



KOZLODUY NPP

ANNUAL REPORT 2013



THE ESSENCE

FACTS & FIGURES

Total electricity generation (Since 1974 till the end of 2013)	538 816 749 MWh
Gross electricity generation in 2013	14 171 222 MWh
Net electricity generation in 2013	13 316 118 MWh
Share in the national energy mix	32.6%
Load Factor	80.89%
Unit Capability Factor	87.58%
Share of energy sold at the regulated market	56%
Share of energy sold at the free market	44%
Personnel	3 740
Total operating income	BGN 735 057 thousand
Total operating costs	BGN 627 752 thousand
Earnings before interest, taxes, depreciation and amortization /EBITDA/	BGN 245 917 thousand
Earnings before interest and taxes /EBIT/	BGN 107 305 thousand
Profit for the year 2013	BGN 42 102 thousand



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**Dear Readers,**

It is a cherished well established tradition in the Company to look back at the past year with the intention of summing it up and find the relevant answers to a number of major questions, such as: Were we successful in achieving all objectives as planned? Did we meet the expectations of society and businesses?

Looking back into the past 2013 we can say we did accomplish our main goal - to provide safe, efficient, and environmentally friendly electricity generation with guaranteed quality and security of supplies in compliance with the national and international standards.

We might provisionally divide the year into two main periods. The first one was marked by dispatcher restrictions due to reduced export of electric power, this fact resulting in a decrease in sales and Company income, respectively. In August the transmission tax was considerably reduced, leading to actual „boom“ in electric power export. Kozloduy NPP was now able to fully operate and utilize the capacity of the two 1000 MW Units.

In July we reported accrued loss of about 6 million BGN for the first half-year, while at the end of 2013 the balance sheet registers 42 million BGN profit. Of course, we do not consider our performance to be successful on grounds of figures solely. It is important to point out that the cheapest component in the national energy mix is namely the electric power, generated at the Kozloduy NPP, unconditionally contributing for the lower end price for each household. In case we do not confine to measure our success in mere figures but rather as benefits for the entire society we do have good reasons to take pride in.

At the end of 2013, Kozloduy NPP was once again the host of the WANO (World Association of Nuclear Operators) Peer Review. The highly positive results of the Mission are a valuable recognition for all KNPP employees, for their everyday efforts, for their continual strive for perfection.

Unfaltering is our pace into 2014, the year that will see the 40th anniversary of the commissioning of the first Nuclear Power Plant in South-Eastern Europe. It is my profound conviction that Kozloduy NPP professionals shall materialize all of the significant projects as envisaged within our business plan. Thus we shall ensure that the Company preserves its position of a major electric power supplier for Bulgaria and the region.



IVAN GENOV
Chief Executive Officer

PRODUCTION PROGRAMME AND PERFORMANCE INDICATORS

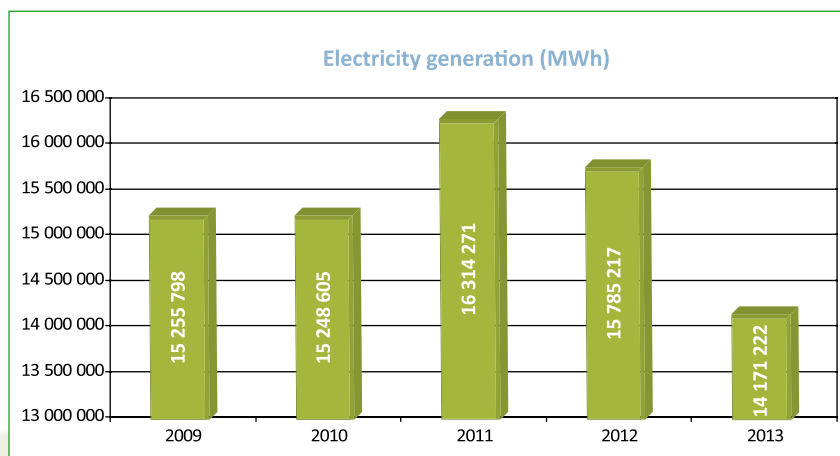
ELECTRICITY GENERATION

Throughout 2013 the 1000 MW Units 5 and 6 of Kozloduy NPP plc provided for 32.6% of the Bulgarian national electricity generation. The Units have been operated in compliance with the load schedule agreed with the Electricity System Operator and updated online in accordance with the Grid Management Procedures and dispatcher restrictions.

The gross electricity generated by Kozloduy NPP plc through the year amounted to 14 171 222 MWh. The nuclear plant electricity generation and its share in the total national generation throughout the year were significantly lower in comparison with the past years due to the increasing share of the electricity generated by Renewable Energy Sources and other electricity generators having contracts for mandatory purchase (co-generation, long-term contracts with TPPs).

Since the commissioning of the first power unit in July 1974 until the end of 2013, the nuclear power plant has generated 538 816 749 MWh of electricity in total satisfying all safety requirements for nuclear facilities in operation and without any impact on the environment.

Since its commissioning in 1987 until the end of 2013 Unit 5 has generated 138 918 365 MWh. Throughout its operating history, from 1991 until the end of 2013, Unit 6 electricity generation amounted to 128 902 427 MWh.

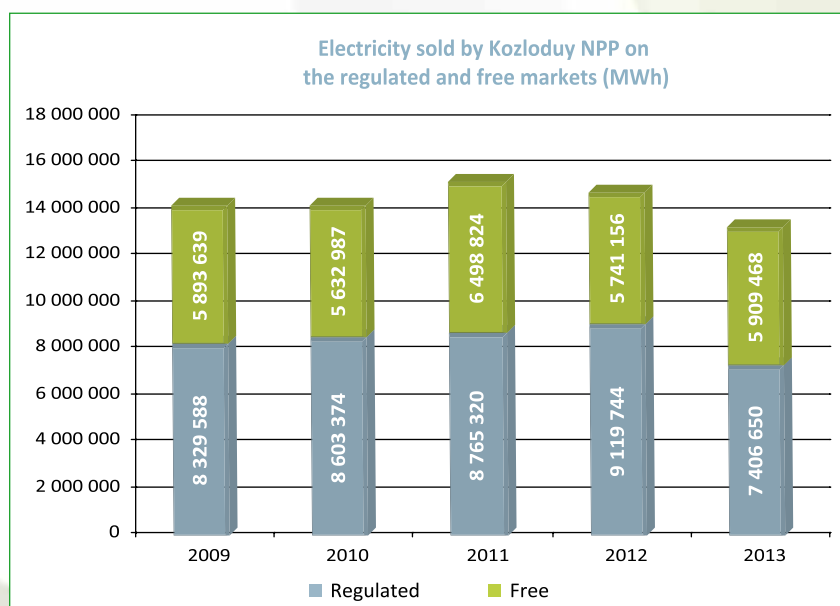


In 2013, Kozloduy NPP supplied to the national grid an active net amount of 13 316 118 MWh electricity.

The major portion of the total net generation – 7 406 650 MWh (56%) – the power plant supplied to ‘protected consumers’ on the regulated market (households and small and medium-sized enterprises). Kozloduy NPP sold successfully the remainder

of the net production (44%) on the free market supplying the large and medium industrial consumers in the country and in the region with electricity.

Therefore, in 2013 the nuclear power plant preserved its position as a reliable and preferred electricity supplier in a dynamic market environment.



SPECIFIC PERFORMANCE INDICATORS

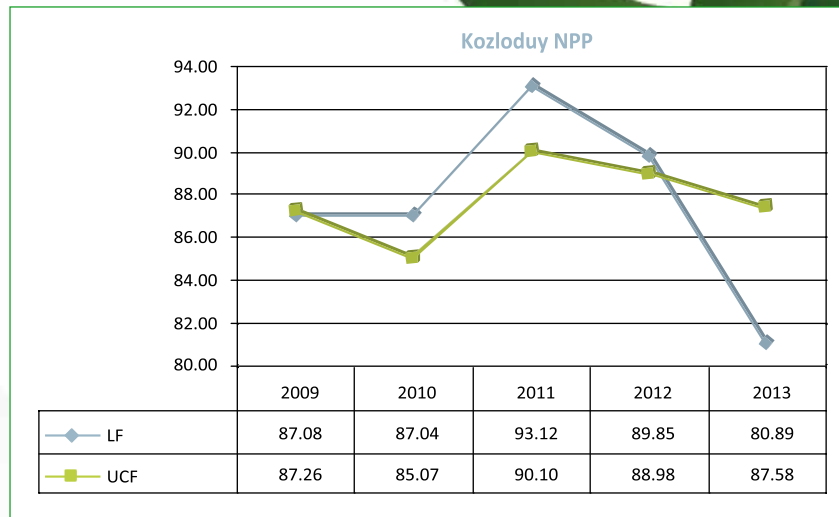
The plant specific performance indicators reflect the complex impact of a number of internal and external factors on the production, reliability and safety of the nuclear facilities.

The internal factors (controlled by Kozloduy NPP) are arrangements and conduct of operations, ensuring the required maintenance and repair quality, safety provision and preventive measures implementation to continuously enhance plant safety and reliability, etc.

The external factors, which are not controlled by the Kozloduy NPP management, are the dispatcher restrictions, change in the environmental conditions, resolutions of supervisory bodies etc.

Throughout 2013 the 1000 MW Units 5 and 6 of Kozloduy NPP plc provided 32.6% of the Bulgarian national electricity generation.

therefore, the Load Factor (LF) value was lower than the Unit Capability



Throughout 2013 the external factors (load dispatcher restrictions) prevailed and,

Factor (UCF) value. In accordance with the WANO (World Association of Nuclear Operators) criteria, the UCF value above 85% is an indicator for a good level of plant reliability and safe operation.

HEAT GENERATION

Kozloduy NPP also generates thermal power for the heating of on-site main and auxiliary facilities as well as of households in the town of Kozloduy.

The heat supplied to the end consumers (households, businesses, and budget enterprises) throughout 2013 amounted to 80 697 MWh.



MAINTENANCE PROGRAMME

The maintenance and repair activities are aimed at ensuring the operability of Units 5 and 6 main and auxiliary facilities (safety system structures, systems and components, safety related systems and systems important to the production) and balance-of-plant. In compliance with a preliminary approved Schedule, plant limits and conditions, manufacturing requirements, Technical Specification requirements for the safe operation and licensing requirements, the following activities are implemented every year:

Preventive maintenance, minor maintenance, intermediate maintenance, overhaul maintenance of mechanical equipment, electrical equipment and instrumentation and control system equipment;

- Performance tests and inspections;
- Specialized inspections, diagnostic control, corrective maintenance, if required;
- Annual outages with refuelling of the nuclear facilities with fresh nuclear fuel.

In 2013, Units 5 and 6 refuelling outages were performed with a minimum downtime of the operating facilities - 39 and 36 calendar days, respectively, (measured since tripping of the turbine generator to its connection to the national grid) due to the precise organisation and co-ordination during the performance of the required scope of activities.

Except for all required activities



on providing for the equipment operability and reliability and the safe operation of the nuclear facilities, a significant number of programmes on the complex assessment of the equipment and facilities for plant lifetime extension have been implemented.

A number of modernization and retrofit projects as installation of additional passive autocatalytic hydrogen

recombiners in Unit 6 containment, installation of service plugs made of high temperature resistant material for prevention of early containment bypass in the event of a severe accident at Unit 6, replacement of breakers in Units 5 and 6 6kV sections.



SAFETY

LICENCING REGIME

The operation of nuclear facilities at Kozloduy NPP is subject to state control on behalf of the Bulgarian Nuclear Regulatory Agency (BNRA) at the Council of Ministers of the Republic of Bulgaria. Specialized control over the activity of Kozloduy NPP is exercised by the Ministry of Environment and Water, Ministry of Health, Ministry of Regional Development and Public Works, State Agency for Metrological and Technical Surveillance and the State Agency for National Security.

Throughout 2013, the Kozloduy NPP Units 5 and 6 and Spent Nuclear Fuel Storage Facility were operated in compliance with the operating licences issued by the BNRA. On 21 June 2013, an application was lodged for renewal of the SNFSF operating licence. The activities concerning the Spent Nuclear Fuel Dry Storage Facility (SNFDSF) were carried out in accordance with the permit for commissioning issued by the BNRA.

By virtue of Council of Ministers' Decree No. 1038 of 19 December 2012 the Kozloduy

NPP Units 3 and 4 were declared radioactive waste management facilities subject to decommissioning and their management was entrusted to the State Enterprise Radioactive

KNPP continued all activities related to Units 5&6 lifetime extension

Waste (SE RAW). On 25 February 2013 the Chairman of the BNRA revoked the licences held by Kozloduy NPP issuing as of the same date operating licences for the facilities (Units 3&4) to the SE RAW. In connection with the exclusion of Electricity Production-1 (EP-1) from the administrative structure of Kozloduy NPP, an application was lodged for amendment of the licence for the use of sources of ionizing radiation (SIR) for the purposes of radiochemical control, environmental radiological monitoring, and metrological surveillance. The amendment reflects the exclusion of the EP-1 Radiochemistry from the scope of the license and exclusion of the SIR from the inventory as entrusted to the SE RAW.

The activities related to the licencing of the project on the thermal power uprate of Units 5 and 6 – 3120 MW as well as the additional requirements of the BNRA on the open procedures

for amendment of the licences of the two units are being implemented.

The work under the project for the Units 5 and 6 lifetime extension and activities concerning the licencing conditions related to this project continued throughout the year. The

documents agreed by the Regulator relevant to the comprehensive study of the actual status of the equipment and facilities at Kozloduy NPP Units 5 and 6 were submitted to the BNRA. The developed "Preparatory Programme for Lifetime Extension of Kozloduy NPP's Units 5" was also submitted for approval.

In connection with amendments to the Regulation on the Procedure for Issuance of Licenses and Permits for Safe Use of Nuclear Energy, on the basis of orders of the BNRA Chairman, the licences for the use of SIR in fire detection sensors were revoked as well as the licence for the use of SIR for monitoring purposes – x-ray inspection of closed spaces. Such activities are subject of regulatory control by the BNRA.

In 2013, 40 applications were submitted to the BNRA and 42 permissions for implementation of modifications were granted leading to changes in structures, systems, and components for safety enhancement of the Kozloduy NPP plc Units 5 and 6 and SNFSF.

SAFETY CULTURE

A number of activities were done in 2013 to enhance safety culture. The main initiator and driving force of the measures was the Safety Culture Council (SC). It is a consultative body to

the Safety and Quality Director on the issues associated with safety culture.

In 2013, the basic key point in that respect was the implementation of

a long-term programme for SC enhancement. It was developed after a safety culture self-assessment conducted at Kozloduy NPP in 2011. In result of that programme imple-

mentation, a Company Code of Ethics was developed and effected. The following was brought into operation: electronic mail and automated information system for circulation of documents that are for review, cooperation and dissemination of working documents; dissemination of controlled documents in electronic copies; timely publishing of information about company events and operating events, both internal and external, low level event and near miss reporting system, etc., in the Intranet.

Thus, better communication within the plant was ensured both vertically and horizontally to provide for a better informed staff. The work with documents and business correspondence is optimized. Some controlled documents are disseminated in electronic copies to the workplaces through the SmartDoc data base which reduces the number of documents that are printed and stored in paper copies.

The interviews of the staff that started the previous year continued in 2013 on issues related to safety culture. For that purpose the members of the SC Council visited the workplaces and



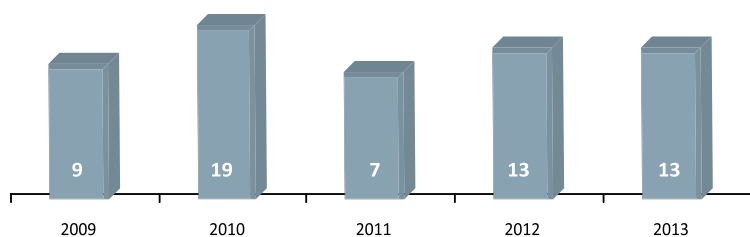
discussed specific matters related to the SC, team work, building up an atmosphere of confidence, error and problem reporting, leadership, preparation for international missions, etc. The purpose was to reassure people's confidence in their knowledge in the field of safety culture, and provide that everyone's opinion was important and everybody's contribution to safety enhancement was substantial.

In 2013, focus groups organised discussions of a number of significant issues. About 100 representatives of managerial and technical personnel took part in those discussions which

allowed considering the standpoint of people having different experience, rights and obligations. The focus group results were summarised and analysed and corrective measures were identified on their basis; those results could also be used as data base for any subsequent safety culture self-assessments. Such self-assessment is scheduled for 2014 and the purpose is to include more interviewed people and observations of staff safety culture development as an important component of organisational culture.

NUCLEAR SAFETY

Events reported to the Bulgarian Nuclear Regulatory Agency according to the INES scale



13 operating events were registered at Kozloduy NPP in 2013 and reported to the BNRA. All events were rated as Level 0 – below the INES scale (no safety significance).

Two scrams occurred throughout the year – on 30 October at Unit 5 and 20 December at Unit 6.

RADIATION PROTECTION

In order to maintain a high-level radiation protection of the personnel and the public, Kozloduy NPP pursues a policy for systematic application of the ALARA principle (ALARA - As Low As Reasonably Achievable) to optimize dose exposures. Thus, the measures to mitigate the harmful effects of ionizing radiation are continuously improved. The policy efficient implementation is based on the staff training and motivation, application of good practices from the plant and international operating experience, preliminary planning and preparation of the activities before the annual outages, analysis of completed activities, and reliable and efficient radiological monitoring. The annual individual and collective doses for 2013 ranked Kozloduy NPP among the well performing in this area nuclear power plants. The maximum individual dose for the last year was 8.22 mSv (41% of the annual limit stipulated by the regulations). The average collective dose for the two WWER-1000 reactors throughout 2013 was 0.23 manSv/unit. According to data from the WANO (World Association of Nuclear Operators) Annual Reports, this value is more than two times lower compared to the average value of that indicator for a period of five years – 0.54 manSv/unit, in power plants with pressurized water reactors (PWR).

Kozloduy NPP makes every effort to ensure control of technological processes

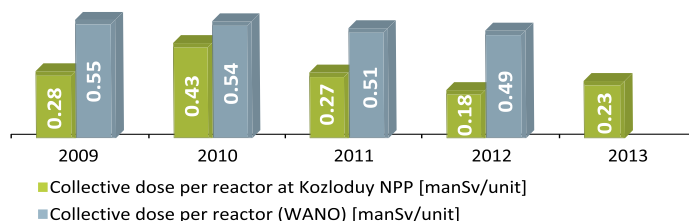
Kozloduy NPP make consistent efforts to strictly control the technological processes, prevent uncontrolled releases of radioactive substances to the environment, and monitor the liquid and gaseous emissions to the environment reliably and in a wide range.

The stipulated limit on public dose exposure due to emissions to the environment is 250 μ Sv, annual individual effective dose. In order to optimise the Radiation Protection, Kozloduy NPP has established reference levels (50 μ Sv for liquid and 50 μ Sv for gaseous discharges). In compliance with those reference levels the maxi-

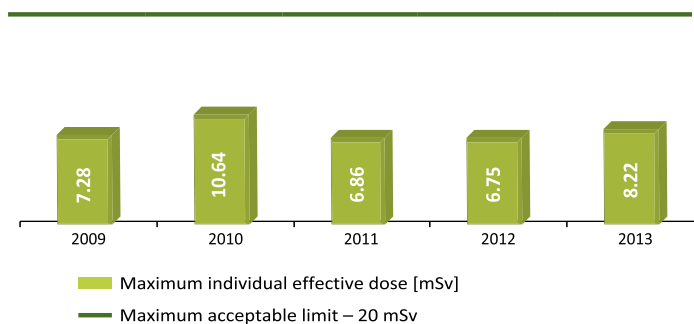
mum concentrations of radioactive substances in the plant waste air and waters have been determined, approved by the BNRA, and agreed by the Ministry of Health and Ministry of Environment and Water.

Based on the successful completion of several projects on the improvement of radiological monitoring of liquid and gaseous discharges at Kozloduy NPP, a regular sampling and reliable measurement of all radiologically significant elements in the waste streams was ensured. Since the accession of Bulgaria to the European Union, the data on the discharges are reported to the European Commission on a yearly basis.

Collective dose per reactor (WANO)



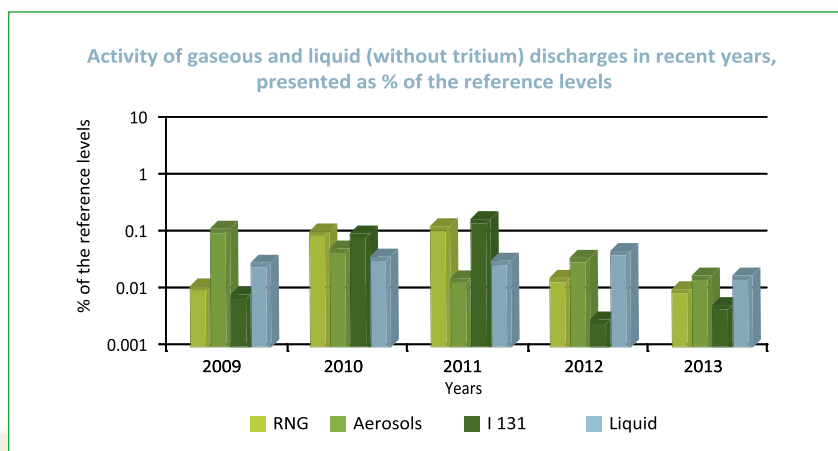
Maximum individual effective dose in Radiation Controlled Area – 2



GASEOUS AIRBORNE AND LIQUID RADIOACTIVE DISCHARGES

Throughout 2013, the concentration of radioactive substances in gaseous discharges to the atmosphere was kept considerably below the maximum acceptable limits. The discharges of radioactive noble gases (RNG) are negligibly low – less than 0.02% of the reference level for the site, aerosols discharged are below 0.03% of the reference level, and discharges of ^{131}I are below 0.01% of the reference level.

Kozloduy NPP monitors the concentration of carbon 14 (^{14}C) and tritium (^3H) in the gaseous discharges from the operable Units 5 and 6. The discharges of ^{14}C are 2.1%, and discharges of tritium are 0.2% of the corresponding annual limits.



Throughout 2013, the concentration of radioactive substances in liquid discharges was kept considerably below the reference levels. The total activity (without tritium) of the waste waters discharged into the Danube River is below 0.1% of the approved

reference level. Tritium activity in the liquid discharges is approximately 11% of the annual limit.

As for previous years, the concentration of radiologically important alpha and beta emitters in the liquid and gaseous discharges is negligibly low.

RAW MANAGEMENT

The radioactive solid and liquid waste (RAW) generated from the operation of Kozloduy NPP is handed over for treatment to the Specialized Enterprise Radioactive Waste of Kozloduy (SE RAW).

In 2013, 486 m³ of compacted solid radioactive waste and 19 tons of non-

compacted solid radioactive waste (RAW) were generated. The entire quantity was given for processing. Solid RAW are being released from the temporary storage places at Auxiliary Building 3 of EP-2 and a total of 91 m³ waste is transferred.

The generated quantity of liquid ra-

dioactive concentrate (still bottom) during processing of radioactively contaminated waters amounted to 182 m³. Still bottom of 290 m³ was given to SE RAW for processing. The trend with the liquid RAW storage tanks is towards increase of the unconfined spaces.

SPENT FUEL MANAGEMENT

The spent nuclear fuel (SNF) at Kozloduy NPP is stored in compliance with all safety requirements. After being kept for a certain period in the Spent Fuel Pools, the fuel is

transferred to the pool type spent nuclear fuel storage facility which is used for all units. The spent nuclear fuel of Units 1, 2, 3, and 4 is stored at the Dry Spent Fuel Storage Facility. The assemblies are stored in casks of Constor 440/84 type. Part of the spent fuel, following the storage in the SFSF, is returned to the Russian

Federation for reprocessing and long-term storage.

In 2013, the spent nuclear fuel which was stored on the Kozloduy NPP site in Units 5&6 reactors, in the Wet and Dry Storage Facilities was subject to 15 inspections conducted by the BNRA, IAEA, and EC.

EMERGENCY PLANNING AND PREPAREDNESS

Kozloduy NPP systematically maintains a high level of preparedness to respond in case of a nuclear, radiation or other accident or natural disaster. Drills and exercises on set scenarios are conducted on annual basis for that purpose. In 2013 three emergency drills were conducted and one general exercise on the following event: "Earthquake of PGA-0.35g and ultimate heat sink loss accident." During that exercise 577 people were

really evacuated to the town of Kozloduy, the mobile diesel generator was transported and connected to Unit 5 switchgear, and 9 "injured" were transported to the hospital in the town of Kozloduy.

Training was conducted of 1690 students and 80 teachers of the schools in the town of Kozloduy, the villages of Butan, Glozhene, and Harlets on the subject of "Protective measures and behaviour during an accident at

Kozloduy NPP." The participants were familiarized with protective measures and rules for behaviour during a possible accident at Kozloduy NPP.

PHYSICAL PROTECTION

A project for modernisation of telecommunication and security technical systems was implemented in 2013 to enhance the level of Kozloduy NPP physical protection.

New communication systems were built to integrate the National Early Warning and Notification System with Kozloduy NPP's warning and notification systems. A unified radio communication system for notification of rescue activities was built to improve the cooperation between the Ministry of Interior, Ministry of Economy and Energy, Ministry of Health, BNRA, BEH, and Kozloduy NPP.

The building of a company TETRA station DXT3, located on the territory of Kozloduy NPP and integrated with the existing national digital cell TETRA radio system of the Ministry of Interior, was the first part of the project. The TETRA station at Kozloduy NPP controls a total of eleven base sta-

tions providing coverage of the site territory and the 30-km zone around the NPP. The system is integrated with the existing telephone exchange of Kozloduy NPP and shall be used for both technological purposes and alerting under the Emergency Plan.

Under the second part of the project, a public notification system was built in the 30-km zone around Kozloduy NPP. The system is activated by the Regional Control Unit at the Emergency Response Centre. In case of an emergency situation with a loss of the KNPP's Regional Control Unit the sirens can be triggered from Sofia. The electronic sirens will be controlled via radio signal provided by the TETRA system.

The third part of the project covers the implementation of an IP stationary communication system at Units 5&6 and Auxiliary Building 3 Control Rooms. The implemented systems

are of Seismic Class I. First category power supply and redundant accumulator batteries are provided for 8 hours of operation in case of main power supply loss.

The Automated Access Control System was modernised in compliance with the current international requirements. The existing system was additionally equipped with readers for biometric identification providing access to the special statute zones of Kozloduy NPP. A new radio security system was brought into operation. Thirteen points were connected to it and 13 new transmitters were installed. The system is a hub of alarm signals transmitted via radio and/or the LAN network. It has two independent radio receiving sets working at two independent radio frequencies which provide a very high level of radio signal admittance.

FIRE SAFETY

The set of organizational and technical measures applied at Kozloduy NPP ensures high-level fire safety in accordance with the international requirements and standards.

Fire safety ratings and fire hazard analyses are systematically conducted at Kozloduy NPP. Thus, the required actions guaranteeing timely detection, suppression, and mitigation of consequences of fires are taken. To reduce the risk in this area, a fire safety culture of high standard is continuously maintained and enhanced. No fires and ignitions causing a shutdown of a Unit or reduction of electricity generation were registered throughout 2013.



The inspection conducted by the National Fire Safety and Protection of Population Service at Vratsa Police De-

partment confirmed the high-standard of fire safety at Kozloduy NPP.

RADIOECOLOGICAL MONITORING

Radioecological monitoring at Kozloduy NPP is meant for monitoring and analysis of the environmental radiological status and evaluation of the local public dose exposure in accordance with the European and national regulations. The scope of monitoring and controlled parameters are stipulated in a long-term programme agreed by the Bulgarian regulatory and supervisory bodies – BNRA, National Centre of Radiobiology and Radiation Protection (NCRRP) at the Ministry of Health (MH), and the Executive Environment Agency (ExEA) at the Ministry of Environment and Water (MEW). The Programme fully

complies with the relevant national and European regulations including Article 35 of the EURATOM Treaty, Recommendations of EC

2000/473/ EURATOM and 2004/2/ EURATOM.

The monitored area includes the Kozloduy NPP site, 2-km Precautionary Action Zone (PAZ), 30-km Urgent Protective Action Planning Zone (UPZ), and control points within a 100-km radius of Kozloduy NPP. Subject to monitoring are the basic environmental constituents – air, water, soil, vegetation, agricultural crops, milk, fish, etc. The radiation gamma background in the local settlements is continuously measured. Field measurements by means of a mobile laboratory are carried out.

Over 4,000 analyses of the radioactivity in 2,162 samples of different environmental constituents were conducted throughout 2013. This exceeds the respective numbers at many analogous laboratories in EU Member States and other countries around the world.

The results obtained with respect to the radiological indicators in the analysed environmental samples in the vicinity of Kozloduy NPP throughout 2013 were within the background levels specific for the region. No adverse effects of the nuclear power plant operation were detected. The human-induced activity levels detected were much below the permissible limits for the relevant radiological indicators and analysed samples. The radiological situation was absolutely favourable. The Kozloduy NPP site was also subject to a strict radioecological monitoring – ground water, aerosols, atmospheric depositions, soils, bottom sediments, etc. A detailed annual report on the radioecological monitoring including an analysis of all the results throughout the year was submitted to the BNRA, NCRRP-MH, and Executive Environment Agency at the Ministry of Environment and Water. The results of the internal radiological monitoring were

verified to the independent radioecological analyses under programmes of the MEW and NCRRP-MH.

The gamma background levels at the on-site measurement points and measurement points within the 100-km zone throughout 2013 were fully comparable with and did not differ from the natural gamma background specific for the region. The measurements are carried out by means of low-background dosimetric instrumentation of high precision and passive thermoluminescent dosimeters.

For information of the public in the municipalities within the 30-km zone, an automated information system for radiological monitoring (AISRM) with a total of 13 local measuring posts in different settlements is used. Data are displayed on information boards in public places and wirelessly transmitted on-line to the central station at Kozloduy NPP and also to ExEA (MEW). Data obtained through this automated system are within the range of the natural background.

The human-induced atmospheric activity throughout the year was close to the natural background (average of $2.3 \mu\text{Bq}/\text{m}^3$) and much below the permissible limits specified in the Basic Standards for Radiation Protection of 2012.

No radiological effects due to the operation of Kozloduy NPP on the water of the Danube River and drinking water sources in the region were observed. The total beta activity of the water from natural ponds is between 0.018 and 0.088 Bq/l, which is only 18% of the maximum permissible 0.5 Bq/l stipulated in Regulation H-4/2012. The percentage of tritium in the samples from the open ponds is around the Minimum Detectable Ac-

tivity (MDA) – up to 7.8 Bq/l. The radiological condition of drinking water complies with the health standards (Regulation No. 9 of 16 March 2001). The total beta activity measured in the local drinking water sources varies between 0.024 and 0.084 Bq/l. Tritium above the MDA was not detected (average of 3.6 Bq/l).

The human-induced soil activity is not affected by the operation of Kozloduy NPP. The activity of ^{137}Cs throughout 2013 varies between 1 and 39 Bq/kg, the average value being 10 Bq/kg. This percentage is lower than the average for the country. The activity of ^{90}Sr is between 0.3 and 3.7 Bq/kg. Those are values specific for the soils in the region. The vegetation analysed shows normal human-induced activity – ^{137}Cs up to 2.8 Bq/kg and ^{90}Sr up to 2.8 Bq/kg.

The radioactivity of the main food produced in the region, milk, fish, and agricultural crops, is within normal radiation background levels, much below the relevant permissible limits (Regulation No. 10 of 2002).

The quality of the analyses and measurements conducted is guaranteed annually by taking part in prestigious international interlaboratory com-

parisons involving reference samples organised by the IAEA – Vienna, the Federal Office for Radiation Protection BfS (PTB) – Germany, the World Health Organisation (WHO) – France, and the National Physical Laboratory (NPL) – Great Britain. The reports demonstrate good laboratory practice proven throughout the years with guaranteed accuracy and reliability of analysis results. The Radioecological Monitoring Department at Kozloduy NPP is a distinguished member of the world network of the Analytical Laboratories for the Measurement of Environmental Radioactivity (ALMERA) – IAEA annually taking part, along with 139 laboratories from 81 countries, in laboratory competence tests and complying with all the requirements. Since 2012 the internal radiological monitoring at Kozloduy NPP has been accredited by the Bulgarian Office of Accreditation to BDS EN ISO/IEC 17025:2006 as a testing laboratory RMTL, Reg. No. 154 ЛИ/02.08.2012. This accreditation officially proves the competence of the laboratory.



MONITORING OF PUBLIC DOSE EXPOSURE

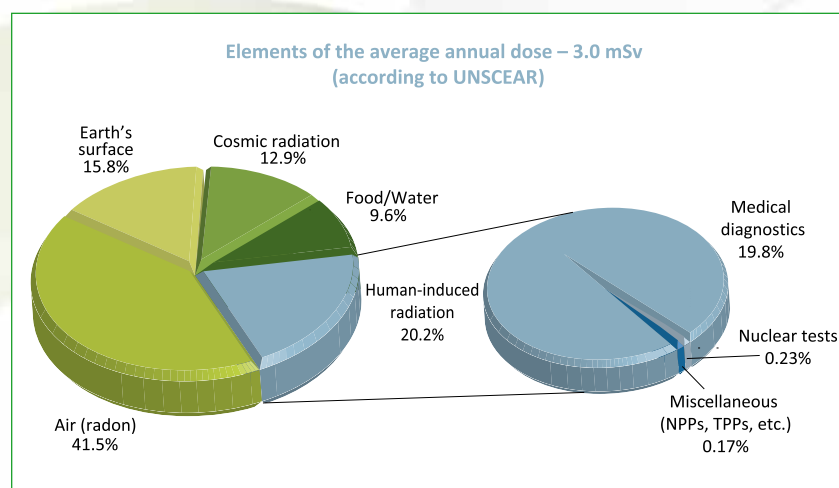
Additional public dose exposure was calculated utilizing verified and validated modelling codes based on the CREAM methodology adopted by the European Union and adapted to the relevant geographical and hydrological factors characteristic for the area of Kozloduy NPP. The models were based on conservative analysis accounting for all possible scenarios for increased radiation background due to releases from Kozloduy NPP and irradiation of the public.

For 2013, based on microclimatic data, the total maximum individual effective dose for the population within the Urgent Protective Action Planning Zone due to liquid and gas and aerosol releases in the atmosphere, taking into account the contribution of ^{14}C and ^3H , is $4.8 \mu\text{Sv/a}$. This is negligibly low compared to the maximum annual dose to the public ($1000 \mu\text{Sv}$) as specified in the Basic Standards for Ra-

diation Protection of 2012. The collective dose to the public within the Kozloduy NPP 30-km Urgent Protective Action Planning Zone is 0.022 manSv .

The low radioactive releases from Kozloduy NPP determine dose exposures of negligible radiological risk to the population within the area of the Plant. The average additional dose exposure to the population within

the 30-km zone is about 500 times lower than the one originating from the natural radiation background ($2330 \mu\text{Sv}$). Over the last 5 years the maximum individual effective dose to the public varies in the range of $4 \div 7 \mu\text{Sv/a}$ which is below the limit set by regulatory bodies – $10 \mu\text{Sv/a}$ as specified in the Basic Standards for Radiation Protection of 2012.



ENVIRONMENTAL PROTECTION – NONRADIOLOGICAL ASPECTS

Protection of human health and environment from adverse effects associated with the activities carried out at the Kozloduy NPP site is a top priority in the operation of the nuclear facilities.

The environmental protection policy of Kozloduy NPP plc is aimed at achieving the following objectives:

- Protection of the atmosphere and the purity of ambient air.
- Protection and management of the water in the area of Kozloduy NPP.
- Safe management, minimization, and utilization of nonradioactive waste.
- Energy efficiency and control of the effects on the environment due to the substances and materials used.
- Minimization of the risk of environmental damage and incidents.

All the relevant activities were carried out in accordance with the national regulations. In connection with the purchase of two new mobile diesel generators for the needs of Units 5 and 6, documents were submitted in 2013 to review the permit for greenhouse gas emission quota trading. A request for amendment to the permit for the discharge of waste water into the Main Drain Channel was prepared. The permit was amended – the permissible limits for indicator “Boron” being changed from “Not Allowed” to 0.2 mg/l . The maximum acceptable limits for the individual streams (hourly maximum, daily

mean, and annual) were reduced. In compliance with the operating licence for an enterprise of high risk potential, preparation of an emergency response plan of Kozloduy NPP plc for actions in the event of an accident involving hazardous chemicals was launched.

Three public hearing sessions focused on the Environmental Impact Assessment Report (EIAR) and Compatibility Assessment Report for the construction of a facility for treatment and conditioning of solid radioactive waste of high volume reduction factor at Kozloduy NPP were organised and held in 2013. The sessions were held in the municipalities of Kozloduy and Mizia and the town of Bechet, the Republic of Romania.

Under the Nonradioactive Waste Management Programme and pursuant to the Permit for Activities involving Nonradioactive Waste, 52 new casks and metal barrels for selective collection of oily waste were purchased in 2013. 33 ton of disused rubber and rubber products were transferred to a licensed organization.

For the purposes of the required control, regular internal walkdowns and inspections were carried out throughout 2013. Eight planned ecological inspections were carried out by the control bodies – MEW, ExEA, RIEW, and Danube River Basin Directorate – Pleven. No breaches were identified in the course of those inspections. About 3,000 water sam-

ples were analysed throughout the year – surface water, groundwater, and waste water. The results indicated no trend towards increase in the values of the indicators monitored. No significant exceedances of the maximum acceptable limits were detected and the values are close to those of previous years. The annual report on the results from the plant nonradiological environmental monitoring in the area of Kozloduy NPP was submitted to the Executive Environment Agency and Regional Inspectorate of Environment and Water – Vratsa.

WORKING CONDITIONS

Risk Assessment Programmes in compliance with the recommendations of the IAEA, international practices, and Health and Safety at Work Act are implemented at Kozloduy NPP. The programmes cover all the activities related to the industrial safety as well as the ones stipulated by the regulations. It is important to focus on prevention and encouragement of safety enhancement and employee health-care solutions. Consistent efforts are being made to maintain personnel training and awareness of adhering to health and safety rules.

In 2013, under project BG 051PO001,

„Health and Safety Prevention,” a system governing the activities on Health and Safety at Work in accordance with the international standard OHSAS 18001:2007 has been successfully implemented at Kozloduy NPP.

Working environment parameters are regularly measured by laboratories to eliminate or minimize unhealthy agents. Compliance with regulations is assessed and corrective actions prescribed if necessary. The employees of Kozloduy NPP are provided with personal protective equipment, free wholesome food, shortened working hours, and compulsory work

injury insurance of groups of workers subject to high risk. The workplace risk is methodically assessed and the implementation of the prescribed measures is regularly accounted for.

As a result, there is a strong tendency at Kozloduy NPP to a reduction in injury-related absenteeism.

The indicators characterising industrial injuries at Kozloduy NPP continue to show low. The percentage of industrial injuries at Kozloduy NPP throughout the year is 0.24. This is lower than the average for the industry (1.63) and for the country (0.75).

FINANCIAL PERFORMANCE

In the first half of 2013, the Company's business was affected by the imbalance in the national grid, which resulted in dispatching restrictions on the electricity generation at Units 5 and 6, and blocked exports in the electricity market. Due to those adverse for the Company's activity conditions, the sales revenue decreased, which affected the financial status and until 30 June 2013 the losses amounted to BGN 5 888 thousand.

The regulatory changes which resumed the exports of electricity in the second half of 2013 increased the sales of electricity on the free market. The income growth improved the financial status and at the end of 2013 the reported profit amounted to BGN 42 102 thousand. The reduc-

tion in the prices on the regulated market had a negative effect on the Company's financial status throughout the second half of the year. The availability price was reduced from 27.00 to 22.45 BGN/MWh (Decision No. 4-25/29.07.2013)

The operating revenue in 2013 amounted to BGN 735 057 thousand. Major share (97 %) of the revenues is due to electricity and thermal power sales which amounted to BGN 718 641 thousand in total.

The electricity sales revenue amounted to BGN 716 590 thousand and consists of the revenue from sales on the regulated market which amounted to BGN 313 490 thousand and revenue from sales on the free market which amounted to BGN 403 100 thousand. The ratio of the revenue from the reg-

ulated market to the revenue from the free market is 44:56, while the ratio between the respective quantities of electricity sold on those markets is 56:44.

The Company's operating costs throughout 2013 amounted to BGN 627 752 thousand.

In accordance with the regulations, the Company promptly paid all contributions payable to the state and local budget – BGN 253 913 thousand in total, which included contributions to the Nuclear Facility Decommissioning (NFD) and RAW Funds in the amount of BGN 76 030 thousand, taxes and fees – BGN 138 737 thousand, and contributions to social and health insurance funds – BGN 39 146 thousand.

Financial Indicators

BGN thousand

	Indicator	2013	2012 restated	Change %
1	Total operating income	735 057	847 358	-13.25%
2	Total operating costs	627 752	620 566	1.16%
3	EBITDA ¹	245 917	351 354	-30.01%
4	EBIT ²	107 305	226 792	-52.69%
5	EBT ³	110 095	213 073	-48.33%
6	EBIT margin	14.6%	26.8%	-45.46%
7	EBITDA margin	33.5%	41.5%	-19.32%
8	Total of assets	2 360 461	2 590 032	-8.86%
9	TA ⁴	1 792 859	1 787 933	0.28%
10	Working capital ⁵	313 614	446 743	-29.80%
11	Cash	45 322	78 985	-42.62%
12	Equity	1 628 054	1 705 320	-4.53%
13	Long-term bank loans	236 289	275 039	-14.09%
14	Return on equity	6.76%	12.49%	-45.88%
15	Return on assets	4.66%	8.23%	-43.30%

¹ EBITDA – earnings before interest, taxes, depreciation and amortization

² EBIT – earnings before interest and taxes

³ EBT – earnings before taxes

⁴ TA - tangible assets

⁵ Working capital – Current assets minus current liabilities

The unsatisfactory financial performance for the year 2013 (compared to 2012) resulted from the adverse conditions in the electricity generation and marketing during the first half of 2013.

The unfavourable economic environment influencing the Company's activity in 2013 led to a critical condition with respect to the provision of funds for the operating, investing, and financing activity at the time.

The companies in the Bulgarian Energy Holding plc took measures for

the optimum targeted utilization of the current financial resources and resolution of the matters related to receivables from and payables to related parties. As a result of the measures taken, the critical period was gradually overcome at the end of the first half of the year, without external funding, and the Company's payables to the budget, lender EURATOM, staff and trade partners were realised.

The safe operation of the nuclear facilities and completion of major investment projects (such as the

lifetime extension of Units 5 and 6 and their thermal power uprate) were financially provided for.

The Kozloduy NPP plc business results are shown in the Company Financial Statements prepared in compliance with the International Financial Reporting Standards.

Statement of profit and loss and other comprehensive income for the year ended 31 December 2013

BGN thousand

	2013	2012 restated
Sales revenue, including	718 641	807 655
Revenue from electricity sales	716 590	805 523
Revenue from thermal power sales	2 051	2 132
Finance income	1 739	2 730
Revenue from services, goods and other sales	14 677	36 973
Changes in work in progress and other changes	7 674	(5 425)
Acquisition of machinery, facilities and equipment under business activity	104	474
Cost for materials	(151 244)	(147 010)
Costs on hired services	(100 072)	(83 156)
Depreciation and amortisation	(138 612)	(124 562)
Staff costs	(168 218)	(160 145)
Other costs	(77 384)	(100 742)
Revenue from operating activities	107 305	226 792
Financial costs	(9 139)	(23 703)
Financial income	11 929	9 984
Profit before tax	110 095	213 073
Payments for tax to income	(4 747)	(16 312)
Profit for the year from continuing operations	105 348	196 761
Loss for the year of discontinued operations	(63 246)	(42 408)
Profit for the year	42 102	154 353
Other comprehensive income		
Revaluation of the non-financial assets		481 624
Revaluation of liabilities on defined income plans	(1 618)	(4 733)
Tax to the income referring to the other comprehensive income	162	(47 689)
Other comprehensive income/(loss) for the year, net income from tax	(1 456)	429 202
Total of comprehensive income for the year	40 646	583 555

Statement of Financial Position

BGN thousand

	2013	2012 restated
ASSETS		
Non-current assets		
Tangible assets	1 792 859	1 787 933
Intangible assets	4 354	4 896
Investments in subsidiaries	15 161	3 161
Loans granted to related parties	19 180	19 489
Available-for-sale financial assets	232	232
Non-current assets	1 831 786	1 815 711
Current assets		
Nuclear fuel	263 396	235 475
Inventories	57 458	59 136
Trade and other receivables	35 315	33 534
Loans granted to related parties	2 930	1 488
Receivables from related parties	123 966	335 923
Receivables from tax to the income	288	4 369
Cash and cash equivalents	45 322	78 985
Current assets	528 675	748 910
Assets included in disposal groups classified as held for distribution to the owner		25 411
TOTAL OF ASSETS	2 360 461	2 590 032
EQUITY AND LIABILITIES		
Equity		
Share capital	153 855	124 546
Legal reserves	12 454	20 376
Revaluation reserve of non-financial assets	432 750	433 462
Revaluation reserve of defined income plans	(6 423)	(4 967)
Other reserves	984 126	976 842
Retained earnings	51 292	155 061
Total of equity	1 628 054	1 705 320
Non-current liabilities		
Loans	236 289	275 039
Deferred sums under construction contracts	5 847	9 027
Financing	173 055	186 516
Payments under retirement obligations	10 528	21 187
Deferred tax liabilities	91 627	90 776
Non-current liabilities	517 346	582 545
Current liabilities		
Trade and other payables	127 183	88 150
Payments to related parties	21 296	156 560
Loans	46 880	47 438
Financing	1 524	7 676
Deferred sums under construction contracts	4 706	1 408
Payments under retirement obligations	13 472	935
Current liabilities	215 061	302 167
Total of liabilities	732 407	884 712
TOTAL OF EQUITY AND LIABILITIES	2 360 461	2 590 032

Statement of cash flows

BGN thousand

Operating activities	2013 r.	2012 r.
Receipts from customers	869 445	769 343
Payments to vendors	(295 330)	(328 768)
Contributions payable to staff and social and health insurance institutions	(165 002)	(148 462)
Charges, fees and other taxes paid	(62)	(164)
Payments to RAW and NFD Funds	(76 030)	(84 592)
Receipts from/(payables to) tax to income	347	(12 534)
Cash flow related to other taxes and payables to the State Budget	(116 943)	(135 128)
Cash flow related to insurance	(9 129)	(15 555)
Other operating activity earnings	56 317	22 315
Net cash of continuing operations	263 613	66 455
Net cash of discontinued operations	(65 363)	(36 966)
Net cash used in operating activity	198 250	29 489
Investing activities		
Acquisition of properties, machinery and facilities	(120 749)	(63 162)
Proceeds from sale of property, plant and equipment	259	149
Subsidiaries' acquisition	(12 000)	(2 000)
Loans granted	(1 061)	(939)
Loan granted revenues	150	0
Interest received	1 438	4 438
Dividends received	262	263
Net cash used in investing activities	(131 701)	(61 251)
Financing activities		
Bank borrowings	(38 750)	(33 249)
Interest paid	(8 200)	(8 870)
Dividends paid	(53 262)	(30 743)
Net cash used in financing activities	(100 212)	(72 862)
Net change in cash and cash equivalents	(33 663)	(104 624)
Cash and cash equivalents at beginning of the year	78 985	183 609
Cash and cash equivalents at end of the year	45 322	78 985

The regulatory changes which resumed the exports of electricity in the second half of 2013 increased the sales on the free market

INVESTMENT PROGRAMME

In 2013, the total amount of the self-financing funds spent on the Kozloduy NPP Investment Programme was BGN 94.3 million. That was about 44% more than the Company funds spent in 2012.

The main part of Kozloduy NPP investments were aimed at completing successfully the Company's priority projects such as:

- **Programme on Kozloduy NPP plc safety maintenance and improvement including measures of the Programme for the implementation of the recommendations from the stress tests conducted at the nuclear facilities.** A number of additional activities formulated as new measures were completed following the analysis and investigations performed and within the programme implementation process. Reviews to assess the separate measures progress were periodically carried out.
- **Plant lifetime extension project** including the implementation of:

- Activities under the contract for comprehensive study of the actual status and assessment of the rest life time of the equipment and facilities at Units 5 and 6;
- Design, procurement and installation of 0.4 kV main power supply switchgear, back-up safety system switchgear at Units 5



and 6 and switchgear in the balance-of-plant systems. The project completion will result in improvement of facilities' operation and design lifetime extension. The work under this project will continue in 2014 and 2015.

- Procurement of K 1000-60/1500-2 turbine high pressure rotor 4th stage blades and spare parts.

- **Project on thermal power uprate of Units 5 and 6 reactor facilities up to 104%** included activities as follows:

- Acceptance of work projects on the in-core monitoring system retrofitting and equipment procurement specification to be implemented within the framework of the 2014 units' outages.

- A contract on the procurement of a new stator, retrofitting of the TBB-1000-4 Y3 type generator rotor and retrofitting of БВД-4600-1500 Y3 exciter to ensure Unit 6 1100 MW operation. The contract shall be concluded within the 2014 unit outage. Analogous activities shall be performed at Unit 5 in 2015.

- A procedure on the Units 5 and 6 separation installation was initiated.

In 2013, Kozloduy NPP plc financed a series of other important projects. These projects included the planned measures under the **Energy Efficiency (EE)** Programme which was developed in compliance with the existing obligations of the Company pursuant to the Energy Efficiency Act, the applicable regulations and EE Action

Projects related to Units 5 and 6 lifetime extension are funded with highest priority

Plan of the Republic of Bulgaria with the aim of achieving a stable trend towards improvement of the energy consumption indicators. Projects on the replacement of heat distribution stations and energy saving measures for important sites have been implemented throughout the year.

In 2013, the Company funded and completed important **projects related to the plant physical protection.**

Costs were also incurred for other necessary investment activities to ensure normal operation of facilities supporting electricity generation.

Throughout 2013, the applied long-term assets amounted to BGN 62 million which was 19% more than in 2012. Some of them were as follows:

- Reconstruction of the high voltage electrical network at Kozloduy NPP, new power supply at the Bank Pump Station - the partial reconstruction of the existing high voltage lines provided for the separation of two new 220kV high voltage lines.
- Design, supply and installation of gauges for measuring the amount of sewage water discharged in the Main Discharge Canal.
- Reconstruction of the local radiation control room.
- Reconstruction of gates and fence facilities of the perimeter protection zone of the Bank

Pump Station protected area (service water supply channels).

- Insulating the façade of Units 5 and 6 reactor building.
- Procurement and installation of heating system for the administrative building warehouses.
- Control Checkpoint-6 fencing.
- Retrofitting Control Checkpoint-4 with the aim of optimizing the passing of individuals through RM-7 type monitors etc.



PREPARATION FOR CONSTRUCTION OF A NEW NUCLEAR UNIT

BIn pursuance of Republic of Bulgaria's Council of Ministers' Decision (item 28/Minutes of Meeting No.14 of the CM's meeting/11 April 2012), a number of actions were initiated in preparing the construction of a new nuclear unit on Kozloduy NPP site.

Actions were taken on feasibility studies to develop the cost-effectiveness analysis, needed for the selection of site, and development of an environmental impact assessment report (REIA) was tendered.

In 2013, a cost-effectiveness analysis was conducted to justify the construction of a new nuclear unit on Kozloduy NPP site. The STC approved the design at the end of October and the results are as follows:

- Sites were analysed in terms of the connections to be implemented to the existing infrastructure, the layout of the new nuclear unit on the respective site justified by an economic evaluation;
- The potential reactor models to be used for the new nuclear unit;
- Economic evaluation of the options for the construction of a new nuclear unit on Kozloduy NPP site;
- The social and economic effects of the new nuclear unit construction (including the direct and indirect increase of employment in North West Bulgaria);

- Compliance of considered reactor models with the requirements for nuclear safety, radiation protection and security;
- The nuclear fuel cycle, including the expected radioactive waste and spent nuclear fuel generation and management.

Analyses in the following areas were conducted under the Project „Study and identify the location of the preferred Plot for the construction of the New Nuclear Unit on Kozloduy NPP site“:

- Engineering and geological structure;
- Modelling of radionuclide site subterranean migration;
- Analyses of geophysical fields and modern movements of the lithosphere;
- Climatology and local meteorology;
- Hydrology;
- Demography and man-made impacts;
- Assessment of site protection against dangerous meteorological, hydrological and geological phenomena;
- Assessment of the potential effect of the nuclear facility on the public and environment.

Field works on the additional engineering, geological and geophysical studies of the selected site are completed, and the analytical part is in progress. A document entitled 'Seismic Design Basis Definition; Liquefaction Potential Analysis,' and a document on the Natural and Anthropogenic Hazards Analysis for the preferred site for the construction of the NNU are being developed.

In connection with the tender for

the environmental impact assessment, a Terms of Reference for the scope and contents of the Environmental Impact Assessment Report was developed and approved by the Ministry of Environment and Waters. Within the process of the Terms of Reference consultations, the two countries that declared their participation in the EIA procedure, Republic of Romania and Austria, were notified.

The EIA Report was developed on the basis of the approved Terms of Reference to assess the impact of the new nuclear unit construction on the environment by considering the cumulative effect of the joint operation of all facilities located on Kozloduy NPP site. The transboundary effect and the extent to which the investment proposal impacts adjacent protected territories were assessed in the EIA Report.

The EIA Report obtained positive quality assessment by the Ministry of Environment and Waters on 30.09.2013. The entire documentation was publicly available in Bulgaria and was submitted to the competent authorities of Romania and Austria in accordance with the EIA Convention in transboundary context.

Following the instructions of the Ministry of Environment and Waters, public hearings were conducted in five municipalities of the 30-km zone around Kozloduy NPP within the period 14-20 November 2013. The minutes from the public hearings, and the received stakeholders' opinions and statements were submitted to the Ministry of Environment and Waters.

Based on the conducted analyses

and the results received from the three projects under the feasibility study, Site No.2 was unambiguously preferred with a Minutes of Meeting from a STC, No.TC-60/04.11.2013.

In parallel with that, the implementation of the Project for Preliminary investigations of the possibilities to recruit, select and train

Units 7&8 staff at Kozloduy NPP was launched. The purpose of the project was to analyze the staff needs, the professional selection system, training, qualification, and re-qualification according to the recommendations of the IAEA, WANO, and the requirements of the current regulations, as well as to assess the capabilities of the educational system to prepare the necessary number of specialists.

On 26 August 2013, the Nuclear Regulatory Agency Chairman issued a permit for nuclear facility site selection.

In pursuance of the requirements of Bulgarian legislation, and, in particular, the Regulation for the issuance of licences and permits for safe use of nuclear energy, and as a result of licensing activities of the plant in 2012, on 26 August 2013, the Nuclear Regulatory Agency Chairman issued a Permit for spec-

ification of the location (site selection) of the nuclear facility for a period of 3 years. Within this period, engineering surveys and studies need to be conducted in a scope sufficient to specify the characteristics of the region and the facility site. The surveys are necessary for the development of the design basis and safety assessment.

The document package to be submitted when the Minister of Econ-

omy and Energy tabled the proposal for the construction of a new nuclear unit in accordance with Art.45, para.2 of the SUNEА was compiled. The developed documents covered nuclear safety and radiation protection assessments, environmental impact assessment and physical protection, social and economic importance of building the nuclear power plant for the country and for different regions, radioactive waste and spent nuclear fuel to be generated in result of plant operation, and their management.

Documents are being prepared for obtaining an order for selected site approval.



INTERNATIONAL COOPERATION

The Bulgarian nuclear power plant strives to apply the best world practices in order to maintain compliance with modern international requirements. Lead by this goal, Kozloduy NPP PLC car-

ries out a continuous exchange of information and operating experience by working in close cooperation with the International Atomic Energy Agency (IAEA), the World Association of Nuclear Operators (WANO), the

World Nuclear Associations (WNA), FOREATOM and a number of other international organisations and leading companies in nuclear industry.

COOPERATION WITH WANO

Through its programme for peer reviews of the World Association of Nuclear Operators, Kozloduy NPP receives expertise and cooperation in its strive for continuous enhancement of operating safety.

A WANO Peer Review of Units 5&6 was conducted following the request of the nuclear power plant management in the period of 21 November to 6 December 2013. A team of 22 experts, representatives of the association regional centres in Moscow, Atlanta and Paris reviewed the documentation and production practices. The implementation of SOER (Significant Operating Experience Reports) recommendations and the following fields were reviewed: Organisation and Administration, Operations, Engineering Support, Operating Experience, Radiation Protection, Chemistry, Training and Qualification, Emergency Planning and Preparedness, and Fire Safety. WANO experts established 8 strengths and good practices which were considered to

be accepted by other nuclear power plants. Areas for improvement were identified. The international team leader stated that Kozloduy NPP had promoted impressive improvements in the plant, its processes and working practices, and that there were no omissions to compromise safety. The availability of competent and motivated specialist ensuring safety and reliable operation of the nuclear power plant was highlighted.

In 2013, the Moscow Centre (MC) of WANO conducted two Technical Support Missions at Kozloduy NPP on the subjects of Industrial Safety and Radiation Protection. Methodological and expert support was provided within the frameworks of the missions to improve the processes of using reliable practical experience. In March and April the MC of WANO organized two international workshops: "Significant Operating Experience Reports (SOER) and Corrective Measures" and "Study and Localize Corium After a Severe Accident for WWER-1000 Reactors."

Specialists of the Bulgarian nuclear power plant also took part in other conferences and workshops of the Association conducted in different countries, in the annual Governing Board meeting of WANO-MC in Moscow, in the 12th Assembly General of the Association, and in the traditional annual meeting of the Council of the Technical Managers (Chief Engineers) of the nuclear power plants of the WANO-MC member states.

Leading experts of Kozloduy NPP were included as inspectors in the teams for a number of WANO Peer Reviews of the Bilibino NPP and Smolensk NPP, Russia, Trillo NPP, Spain, Paluel NPP, France, Gösgen NPP, Switzerland, Ringhals NPP, Sweden, and in the Follow-up Peer Review SALTO of Paks NPP, Hungary, as well as in the Technical Support Missions of the MC of WANO at Balakovo NPP and Novovoronej, Russia, Hmel'nitski NPP, Ukraine, and Bohunitse NPP, Slovakia.



COOPERATION WITH IAEA



Kozloduy NPP works in close cooperation with IAEA, WANO, WNA, etc.

In 2013, under the Conceptual Project BUL2010005, Support in Development of the Programme for Kozloduy NPP Units 5&6 Lifetime Extension, the Company hosted three National Workshops organized by IAEA on License Renewal and Management of Component Ageing (in January), Preparation for SALTO Peer Review (safety aspects related to the long-term operations) in June, and Status Monitoring and Management of Cable Facility Ageing in November. In connection with one of the priority projects of Kozloduy NPP for Units 5, 6 lifetime extension, plant specialists took part in a Working Meeting in Vienna on the presentation of the IGALL (International Generic Lessons Learned) software and exchange of experience on Paks NPP (Hungary) nuclear facilities operational lifetime extension which was organized by IAEA.

From 10th to 21st June, an expert team of 7 IAEA specialists conduct-

ed an IPSART Mission (International Probabilistic Safety Assessment Review Team) for independent international assessment of Units 5&6 Level 1 Probabilistic Safety Analysis (PSA). Subject to that review were the organization and management of the PSA, initiating events specification and grouping, emergency sequence analysis, risk analyses for seismic events, fire and floods, equipment and staff reliability, etc.

Company specialists regularly take part in regional projects and in project for technical cooperation with IAEA. The main topics in 2013 covered operating life extension of VVER reactors; methodology for self-assessment of nuclear safety culture at nuclear facilities, new builds, spent fuel storage. In May, at the IAEA Headquarters in Vienna, the fifth successive international expert meeting was conducted on the application of the Agency Nuclear Safety Action Plan entitled "Human and organizational

factors in nuclear safety in the light of the Fukushima accident." In July, a representative of Kozloduy NPP took part in a Working Meeting of IAEA and operating plants' experts to update the document TECDOC-1100.

Throughout the year, representatives of Kozloduy NPP participated in a number of international conferences, symposia, working meetings, exchange of experience and training in the field of emergency preparedness and planning, export of nuclear material and technologies for civil use, optimization of maintenance activities, detection and identification of radionuclides in different fields of medicine, industry, etc. Participation in the work of the largest world and European forums and organizations as the World Nuclear Association, European Nuclear Society – FORATOM (through Bulatom) allows plant specialists to follow the innovations in the world nuclear industry, and present in front of the international scientific community and the European Union institutions the achievements of Bulgarian nuclear power.

HUMAN RESOURCES MANAGEMENT

The professional team of highly qualified, motivated, and committed to its work employees is among the most valuable assets that Kozloduy NPP has. Therefore, the plant staff is highly praised by the international missions and reviews conducted at the Bulgarian nuclear plant. This team was established and built up for years and the traditions, experience gained, and priorities in this area were summarized in the Hu-

man Resources Management Policy. The main objectives of the Company management are related to maintaining and developing a present-day professional recruitment system, providing for professional career development prospects, systematic training, qualification improvement, and management of the knowledge gained. All this is specified by the crucial role of the personnel as a key factor in the safe operation of the

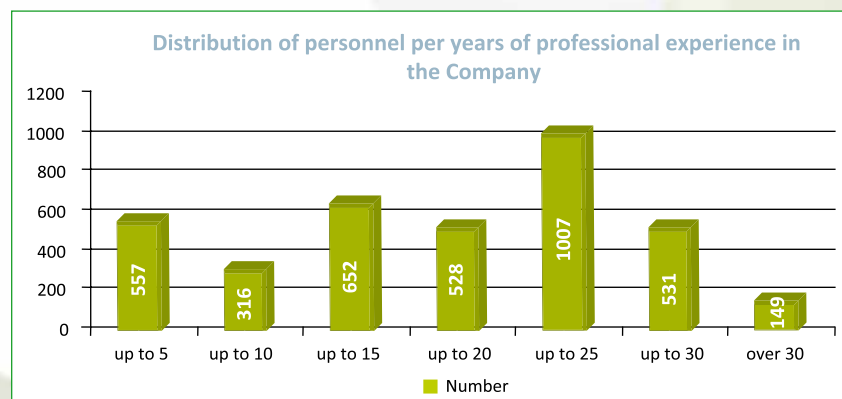
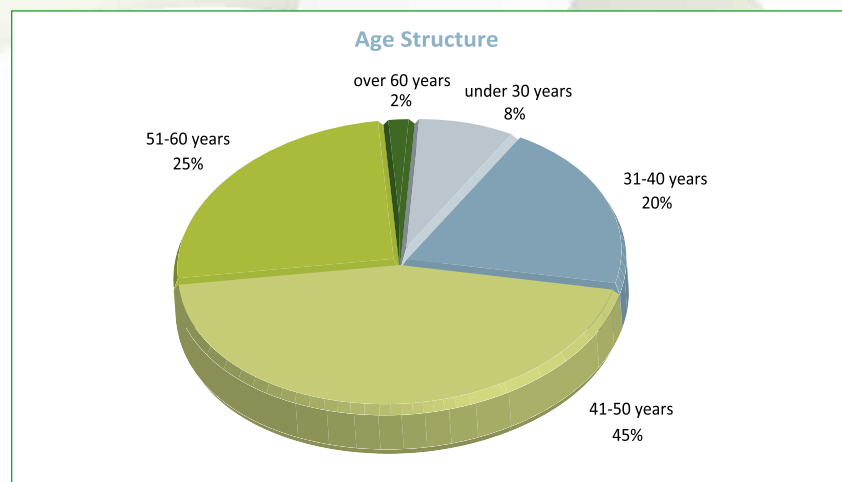
nuclear facilities and in achieving the Company's objectives.

The applied management system and organizational structure provides for accomplishment of the priorities set. The professional recruitment system of Kozloduy NPP is developed in compliance with the IAEA Safety Standards' requirements and the good practices of the other nuclear power plants.

PERSONNEL PROFILE

3 740 people were employed in the Company at the end of 2013. The number of the employees on the payroll as well as the job positions included in the staff list has been reduced in comparison with 2012 resulting from the transfer of 432 workers and employees from Units 1-4 to State Enterprise RAW.

Throughout 2013, 3 184 people stood as candidates in the recruitment procedures for the 108 vacancies advertised. 90% of them have received information about the vacant positions from the Kozloduy NPP's official website and the remaining 10% – from relatives and acquaintances. A huge number of candidates stated the opportunity for professional development was a major drive for standing as candidates – 48%. Twenty-nine percent of all respondents stated that unemployment was the reason for applying, while 23% said they sought higher remuneration. The re-

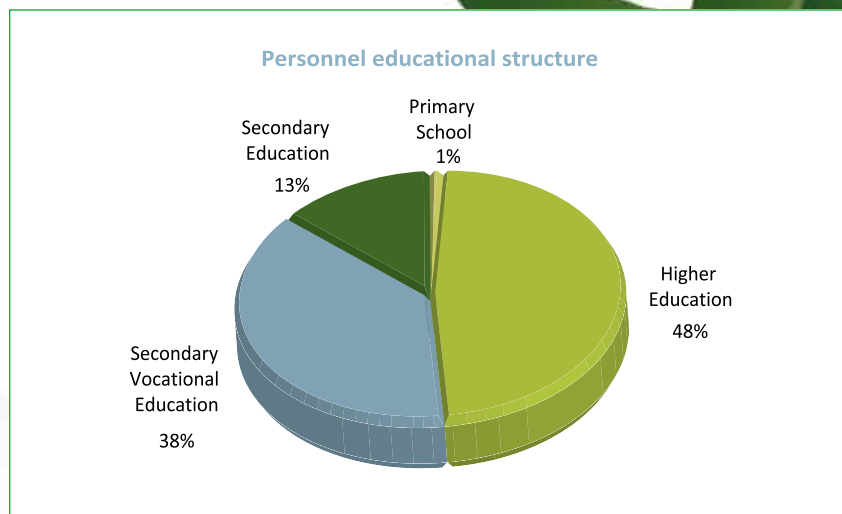


sults of all recruitment stages are also published on the plant website to assure better transparency, information and convenience for applicants.

The number of the discharged employees in 2013 followed the previous years' trend. Most of these employees were discharged upon reaching retire-

ment age and the number of the employees that left the company on their own initiative dropped down - only 5.8% in 2013 against 13.95% in 2012.

The average age of the plant staff is 44 years and 6 months, and the average working experience in the Kozloduy NPP is 17 years and 6 months. In 2012, the average age of the plant staff was 45 and the average working experience in the Kozloduy NPP was 18 years. The company provides career development prospects, therefore, a huge number of young specialists apply for the vacant positions advertised. About 45% of the newcomers in 2013 are individuals under 30 which contributes to the improvement of staff age structure.



The percentage of personnel having higher and vocational education is 86%, and the personnel with primary school education are about 1%. Seventy-three

percent of all employees with higher education hold a Master's degree and the employees with a Ph.D. are 0.6%.

MOTIVATION OF PERSONNEL

The establishment of an effective communication and effective use of work incentives are among the main principles of the human resources management. For the present purpose, a plant personnel motivation study is conducted on a regular basis. The last study was carried out at the end of 2013. Compared to 2012 when the motivation sub-factors with results below 50% were 7, in 2013 the number was only 4. The last study results show that the values of

some of the motivation sub-factors have increased with more than 10%. These are Personnel Management, Common Future Plans, and Work Performance Appraisal System. 10 of the motivation sub-factors increased with 5 to 10%.

In compliance with the IAEA standards requirements included in the GS-G-3.1 Safety Guide, in 2013 a psychological study of the work stress parameters of operating personnel

working at the Units 5 and 6 Control Rooms was conducted. A work stress indicator was used for the study. It was modified and adapted for the Bulgarian social environment by the Institute for Population and Human Studies at the Bulgarian Academy of Science, Department of Psychology. A task group shall be assigned with the aim of adopting measures to reduce stress and improve work environment.

TAKING CARE OF THE FUTURE

Kozloduy NPP places a high value on the care of the young people and support for their career development. The plant provides opportunity for students all around the country to take part in paid and unpaid internship programmes each year as a token of social responsibility and in cooperation with a number of universities. In 2013, the interest in the individual internship programme attracted students from different universities in the country and abroad. The programme was implemented for a ninth year in a row and in 2013 27 interns with different majors worked for 20 days at the plant. The results of the questionnaire survey carried out among the interns regarding their fu-

ture career plans showed that 67% of the students had included Kozloduy NPP in their personal development plans. "Excellent work arrangement", "The arrangements and performance were on a very high level", "The team was on a very high professional level", "I received great help in preparing the project. The team worked in a friendly environment and demonstrated solidarity" - stated most of the young people in their questionnaires.

In 2013, a third contract was signed in compliance with the New Begin-

ning - from Education to Employment Project under the Human Resources Development operational programme of the National Employment

Agency. Forty-two people at the age of 29 and younger were employed for a period of six months and were trained in different Company divisions under skilled

specialists mentoring. Upon completion of the internship programme, on the initiative of the interns' line managers, 36 of them concluded labour contracts and, today, they are members of the nuclear plant team.

The professional team of highly qualified and motivated employees is among the most valuable assets that Kozloduy NPP has.



TRAINING

The leading role of the human factor for the nuclear facilities' safety and reliability imposes extremely severe requirements for the qualification of the nuclear plant personnel. The requirements are determined hierarchically by the international standards, national regulations and corporate documents.

The plant training organization shall have a formal authorization granted by the Bulgarian Nuclear Regulatory Agency pursuant to the Bulgarian regulations in order to fulfil requirements for positions affecting nuclear safety and radiation protection. Kozloduy NPP obtained the relevant licence in 2006 and renewed it in 2011. The responsibilities for licence application are assigned to the Personnel and Training Centre Department. The Training Centre has all conditions required to conduct specialised training at a full-scope simulator

(FSS) for WWER-1000 reactors. The simulator is continuously upgraded in compliance with the current state of the reference Unit 6. The WWER-440 multifunctional simulator (MFS) was fully operable until the moment when Units 3 and 4 were taken out of Company assets.

The training process at the nuclear plant is performed in compliance with the systematic approach to training methodology adopted by the IAEA as an international standard. The training process starts by signing a contract of employment of the candidate with Kozloduy NPP, and concludes by breaking off the labour relations. Prior to independent performance of the job, each newly recruited employee should receive initial training to acquire knowledge and skills related to the operation and maintenance of certain facilities and systems, technologies, instructions

and work procedures, specific requirements of nuclear and radiation safety, while shaping strong work ethic and relevant attitudes to guarantee a high level of safety culture.

The knowledge and skills acquired during the initial training are maintained, upgraded and further developed in the course of the continuing training - periodic, extraordinary, for completion of specific or rarely performed tasks. This training is defined as continuing training.

The scope, duration, training settings, topics and periodicity of training are specified in the training programmes developed on the basis of the relevant regulations. Since the begin-



ning of 2013, 127 individual initial training programmes, 216 continuing training individual programmes and more than 135 plan-schedules for different personnel groups have been developed. Different training settings and methods are applied based on the activities included in the training programmes. 2 070 training courses were conducted covering Process Systems and Equipment, Process Modes, Human Factor, Safety and Emergency Planning, Quality Management, Decommissioning and many other areas. These courses covered 73 664 man-hours of training. Over 14 700 man-hours on-the-job training in the form of one- and two-hour thematic courses were conducted. The control room operators and reactor physicists annually receive simulator training on the FSS with the aim of maintaining the qualification and ability to respond in different situations. Simulator training is delivered to Switchyard Shift Supervisor and electrical equipment operations personnel.

In 2013, the simulator training on the FSS delivered by licensed instructor-operators was mainly focused on topics determined by the internal and external operating experience. Simulator training of 10 474 man-hours was conducted, 9 704 of which were conducted on the FSS and 770 on the MFS.

Continuing training was provided for 46 individuals performing activities with sources of ionizing radiation, and 4 employees were included in initial training throughout the year. Thirteen of them have received certificates verifying their individual licences and four individuals obtained such licences.

As a result of the long experience and large scope of information, the Training Centre is a source of nuclear knowledge to be also applied in other fields rather than nuclear. 1 345 individuals were trained in 35 courses and more than 4 129 individuals passed initial training for access to the Kozloduy NPP site at the request of external companies and engineering organizations. In pursuance of the Company's policy on cooperation with the secondary and higher educational institutions, a professional practice of 212 students has been carried out.

The nuclear power plant participation in different scientific and application project in cooperation with international organizations and recognized companies in the nuclear field is significant.

The project on the development of the simulator hardware and software complex model of Unit 6 first, second and third control safety systems was successfully completed in 2013. The project on the upgrade of the high pressure heaters' model and high pressure deaerators' model were completed.

The training process at the Nuclear Plant is performed in compliance with the Systematic Approach to Training methodology adopted by the IAEA as an international standard.

A part of the pilot training under the CORONA Project was conducted in May at Kozloduy NPP. The Project's main objective is establishment of a regional centre of competence for WWER technology and nuclear applications as a part of the EURATOM Programme.

The compliance with national and international requirements to personnel training and qualification is controlled and monitored by the Company management, national regulatory authorities and international organizations (IAEA, WANO). The results of these reviews show that the activities regarding personnel training and qualification are implemented at the required high level.



KOZLODUY NPP – A RESPONSIBLE EMPLOYER

The priority goals of the Nuclear power plant corporate social responsibility policy are specified within the long-term intentions as stated in the Company's Business plan, the enterprise agreement and in other internal documents.

The subjects of the Management social policy, include the social needs, important for staff, job positions to be adequate to employees' qualification, a relevant remuneration package, safe and healthy labour conditions, social insurance in case of loss of ability to work, health care and medical aid, living conditions, recuperation possibilities and cultural development in the free time.

Each year, considerable finances are being allocated for social expenses and their distribution is prioritized at a Meeting of the Kozloduy NPP staff representatives.

Kozloduy NPP is a socially responsible company that ensures equal career development rights to its employees, provides clean environmentally friendly electric power generation, takes care of adjacent areas, the public and the people in need, treats its customers and partners in an ethical manner.

The Company invests in a lot of additional benefits for the employees, that are not included in the salary, thus increasing the actual income of

the staff by means of additional health insurance, additional retirement insurance, medical care, medicines and aid, mandatory medical check-ups, free meals, free recreation, conditions and facilities for sport and recuperation, supplementary means for the summer holidays, etc.

PREVENTIVE RECREATION, SPORT AND CULTURAL ACTIVITIES

Preventive recreation for employees is organized at the Ledenika Recreation and Health Centre according to a year-round schedule. There, employees of all labour categories can take advantage of the excellent conditions the Centre provides to relax and recreate. Staff are entitled to have their holiday at the Black Sea coast resort Kranevo or the mountain resort Shiroka Polyana recreation facilities.

Those who are willing to play sports in the town of Kozloduy have at their disposal the Sports and Recreation Centre with both indoor and open air swimming pools.

The Physical Culture, Sports and Tourism Club at the Plant is actively developing with various sections involving numerous amateur sportsmen. Sporting and cultural events for

children and adults are financed by sections such as football, swimming, judo and a lot more.

The House of Culture is the place that hosts hundreds of events each year. The traditional courses and schools include fine arts, piano, ballet, folklore, as well as foreign language teaching for both children and adults.

CARE FOR RETIRED EMPLOYEES

The employees that have retired from the Plant have their own Club. They take active part in Company's activities and, therefore, certain

funds are also allocated to encourage social integration of senior citizens. The social facilities and services offered are readily accessible for KNPP

Senior Citizen Club membership card holders at preferential prices.

SUPPORT FOR COMPETITIONS, INNOVATIVE IDEAS AND SOCIAL INITIATIVES

In March 2013, the Nuclear Plant provided support for a national competition, organized by the Bulgarian Atomic Forum (BULATOM), in cooperation with the Astronomical Observatory and Planetarium in the town of Yambol. The topic of the event was "The Challenges Bulgarian Nuclear Energy Faces" with the participation of young students from Sofia, Haskovo, Kardzhaly and Yambol secondary schools.

The Nuclear Power Plant supported the organization and conduct of Nuclear Equipment and Nuclear Energy

competition organized by lecturers and professors from the Thermal and Nuclear Power Department of the Technical University of Sofia (TU). Eighteen graduates of the Thermal and Nuclear Power Department of the TU's undergraduate programme were involved.

Kozloduy NPP provided the opportunity for children from the *Radost* kindergarten preparatory groups in the town of Kozloduy to visit the Information Centre together with their teachers and to actually implement for a third year in a row the Project

"The Atomic Heart of Bulgaria Is in My Town." The Nuclear Plant paid special attention to the 36 children with special needs living in settlements within Kozloduy Municipality. Together with their parents and pedagogues they had their holidays at the Ledenika Recreation and Health Centre.

As was the case in the previous years, in 2013 the Company took part in the Bulgarian Christmas Charity Initiative - a nation-wide campaign raising funds for medical treatment of ill children.

APPRAISAL

In September, Kozloduy NPP was awarded the Honorary Diploma of the *Start* Foundation - a member of the National Alliance for Social Responsibility. The Nuclear Plant was awarded on account of its financial support for the organization of the Seventh International Music Festival "Predominance of the Spirit", conducted in the town of Velingrad.

The event creates opportunities for talented disabled young people from Bulgaria and abroad to actually perform on stage and by means of art to get involved in cultural life.

At an official ceremony in Sofia in the last days of 2013 Kozloduy NPP was awarded the first place in the "Employer of the Year" Employment Agency ranking. The Nuclear Power

Plant won the prize in the category "Employer providing employment upon expiration of contracts" within the Human Resources Development Operational Programme.



PUBLIC RELATIONS

DIALOGUE AND PUBLIC SUPPORT

Throughout the past year, Kozloduy NPP kept the tradition of continuous communication with the national and world media. The dialogue, transparency, and timely provision of information guarantee stronger public confidence in the operation of the Bulgarian nuclear power plant. The Public Relations Department promptly informed the media of all the events related to operation as well as of financial results, social policy, international communications, etc.

All the reporters' questions were comprehensively answered in a timely manner. The reporters drew attention to several groups of questions: the Company's financial performance, plans for Units 5 and 6 lifetime extension, as well as the negotiations on the construction of a New Nuclear Unit on the site of Kozloduy NPP.

Evidence of the strong interest in the operation of the Bulgarian nuclear power plant is the number of visitors of the Company's website during the course of one year – 339,173 (plus 6,193 compared to 2012).

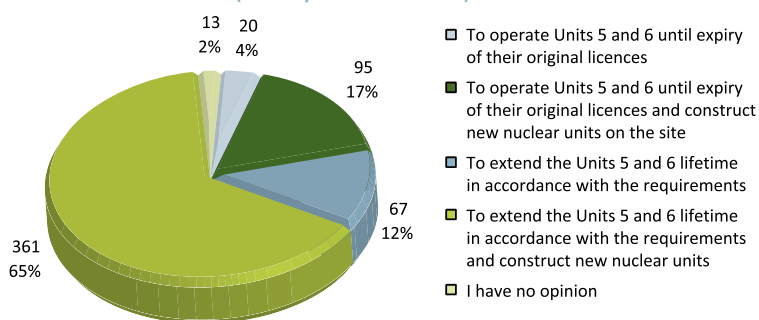
One of the events which raised the strongest media interest was the WANO mission held at Kozloduy NPP in the period from 22 November to

6 December. The WANO peer review gave the operation of Kozloduy NPP a high rating.

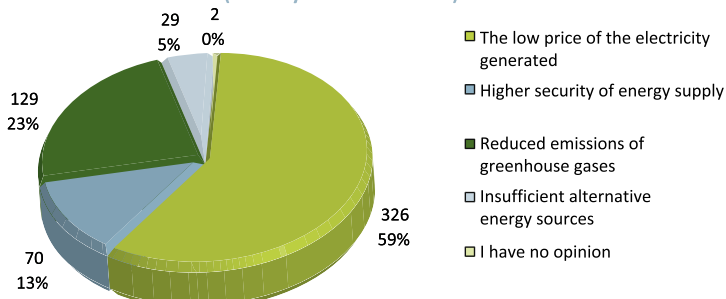
The Public Relations Department continued conducting surveys of all adult visitors to the Information Centre in order to gain an impression of how strong the public support was in favour of the Plant operation. The analysed results demonstrate that a large segment of the Bulgarian population

sees nuclear energy as an important contribution to the energy mix and has a positive attitude towards the construction of new nuclear units and extension of the Units 5 and 6 lifetime.

What in your opinion should the future of Kozloduy NPP be?
(January-December 2013)



What in your opinion is the most important reason to use nuclear energy
(January-December 2013)



The Plant has a well-established tradition of continuous dialogue with national and world media

In November Kozloduy NPP organized and held an Open Door Day. The operation of the largest electric power generation plant in Bulgaria was demonstrated to 555 people. The visitors who took interest in the nuclear power plant were from all over the country – Kardzhali, Ruse, Gabrovo, Vratsa, Montana, Sofia, Shumen, Plov-

div, Karlovo, Panagyurishte, Popovo, Lom, Stamboliyski, and many other locations. Once more, the initiative attracted many children and young people – they were more than a third of the guests on the Open Door Day. The event's agenda covered visits to the Main Control Rooms and Turbine Halls of the 1000MW Units 5 and 6 where

experts from the nuclear power plant presented the technology of electricity generation from nuclear energy. Most attractive to the visitors were the demonstrations with fire-fighting equipment performed in front of the Plant Information Centre by specialists from the Fire Safety and Civil Protection Regional Department at Kozloduy NPP.

INTERNAL COMMUNICATIONS – SEEKING FEEDBACK FROM EMPLOYEES

Internal Communications represent a continuous two-way flow of information providing the proper environment for the working process, increasing the motivation, and maintaining a safety culture of a high standard. The Company's management attempts to ensure favourable conditions for various initiatives and for professional advancement of the Plant employees.

Managers use a set of channels to maximise the benefit of the internal communications. Through the years, the internal website (Intranet) has gained large popularity with its useful sections. The forum for uploading opinions and proposals is a virtual venue where the "agenda" is set by the employees. There is a daily radio broadcast – "Kozloduy News." Wide-format information displays were installed in the main buildings on the site to broadcast safety rules, information about cultural events, electricity generation data, etc.

Feedback is enabled by means of surveys and focus groups. Meetings between staff representatives and senior management are periodically held. Each week, a CEO's Question Day is established providing an opportunity for direct communication on various issues.

Twenty-four proposals of the staff were reported to the management throughout 2013. They are part of the 72 opinions, questions, and proposals raised using the Intranet forum.

Feedback is also enabled by means of the electronic survey "Question

of the Week" – an effective tool to determine the attitudes of the staff. The most answered topics were the following: "Social Policy," "Safety," "Motivation," "Congenial Relations," "Awareness," and "Training."

On the initiative of the Working Conditions Committee, in the period 30 September – 7 October 2013 a survey involving 304 staff members was conducted in order to collect ratings, opinions, and proposals on the efficient use of the Ledenika Recreational Complex.





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