b>Total sum of assets</b>	<b>1 851 428</b>	<b>1 824 445</b>
<b>LIABILITIES AND EQUITY</b>		
<b>Equity, incl.:</b>		
Share capital	101 716	101 716
Reserves	976 431	986 721
Financial results from previous years	4 347	- 9 994
Financial results from current period	3 459	4 712
<b>Total sum of equity</b>	<b>1 085 953</b>	<b>1 083 155</b>
<b>LIABILITIES</b>		
<b>Non-current liabilities, incl.:</b>		
Fixed bank loans	501 327	543 403
Deferred tax liabilities	48 660	47 283
Long-term provisions	7 887	9 612
Funding for FA	74 378	33 144
<b>Total sum of non-current liabilities</b>	<b>632 252</b>	<b>633 442</b>
<b>Current liabilities, incl.:</b>		
Trade and other payables	59 277	40 326
Current portion of long-term liabilities	30 390	29 307
Current tax payables	19 353	25 348
Short-term provisions	16 303	12 620
Funding current activities	7 900	247
<b>Total sum of current liabilities</b>	<b>133 223</b>	<b>107 848</b>
<b>Total sum of liabilities</b>	<b>765 475</b>	<b>741 290</b>
<b>Total sum of liabilities and equity</b>	<b>1 851 428</b>	<b>1 824 445</b>
Contingencies	910	1999
<b>REVENUES STATEMENT OF KOZLODUY NPP PLC, KOZLODUY for 2007</b>	<b>2007 (thousand BGN)</b>	<b>2006 (thousand BGN)</b>
Profit from sales	596 865	728 844
Other revenues	37 292	10 880
Changes in the production balance and independent production	- 4 200	- 15 531
Balance value of goods sold and long-term assets	- 967	- 549
Capital own expenses	230	662
Expenses for liquidation of fixed assets	38	-
Expenses for materials	- 112 694	- 134 111
Expenses on hired services	- 172 552	- 164 197
Depreciation costs	- 140 904	- 177 244
Expenses on salaries /remunerations/	- 79 329	- 70 113
Insurance costs	- 26 671	- 26 315
Other costs	- 81 415	- 142 676
incl. provisions	- 1 009	767
Financial income/expenses	- 11 649	- 7 312
Income of associates	-	-
<b>Profit /loss before taxation</b>	<b>4 044</b>	<b>2 338</b>
Tax expenses	585	- 2 374
<b>Profit /loss for the period</b>	<b>3 459</b>	<b>4 712</b>



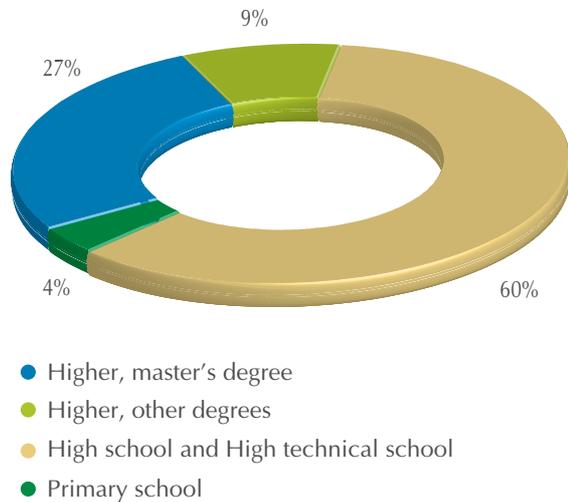


To create optimal conditions for the professional development and to maintain personnel motivation are amongst the major priorities of Kozloduy NPP policy on human resources management.

Towards the end of 2007 the number of KNPP employees was 4 654, this being by 30% less than that in 2000 and the result of the measures implemented throughout recent years to gradually reduce number of employees, complying with worldwide practices in the nuclear industry.

In line with the commitments, as adopted with the social program of the Company as well as with the strategy on Units 1-4 decommissioning reduction of personnel is being implemented by means of encouragement of earlier retirement under the provisions of first and second category of labour and by not filling vacancies. The share of eldest employees (age of 60 and higher) is being constantly

Distribution of Kozloduy NPP personnel according to education



reduced and now it is 1% of KNPP staff. The largest relative share are the age groups of 36-40 and 41-45 years old - both groups represented by 22%.

This year the number of specialists of higher education with Master's degree, working for the NPP increased from 26% in 2006 to already 27% in the year 2007.

## MOTIVATION – AN IMPORTANT FACTOR FOR EFFICIENT WORK

In 2007 at the Psycho physiological laboratory of Kozloduy NPP for the second time a psychological study to investigate motivation of Kozloduy NPP Plc staff was carried out. The investigation is the result of a project, developed by Kozloduy NPP in cooperation with the Department of Trade and Industry, the United Kingdom, related to the "Development of action plan to maintain motivation in the approach to NPP closure and during decommissioning".

The objective of the study is to obtain a clear picture how the individuals

under study evaluate the significant indicators that exert direct influence on staff motivation, such as: Company's policy in various areas; qualities of the line managers; interpersonal attitudes, possibilities for progress and development, working conditions, etc. The regular determination of these indicators allows assessing and analysing the ongoing processes in staff motivation. The investigations and analyses performed represent one more form of information feedback from staff to Kozloduy NPP management and contribute to the development of staff motivation enhancement strategies.



## WORKING CONDITIONS

Responsibility towards personnel is measured with the effort the management puts in maintaining healthy and safe working conditions as well as by the provisions made to ensure protection and prevention from occupational risks. In this respect Kozloduy NPP has developed a Program to enhance industrial safety and a Risk assessment program both of them harmonized with IAEA recommendations and international practice. The programs include all activities, related to industrial safety and obligations ensuing from the Health and Safety Conditions of Work Act and the subordinate legislation. An important detail is the emphasis on prevention and promoting safety improvement and the measures to preserve health of employees. Systematic effort is continuously put into training and

maintaining personnel awareness on safety rules and regulations.

To eliminate or confine harmful factors to the greatest extent, laboratory measurements of working environment parameters are conducted on a regular basis. Compliance to normative requirements is assessed and if necessary corrective measures are prescribed.

As a result the last 5 years saw a steady trend of a reducing number of industrial safety-related accidents at Kozloduy NPP. Only 5 of these were registered in 2007.

Indicators, featuring employee injuries at the NPP have also been kept to low values. The Employee Injuries Coefficient at the NPP for the year is 0.25, this being 10 times lower than the mean value for the industry – 2.54.



The continuous improvement of specialized training and competency of personnel is in conformity with the vast responsibilities of Kozloduy NPP employees as well as with the educational and professional requirements of the present day.

According to the training and qualification system as applied at the power plant Training Centre (TC) and in compliance with the specialized training license for the individuals whose activities are related to nuclear safety and radiation protection, separate training programs are being developed. In 2007 a total of 90 such initial training programs and 350 refresher training programs were developed. For their implementation, 103 training courses in various areas were accomplished, related to normative requirements, radiation protection and nuclear safety, technology and operational modes, the implementation of information systems, human factor etc.

The licensed personnel training system is applied to the rest of staff positions as well, taking into consideration the requirements of the normative documents and the peculiarities of the job descriptions. For the training of personnel outside the scope of the license in addition to the typical training programs 107 individual training programs were accomplished and 119 synopses developed.

For the specialized training of operational personnel both simulators are used – the full-scope one (referent Unit 6) and the multifunctional one

(referent Unit 3). It is obligatory that the operators at the MCR as well as the control physicists pass simulator training. In order to keep simulators in correspondence with the referent units, either independently, or in cooperation with outsourcing companies a number of sophisticated engineering projects were implemented. Apart from training purposes, simulators are used to validate emergency procedures and the testing of design modifications.

To provide access for all subcontractors to KNPP site and the individual working places the TC organized and conducted more than 320 courses and trained 6 645 people.

Within the frame of the License, the TC conducts training and issues qualification certificates on activities with ionizing radiation sources to outsourcing organizations. In 2007 13 certificates were issued to specialists from the following companies – "Interpriborservice", "Solvay Sodi", "Enel Oparations", "Festo Proizvodstvo" and "Devnya Varovik". In relation to an extra order from the AES Company, specialized training was developed and conducted for the operational personnel and manager staff of TP "Maritza East 1".

To optimize the registration of personnel training process and qualification status of personnel a new information system "Training and Qualification" has been introduced, that broadens the possibilities to use the information available as well as to prepare the references needed.



Keeping the good tradition of Kozloduy NPP maintaining close relations with the national educational system over the years, the TC took part in joint projects with various Bulgarian as well as foreign universities.

In order to maintain motivation and commitment of Units 1-4 personnel, the management of Kozloduy NPP initiated training of fifty one specialists of the operational staff of Units 1-4 (VVER-440) in analogous teams of Units 5 & 6 (VVER-1000). The selection of specialists to participate in the course has been consistent with the requirements to provide the necessary staff and ensure safety of the closed units. The second

major objective of this initiative is to preserve and develop qualification of Kozloduy NPP specialists so that enough professionally competent staff become available should demands for operational personnel at Belene NPP arise.

In relation to the Decommissioning of Units 1-4, social consequences management program training was conducted for maintenance and technical personnel in courses specialised as "Computer operators" and "Receptionists". Training was organized in accordance with the Law of encouragement employment thus half of the training expenses covered the State budget.



Considerable are the resources that Kozloduy NPP allocates into a large scope of social activities, related to ill-health prevention, adequate recreation and cultural life and entertainment of the employees as well as their families. Additional voluntary health insurance, additional voluntary pension security, high quality health services and possibilities to recover from illness in a convalescent house are also provided for KNPP employees.

In 2007, Kozloduy NPP for the third time entered the Students' Summer Training Program as an expression of the social responsibilities undertaken not only to our own staff, but also to all young people in Bulgaria. The trainees take advantage of the possibilities to familiarize themselves with the activities at the nuclear plant, to gain experience in different areas, to take part in innovation projects and to apply their theoretical knowledge in real working conditions. The fact that about 60% of the participants have voiced their



willingness to continue their professional development at the Kozloduy NPP is a clear testimony that the program is a success.

The social commitments of Kozloduy NPP towards significant public undertakings have been explicitly expressed through the support of the Bulgarian Christmas initiative, the Botev Commemoration Days in Kozloduy, providing fuel for children deprived of parental care, etc.







# INTERNATIONAL COOPERATION

Building and maintaining good international cooperation on a variety of levels is of major importance for achieving commensurate results as regards electricity generation and safety at Kozloduy NPP in compliance with current international standards and safety criteria. The main goal of these relations is to establish the necessary contacts, to gather the required technical information and know-how, and to exchange operational experience in terms of implementing the Company's strategy of enhancing operational safety, reliability and efficiency.

International cooperation development gives priority to the necessity of following and applying the latest trends, methods, approaches and good practices in the quickly evolving nuclear industry. The aim of Kozloduy NPP Management is not only to adhere to modern trends worldwide, but also to take an active part in their development through cooperation with leading organizations in the field of nuclear energy.

Kozloduy NPP is an active member of some of the most prestigious international organizations in the nuclear sphere such as the World Association of Nuclear Operators (WANO), International Atomic Energy Agency (IAEA), EURATOM, FORATOM, European Nuclear Society (ENS), World Nuclear Association (WNA) etc. In 2007 a number of working meetings were held in the plant with WANO, EURATOM, ENS, WNA, IAEA, NRS representatives as well as with experts from the Bohunice NPP and the Romanian Regulatory Body – CNAC.

A number of foreign delegations and high-level representatives of various international organizations visited Kozloduy NPP Plc. throughout the year. Among them, we need to highlight the visits of the Ambassador and Head of Representation of the European Commission in Bulgaria – HE Michael B. Humphreys, the Extraordinary and Plenipotentiary Ambassador of the Czech Republic – HE Martin Klepetko, representatives of EURATOM, IAEA, NRS, and the Finnish Nuclear Society.

Two programmes funded by the Department of Trade and Industry of the UK (now Department for Business Enterprise and Regulatory Reform) were completed in 2007 – on nuclear safety and on the social consequences of nuclear power plant closures in Central and Eastern Europe. The 10 projects implemented are beneficial for the plant in the areas of improvement in the quality assurance system, enhancement of the nuclear safety assessment process,





human factor, assessment of the current level of motivation, English language training, exchange of experience on social aspects at decommissioned sites, etc.

Some of the most important events for the last year, regarding operational safety, reliability and efficiency improvement were the international missions conducted: WANO Technical Support Mission on Effective Operational Decision Making; Preparatory Meeting for the Follow Up Mission related to the Modernization Programme of Units 5&6 at Kozloduy NPP; Verification Mission of the European Commission under the terms of Article 35 of the EURATOM Treaty;

and the Moscow based WANO Centre Technical Support Mission on Periodic Safety Assessment at NPP.

With the active support and participation of Kozloduy NPP experts, a number of specialized conferences and seminars were conducted in 2007, including a Regional Meeting of the Ministers in support of the re-opening of Units 3&4; the International Nuclear Conference on Bulgarian Nuclear Power – National, Regional and World Energy Security; Energy Forum 2007; the 7<sup>th</sup> International Conference on VVER Nuclear Fuel Indicators. Experts of Kozloduy NPP also took part in the IAEA and WANO peer reviews.



The traditions already established in Kozloduy NPP communications policy were preserved and further developed in 2007 and public relations enhanced in several major areas.

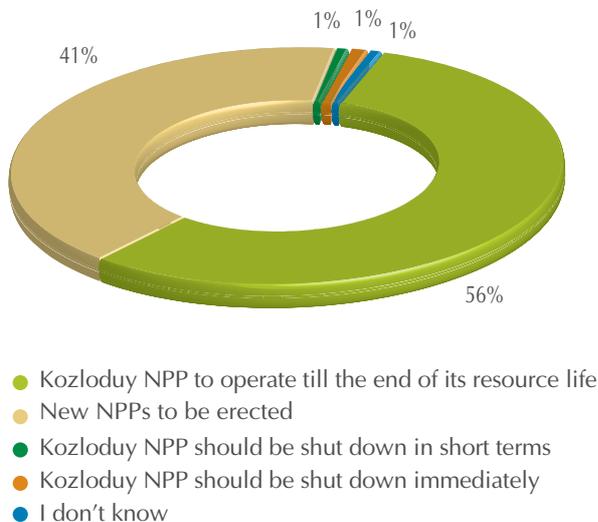
Press releases related to important events at the Kozloduy nuclear power plant were timely sent on a regular basis to Bulgarian as well as to foreign mass media. Special attention was paid to journalists that manifested additional interest in various topics – all issues raised got prompt responses, the journalists were offered thorough assistance during their visits on site to produce their press coverage. Success for mutual understanding proved to be the practice of the senior management of the Company to meet journalists on an annual basis. Rather indicative for the interest to this initiative is the fact that the 2007 meeting was attended by

representatives of almost all national mass media as well as representatives of the regional mass media.

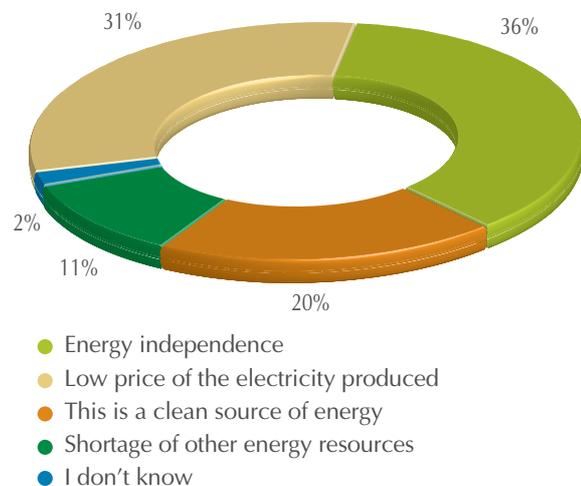
In 2007 the nuclear plant continued to submit information via its own communication channels. the Parva Atomna Journal – a chronicle of the developments at the KNPP, the Annual Report brochure, in which the main results of the achievements of the Company; topical leaflets with information on various aspects of the activities of the nuclear plant as well as other printed materials; the Internet site, which in 2007 witnessed 30% greater interest in comparison with 2006.

The organization of visits to Kozloduy NPP, both – individual or by groups of citizens that show interest in the operation of the plant is another proven practice, directed to improve transparency and openness in the

What, in your own opinion, should the future of nuclear power generation be in Bulgaria?



What is, in your own opinion, the most important reason to use nuclear power?



Results from inquiries, conducted among visitors to Kozloduy NPP in 2007



operation of the NPP. The year 2007 saw the steady trend of increasing public interest towards the Open Doors days that are held twice a year.

In 2007, some inquiries began to be conducted among the adult Bulgarian visitors, the results of which bear information on the public attitudes towards the further development of nuclear power in the country. The individuals questioned during the year totaled 505. All those questioned have answered all the questions thus making the inquiry exhaustive in its character.

With the conviction that Kozloduy NPP employees should be best informed on all developments in the Company, special attention is paid to internal communications. All this is facilitated by

the "Kozloduy NPP news" daily radio program, broadcasted on site of the plant, the news and the daily central newspaper reviews, weekly inquiries on topical issues – "Issue of the week" in the internal Intranet site.

In 2007 Kozloduy NPP marked the 20<sup>th</sup> anniversary of Unit 5 commissioning. This appeared to be an occasion to organize a suitable event that included a series of activities. A documentary video, dedicated to the anniversary was filmed and shown to the enjoyment and great interest of the Intranet and Internet visitors of the Kozloduy NPP site. The campaign met with wide response and proved to be a great contribution to add to the growing confidence in the nuclear power plant.



## TABLE OF CONTENTS

INTRODUCTION	1
GENERATION	2
SAFETY	8
INVESTMENT PROJECTS	18
FINANCIAL STATUS	20
HUMAN RESOURCES MANAGEMENT	22
INTERNATIONAL COOPERATION	28
PUBLIC RELATIONS	30

KOZLODUY NPP PLC  
KOZLODUY 3321  
BULGARIA  
Tel: +359 973 7 20 20  
+359 973 7 20 00  
Fax: +359 973 8 05 91  
[www.kznpp.org](http://www.kznpp.org)



