



REPUBLIC OF BULGARIA
FIRST NATIONAL REPORT
UNDER THE
DIRECTIVE 2009/71/EURATOM

Sofia, 2014

A: Introduction

The Republic of Bulgaria is a member of the European Union and European Atomic Energy Community (EURATOM) from January 2007. Republic of Bulgaria is obliged to be in compliance with the legislation adopted under the EURATOM Treaty and to bring the national legislation in compliance with the relevant directives. The requirements of Directive 2009/71/Euratom are implemented in the Bulgarian legislation with the Act on the Safe Use of Nuclear Energy. The Act establishes the legislative, regulatory and organizational framework which ensures a high level of nuclear safety and radiation protection in using the nuclear energy. The Act establishes an independent regulatory body on nuclear safety and radiation protection, to which rights are given to control the activities of using nuclear energy and to implement penalties when the safety requirements are not fulfilled. The principle of licence holder's absolute responsibility is established with the Act.

According to the Directive, Republic of Bulgaria continues a well-established practice to organize periodic self-assessments of national regulatory framework and to invite international peer review for an independent assessment of regulatory body's activity. The last review was in 2013.

The Bulgarian legislation requires the regulatory body to conduct policy of transparency and openness and to inform the society on the issues of nuclear safety and radiation protection.

National policy

Nuclear energy is a major factor in the country's energy mix in terms of high technology and production efficiency, competitive prices and maintaining a high level of nuclear safety and radiation protection. National policy for the development of nuclear energy is the national responsibility for ensuring the safety of nuclear facilities. In this context, the paramount duty of government is the development and implementation of adequate legislation on nuclear safety. Standards and guidelines of the IAEA Safety Series form an internationally recognized framework that is used as a reference when developing national regulations on safety of nuclear facilities. Adopted in 2002, amended and supplemented in 2010, the Act on the Safe Use of Nuclear Energy (ASUNE) and the regulations thereto, consider and implement in the national legislation the international conventions and treaties, to which Bulgaria is a party, as well as the EU legislation and the IAEA standards and safety guides.

In June 2011 the new Bulgarian Energy Strategy until 2020 was approved. The Energy Strategy is the basic document of the national energy policy that reflects the political vision of the Government for the European development of Bulgaria. The Strategy complies with the current European framework for energy policy and the world trends for development of energy technologies. The main Energy Strategy priorities can be summarized in the following five directions:

- Ensuring the security of energy supplies;
- Achieving the targets for renewable energy;
- Enhancing of energy effectiveness;
- Development of competitive energy market and policy focused on assuring of the energy demands;
- Defending the consumers' interests.

These priorities define the government's vision for the energy sector development in the coming years, namely:

- Maintaining a reliable, stable and secure energy system;

- Energy remains a leading branch of the Bulgarian economy with clearly defined foreign commercial orientation;
- Highlights on clean and low-emission energy from nuclear and renewable sources;
- Balance among quantity, quality and prices of electrical energy produced from renewable sources, nuclear energy, coal and natural gas;
- Transparent, efficient and highly professional management of the energy companies.

Regarding nuclear energy, the Bulgarian Energy Strategy until 2020 foresees preservation of the electrical power share generated from nuclear energy. This strategy will be implemented through long term operation of the existing nuclear units and through new build.

The Republic of Bulgaria policy in the area of RAW and SF management is based on the moral principle for avoiding the transference of responsibility to future generations. The principles of RAW and SF management are declared in the *National Strategy for Nuclear Fuel and Radioactive Waste Management, 2004*, confirmed and developed in *Strategy for Nuclear Fuel and Radioactive Waste Management* adopted by the Council of Ministers in January 2011. In the Strategy, the specific policies and main directions in long-term plan till 2030 are defined, in managing of:

Spent fuel and high-active waste

- Spent fuel, generated at the country's territory is a material containing valuable components. This material should be processed in the country of origin or in third countries in an international and mutually beneficial in economical, technological and ecological way;
- Spent fuel for which the processing is proved to be economically inappropriate, is declared as RAW in accordance with ASUNE and could be managed on the concept of "postponed decision for further use", provided that it would be stored with possibility of elicitation;
- In long-term storage with "postponed decision", the spent fuel should be stored by using the "dry storage technology";
- Geological entombment in Republic of Bulgaria is accepted to be the most appropriate way for permanently guaranteed safe in isolating of high active and long-lived radioactive waste;
- The country participation in projects of regional and international initiatives for deep geological entombment is appropriate, as seeking of international decisions should not threaten the ongoing national program;

Radioactive waste and decommissioning of nuclear facilities

- Generation of radioactive waste minimization, waste reuse and recycling, release from regulation;
- Use of approved technologies for RAW processing;
- Ensuring of anticipative entombment of waste in long-term plan compared to its generation;
- Management of disused sealed radioactive sources;
- Conditioned short-lived low and medium RAW, including facility decommissioning waste and waste of other national economy sectors, will be entombed in one national storage facility of near surface type. The construction of storage for entombment of low and medium RAW has the highest priority during the next five years;
- Decommissioning of Units 1-4 of Kozloduy NPP on the base of the concept "continuous dismantling" till the end stage of "brown field" on Units 1-4 of Kozloduy NPP site.

Assuming that the use of nuclear energy for peaceful purposes contributes to economic and social development of the country and enhancement of the standard of living, the Republic of Bulgaria reaffirms that during the use of nuclear energy, the protection of the health of individuals, the population as a whole, including future generations, and the environment have first and highest priority.

The Republic of Bulgaria policy in the field of SF and RAW management is defined in the national legislation (mainly in ASUNE, LEP, Health Act and the regulations on their implementation) and consists mainly of:

- SF and RAW management is a subject of state regulation and is carried out by legal entities only after receiving of permit and/or licence by the NRA Chairman;
- SF and RAW management is carried out only by persons who have licence for operation of nuclear facilities;
- Responsibility ordering for persons, generating RAW, for their safe management till handover to the state represented by SERAW;
- Establishing of state monopoly on activities for radioactive waste management – RAW management outside the sites where they are generated, is assigned to SERAW;
- Generators of RAW are responsible for management expenses including entombment on the principle of “the polluter pays”;
- In cases of RAW which owner is unknown, their management is a state responsibility;
- Prohibition for import of RAW in the country, except for cases, defined in ASUNE (in reimportation of used sealed sources of ionizing radiation (SIR), produced in Republic of Bulgaria and when the RAW are generated by material reprocessing, conducted as a service in favor of Republic of Bulgaria or Bulgarian legal entity);
- Implementation of the principle for returning certain categories of radioactive sources to the manufacturer after their usage termination
- SF could be defined as RAW if there are conditions for safe storage and entombment in the relevant storage and if the operator paid the relevant fee in RAW fund;
- Timely processing of RAW till they are in condition, assuring their safe storage and entombment and their entombment in the shortest possible term after their generation.

Republic of Bulgaria conducts its policy in the field of SF and RAW management in the legal frameworks of EU and in accordance with the responsibilities taken as a party on international conventions signed.

National Nuclear Program

The Bulgarian nuclear energy program was launched in 1974 with the commissioning of the first nuclear power unit of the Kozloduy Nuclear Power Plant (KNPP). Nuclear power in the country is concentrated at the Kozloduy NPP site where six units have been built. Two WWER-1000 reactors are currently in operation, while four WWER-440 have been shut down for decommissioning.

An interim pool type spent fuel storage facility and a newly built dry spent fuel storage facility are also located at the Kozloduy NPP site. A State Owned Facility for treatment and storage of low-and intermediate level radioactive waste (RAW) is situated on-site as well.

The Republic of Bulgaria was planning the construction of a new nuclear energy unit on the Belene site. The Belene NPP was planned to include two nuclear power units, equipped with WWER-1000/ A92 design reactors. The plant design was undergoing a review at the Nuclear Regulatory Agency (NRA) for over four years. This review process included a number of

internal and external expert assessments and analyses by Bulgarian and international expert organizations. In March 2012 the Bulgarian Government took a decision to terminate the Belene NPP project, and a month later made a decision to build a new nuclear power unit at Kozloduy NPP.

International cooperation in the field of SF and RAW management is of particular significance for the Republic of Bulgaria. Close contacts have been established with the regulatory authorities of the EU member countries. The Bulgarian government institutions, scientific organizations and operators of nuclear facilities generating SF and RAW take part in a number of international initiatives related to SF and RAW management. The programmes of IAEA and the European Commission have been of particular importance and significance to our country and Bulgaria will continue to actively participate in them.

Brief information about the nuclear facilities in Bulgaria

Facilities of Kozloduy NPP Plc.

Nuclear reactors

There is one nuclear power plant in operation in Republic of Bulgaria, in which 6 nuclear energy reactors are built.

Facility	Reactor type	Date of commissioning	Status	Licence validity	Licence holder
Unit 1	WWER-440	October 1974	Permanently shut down for decommissioning	18.10.2015	SERAW
Unit 2	WWER-440	November 1975	Permanently shut down for decommissioning	18.10.2015	SERAW
Unit 3	WWER-440	December 1980	Permanently shut down for decommissioning	25.02.2018	SERAW
Unit 4	WWER-440	June 1982	Permanently shut down for decommissioning	25.02.2018	SERAW
Unit 5	WWER-1000	November 1987	In operation	05.11.2017	Kozloduy NPP
Unit 6	WWER-1000	August 1991	In operation	02.10.2019	Kozloduy NPP

Units 1 to 4 are with reactors type WWER 440/V-230. Unit 1 and 2 are with two independent channels of safety systems. Units 3 and 4 are an advanced model V-230 with triple redundancy of safety systems.

In relation with the engagements, taken in regard of Bulgaria joining to European Union, the operation of the first four Units was terminated before their design-based term of operation expiration. Units 1 and 2 were permanently shut down for decommissioning in the end of 2002, and Units 3 and 4 – in the end of 2006. After Kozloduy NPP Units shut down, licences were issued for their operation without production of electrical and/or thermal energy with storage of spent fuel in spent fuel pools.

With Council of Ministers decisions from 20.12.2008 for Units 1 and 2, and from 19.12.2012 for Units 3 and 4, the Units are declared facilities for radioactive waste management and granted to State Enterprise Radioactive Waste (SERAW). On 18.10.2010, NRA issued licences to SERAW for operation of Units 1 and 2 and on 25.02.2013 – for Units 3 and 4 as facilities for RAW management, which are subject to decommissioning, and terminated the Kozloduy NPP licences for the first four Units. The spent fuel is removed from spent fuel pools. In accordance with the licence conditions, SERAW could perform management of RAW generated, preparatory activities for decommissioning of these units, including dismantling of part of the equipment

which is not contaminated with radioactive substances. SERAW submitted in NRA application for licence issuing for decommissioning of Units 1 and 2.

Units 5 and 6 with reactors type WWER-1000/V-320 are with containment and triple redundancy of safety systems. In October 2009, NRA issued new licences for operation of Units 5 and 6 respectively till November 2017 for Unit 5 and October 2019 for Unit 6.

Facilities for SF management

Facility	Licence	Purpose	Storage method	Capacity
Independent wet spent fuel storage facility (WSFSF)	E-4441, validity term 25.06.2024.	SF storage	Under water in pool with 4 compartment	housing - 168, under certain circumstances - 200
Independent dry spent fuel storage facility (DSFSF)	Permit for commissioning-O-3571 от 25.11.2011 г.	Long-term storage of SF from WWER-440	Dry in reinforced concrete containers type CONSTOR 440/84	78 containers
Storage facility in reactor hall of Unit 5	E-3000 for operation of Unit 5	SF storage of Unit 5	Under water, on 1 shelf	612 fuel assemblies
Storage facility in reactor hall of Unit 6	E-3001 for operation of Unit 6	SF storage of Unit 6	Under water, on 1 shelf	612 fuel assemblies

Units 1 and 2 spent fuel pools are released from SF respectively on 27.08.2008 and 08.08.2009 and after that are handed to SERAW and from 18.10.2010 are licenced as facilities for RAW management. Units 3 and 4 spent fuel pools are released from SF on 18.07.2012, after which are handed to SERAW and from 25.02.2013 are licenced as facilities for RAW management. Due to this reason, they are no longer facilities for SF processing.

Facilities for RAW management

On Kozloduy NPP site, there are the following RAW management facilities:

Auxiliary Building - 1

Location: a separate building located closely to KNPP units 1 and 2;

Purpose: processing of liquid RAW and storage of solid and liquid RAW;

Processing methods: evaporation, filtration;

Storage capacity for solid RAW, m³: 1010

Storage capacity for liquid RAW, m³:

- Liquid radioactive concentrate: 2350
- Spent sorbents: 1076

Auxiliary Building -2

Location: a separate building located closely to KNPP units 3 and 4;

Purpose: processing of liquid RAW and storage of solid and liquid RAW;

Processing methods: evaporation, filtration;

Storage capacity for solid RAW, m³: 1010

Storage capacity for liquid RAW, m³:

- Liquid radioactive concentrate: 2350
- Spent sorbents: 1076

Auxiliary Building - 3

Location: a separate building located closely to KNPP units 5 and 6;

Purpose: processing of liquid RAW and storage of solid and liquid RAW;

Processing methods: evaporation, filtration;

Storage capacity for solid RAW, m³: 2486+ 213

Storage capacity for liquid, m³:

- Liquid radioactive concentrate: 3600

- Spent sorbents: 200

Storage facility in Reactor Hall – 1 (RH-1)

Location: in the reactor hall of units 1 and 2

Purpose: storage of operational solid RAW category 2, additional category 2-III

Type of stored RAW: not treated

Capacity of the storage facility, m³: 81.6

Storage facility for RAW of Units 3 and 4

Location: in the reactor hall of units 3 and 4

Purpose: storage of operational solid RAW category 2, additional category 2-III

Type of stored RAW: not treated

Capacity of the storage facility, m³: 81.6

RAW processing plant (RAWPP)

Location: on the site of KNPP, close to Auxiliary building-3;

Purpose: treatment and conditioning of solid and liquid RAW category 2;

Processing methods: compaction of solid RAW and evaporation of liquid RAW; chemical and electrochemical decontamination of metal RAW

Conditioning methods: immobilization in a cement matrix, packaging in a reinforced concrete container.

Capacity of treatment of RAW, m³/year: liquid – 450, solid – 1500

Storage facility for conditioned RAW

Location: on the site of KNPP, closely to RAWPP;

Purpose: interim storage of conditioned RAW category 2;

Storage facility capacity: 1920

Trench storage facility

Location: the Lime Plant on-site of KNPP;

Purpose: temporary storage of processed and non-processed solid RAW category 2;

Storage facility capacity, m³:3860

Storage facility for processed solid RAW

Location: the Lime Plant on-site of KNPP;

Purpose: temporary storage of treated solid RAW category 2;

Storage facility capacity, m³: 1130

Sites (No.1 и No.2) for storage of solid RAW in reinforced concrete containers

Location: the Lime Plant on-site of KNPP;

Purpose: Buffer interim storage processed solid RAW category 2-I and 2-II, packaged in reinforced concrete containers;

Storage facility capacity: 2000.

Site for storage of solid RAW in freight containers

Location: the Lime Plant on-site of KNPP;

Purpose: Buffer storage of low-active treated and non-treated solid RAW category 2-I in ISO-standard containers;

Storage capacity, m³: 420.

Storage facility for contaminated soil

Location: the Lime Plant on-site of KNPP;

Purpose: storage of soil, construction and other bulk technological waste with very low level of contamination;

Storage facility capacity, m³: about 8000.

This report is the First National Report of Republic of Bulgaria in implementation of Art.9 (1) of Directive 2009/71/EURATOM from 25 June 2009 for establishing community framework for nuclear safety of nuclear installations.

In this report, legislative, organizational and regulatory framework on nuclear safety and radiation protection, functions and structure of the regulatory body, safety assessments and analyses performed, as well as programs implemented for reconstruction and modernization of nuclear power units in operation, are reported in details. Methods used for safety assessment and the results obtained and main conclusions are also reviewed. The safety during operation of NPP is also reviewed, as where appropriate representative indicators are used. The regulatory practices of regulatory body in the field of national framework actualization, licencing, regulatory guides developing, safety assessments and analyses and regulatory inspections are also included in the report.

The National report is structured in accordance with the ENSREG Guide (ENSREG Guidelines regarding Member States Reports as required under Article 9.1 of Council Directive 2009/71/EURATOM of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations HLG_p(2012-21)_108).

In Section B the information on Directive implementation with the “reporting article by article” approach is presented.

B: Reporting article by article

Article 4 – Legislative, regulatory and organisational framework

1. Member States shall establish and maintain a national legislative, regulatory and organisational framework (hereinafter referred to as the 'national framework') for nuclear safety of nuclear installations that allocates responsibilities and provides for coordination between relevant state bodies. The national framework shall establish responsibilities for:

(a) the adoption of national nuclear safety requirements. The determination on how they are adopted and through which instrument they are applied rests with the competence of the Member States;

(b) the provision of a system of licensing and prohibition of operation of nuclear installations without a licence;

(c) the provision of a system of nuclear safety supervision;

(d) enforcement actions, including suspension of operation and modification or revocation of a licence.

Article 4 (1) Establishing and maintaining a legislative, regulatory and organisational framework

The requirements for nuclear safety are established with acts and secondary legislation (regulations). All regulatory documents are developed in accordance with the requirements of Act on regulations.

The highest positions in the hierarchy of acts are the international conventions on which Republic of Bulgaria is a party. The Republic of Bulgaria joined the Convention on Nuclear Safety (the Convention) in 1995. The Convention was ratified by an Act of the 37-th National Assembly on 14.09.1995, and entered into force on 24.10.1996. With its accession to the Convention, the country confirmed its national policy to maintain a high level of nuclear safety, ensuring the necessary transparency and implementing the highest safety standards. Republic of Bulgaria presented 6 Reports in implementation of the Convention which are published on the NRA's internet page.

The Republic of Bulgaria signed the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereinafter referred to as the Joint Convention or the Convention) in Vienna on September 22, 1998. The Joint Convention was ratified by law in 2000 and has been in force in the Republic of Bulgaria as of 18 June 2001. In 2003 the Republic of Bulgaria prepared its First National Report that demonstrated the level of compliance with the Convention requirements, the achieved safety level of spent fuel and radioactive waste management as well as the planned activities. Republic of Bulgaria presented 4 Reports in implementation of the Convention which are published on the NRA's internet page.

The fundamental Act in the field of safety of nuclear installations is the Act on the Safe Use of Nuclear Energy (ASUNE). The Act is adopted by the National Assembly on preposition by the Council of Ministers.

The ASUNE article 5, section 17 provides that the NRA shall develop and submit for approval to the Council of Ministers (CM) any secondary legislation (Regulations) for the Act enforcement. The documents shall be prepared in compliance with the Law on Normative Acts. The drafts of Regulations and the annexes thereto shall be published on the NRA web page and the portal for public consultations of the CM. Pursuant to the Rules of Procedure of the Council of Ministers and its Administration, the draft regulations shall be agreed with all the ministries and other state bodies. They shall be submitted to the CM by the responsible Deputy Prime Minister. Any

amendments and supplements to the secondary legislation shall be made in conformity with the above sequence.

The basic safety principles are implemented in the act, and established with the reissued in 2006 basic document of IAEA in the field of safe use of nuclear energy – IAEA SF-1 “Safety Fundamentals” and Directive 2009/71/Euratom.

Regulatory and organizational framework

Main regulatory body in the field of safe use of nuclear energy and ionizing radiation, is the Chairman of NRA, who is an independent specialized body of the executive power and whose competency is defined in ASUNE. According to the ASUNE, in addition to the NRA Chairman, other state authorities also carry out specialized control over the facilities and activities, associated with the use of nuclear energy and ionizing radiation. In this respect, the law explicitly mentions as specialized authorities the Ministers of Health, Environment and Water, Interior, Defence, Agriculture and Food, Transport, Information Technology and Communications, Education and Science, and the Chairman of the State Agency for National Security. All of them shall exercise control as per the authorities they have been granted. Such authorities are granted mainly by the following laws:

- Law on Environmental Protection;
- Energy Act;
- Law on Spatial Planning (LSP);
- Health Act;
- Disaster Protection Act;
- Law on the Ministry of Interior.

Institutional framework

The Republic of Bulgaria has the necessary institutions for establishment and implementation of the national policy on safe use of nuclear energy and state regulation and control. The responsibilities and duties are clearly defined and allocated among the respective authorities as follows:

- Nuclear Regulatory Agency (NRA) – the regulatory body on the matters of nuclear safety and radiation protection and the safe management of radioactive waste (RAW) and spent nuclear fuel (SF). The NRA establishes regulatory requirements on nuclear safety and radiation protection, issues licences and permits, carries out regulatory control and imposes enforcement measures to ensure compliance with the regulatory requirements, etc.;
- Ministry of Economy and Energy (MEE) - implements the state policy on energy development. The Ministry develops and implements the national strategy for energy development and the national strategy for spent fuel and radioactive waste management;
- Ministry of Health (MH) implements the state policy of protecting public health and establishes mandatory health regulations, requirements and rules on all matters of hygiene, epidemiology and radiation protection. Through its specialized units, the Ministry carries out specific functions in the area of health protection in the process of using nuclear energy and ionizing radiation. Such specialized units are the National Centre of Radiobiology and Radiation Protection (NCRRP), as well as the departments “Radiation Control” at the Regional Health Inspectorates;
- Ministry of Environment and Water (MEW) directs, coordinates and supervises the development and implementation of the state policy on environment protection and use of

water and the earth. The Ministry is in charge of the National System for Environmental Monitoring and is the competent decision making body in respect of Environmental Impact Assessments;

- Ministry of Interior (MI) provides the security of the nuclear facilities and the related sites, identified as particularly important in terms of physical protection. The Ministry, through the General Directorate “Fire Safety and Civil Protection”, coordinates activities to protect the population and the economy in case of natural hazards or accidents, including the conduct of risk assessment, preventive measures, rescue and emergency recovery works and for providing international assistance.

According to Article 5 of the ASUNE, the coordination among the different authorities is within the responsibilities of the NRA Chairman.

Article 4 (2) (a) National requirements for nuclear safety

Act on the Safe Use of Nuclear Energy

ASUNE regulates the public relations related to state regulation of the safe use of nuclear energy and ionizing radiation and to safe management of radioactive waste and spent fuel. The state regulation is performed by the NRA Chairman who is an independent specialized body of the executive power.

Law for the amendment of ASUNE

In NRA policy declaration is stated that “NRA shall update regulatory requirements in accordance with the development of international standards and European legislation, and shall develop regulatory guides and instructions in areas where it’s necessary”. In implementation of this policy, during the period 2009-2010, a NRA working group developed and proposed to the Council of Ministers a draft for ASUNE amendment and supplement, taking into account the regulatory practice gained in implementing the act, adoption of new EU directives in the field of nuclear safety and radiation protection, as well as the amendment in the Convention for physical protection of nuclear material. Amendments proposed in ASUNE were adopted by the National assembly and promulgated in State Gazette in October 2010.

Secondary legislation

In implementation of ASUNE, 22 Regulations on act implementation are adopted (Annex 1)

NRA maintains program for review of all secondary legislation in implementing ASUNE. The program includes review and update of existing regulations, as well as developing new ones. The secondary legislation review is performed in every two years and always when there is a change in the act, EU documents, IAEA, WENRA and other organizations. In the review experience gained in implementing regulatory acts, operational experience, periodic safety reviews, science and technology development, are taken into account. For example, the last ASUNE amendment in 2010 includes amendments forced by the experience in implementing the legislation existing during that period. A licence for decommissioning is implemented which replaces the issuing of series of decommissioning permits. The purpose is to guarantee that the licensee responsibility for facility safety during the whole period of decommissioning which lasts for decades, is kept, and the licence will be renewed on the base of safety reassessment. With the changes proposed, a legal option is given for the nuclear facility to be decommissioned by a specialized organization which is different from the operator.

In the act a series of shortcomings related with the transfer of responsibility for safety during change in ownership or bankrupt, in the process of constructing new nuclear facility as well as all the rest stages during the facility lifecycle, is arranged. A continuity related to responsibilities taken and rights given is ensured.

Guides issued by the regulatory authority

ASUNE and the regulations on its implementation provide the NRA Chairman with responsibilities on ASUNE implementation and ensure interpretation and guidance for legal requirements implementation. One of the available instruments to accomplish that is the issuance of Regulatory Guides (RGs).

Regulatory guides are not mandatory in nature and the criteria set out in the guides are not necessarily binding. The NRA has established a comprehensive program for development of RGs, which is maintained and updated in accordance with the established priorities, the available resources, and the NRA expert capabilities. Regulatory guides, included in the program, have been selected by analysing the proposals made by the various NRA departments. The program is reviewed annually and is updated based on the new proposals for RGs, change of priorities, changes in the legislative framework, etc.

With the purpose of widespread and easy access to regulatory guides, they are published on the NRA's internet page. These guides are distributed to parties interested with an official letter.

Article 4 (2) (b) Licensing system

To ensure the safety of facilities and activities, the ASUNE establishes an authorization licensing regime of issuing licences and permits. Licensing process is conducted under the conditions of transparency and equality, based on the fundamental legal principles:

- Responsibility for ensuring nuclear safety and radiation protection lies in full with the persons, responsible for the facilities and activities and may not be transferred to others;
- Persons responsible for the facilities and activities shall establish and maintain an effective safety management system;
- The expected economic, social and other benefits, shall outweigh any possible adverse effects of the activities;
- Measures to ensure nuclear safety and radiation protection shall be optimized so as to ensure achieving the highest possible, reasonably achievable level of protection;
- Exposure of the personnel and public shall be limited and maintained as low as reasonably achievable level;
- The concept of defence in depth shall be applied, while implementing all reasonably practicable measures, to prevent accidents and limit their consequences;
- An effective system for emergency preparedness and response, in case of a nuclear or radiological emergency, shall be established and maintained;
- Protective measures to reduce current and/or uncontrolled exposure shall be justified and optimized;
- The competent authority, which carries out the state regulation of the safe use of nuclear energy and ionizing radiation, shall be provided with human and financial resources, sufficient to carry out its responsibilities in full.

The ASUNE defines the scope of activities, facilities and materials subject to licensing. Licence is issued to operate a nuclear facility (unit of a nuclear power plant, facility for spent fuel management, facility for radioactive waste management, research reactor), and also for its decommissioning. The maximum term of the license validity is 10 years. Thus, the operator can plan long-term activities and allocate more resources to safety improvements. An option has been given to renew the license on the basis of a periodic safety review. The Act places very precise and clear requirements to the operator, in respect of the conditions and criteria to be met

in order to obtain a licence, by which the subjective decision-making by the regulatory authority, is avoided to the greatest degree possible.

For given single-time activities, the Act envisages permit issuance as follows:

- Siting of a nuclear facility;
- Design of a nuclear facility;
- Construction of a nuclear facility;
- Commissioning of a nuclear facility;
- Making changes, leading to modification of:
 - Structures, systems and equipment related to nuclear safety and radiation protection;
 - The limits and conditions for safe operation, on the basis of which is authorized to operate;
 - Internal rules for the activity, including procedures, programmes, technical specifications annexed to the operating licence;
- Transport of nuclear material;
- Business transactions with nuclear facilities;
- Import and export of nuclear material;
- Transit of nuclear material.

Licence or permit, its modification, or the refusal of the NRA Chairman to issue the respective document, may be appealed to the Supreme Administrative Court.

The terms and conditions, for issuing licences and permits, are specified by the Regulation on the Procedure for Issuing Licences and Permits for Safe Use of Nuclear Energy (latest revision in force, since September 2012). According to this Regulation, the licence or permit applicant shall submit the respective documents, confirming compliance with the requirements on nuclear safety and radiation protection. These requirements are defined mainly in the Regulations on the implementation of the ASUNE.

Public participation in the regulatory process is provided by the Law on Normative Acts, which requires publication of all bills at least one month prior to their adoption, as well as by the Access to Public Information Act. In addition, the Law on Environmental Protection requires public consultation on the results of the environmental impact assessment report for a nuclear facility.

Article 4 (2) (c) System of nuclear safety supervision

Regulatory inspections

The Act on the Safe Use of Nuclear Energy assigns to the NRA Chairman the responsibility to carry out regulatory control over the nuclear safety and radiation protection in the use of nuclear energy and ionizing radiation, and in the radioactive waste and spent fuel management. This control includes:

- Preventive control by issuing licences and permits for activities and individual licences;
- Monitoring the implementation of the terms of licences and permits for activities and individual licences;
- Follow-up monitoring on the implementation of recommendations and instructions given by the control bodies.

In fulfilment of his control powers, the NRA Chairman shall:

- Perform periodic and extraordinary inspections through designated authorized officials;
- Inform other specialized control authorities to take measures within their competence;
- Alert the prosecuting authorities upon evidence of a crime;
- Amend or revoke issued licences or permits, or individual licences;
- Impose enforcement administrative measures and administrative sanctions, as provided by the ASUNE.

The NRA Chairman is entitled to request from individuals: information about their activities; the necessary documents in respect to the regulatory oversight, and if necessary request the assistance of specialized control bodies.

The overall objective of regulatory inspections and application of enforcement measures is to ensure implementation by the operator of all activities in a safe manner and in accordance with the requirements, rules and regulations on nuclear safety and radiation protection. In pursuance of this objective, the NRA annual plan includes the areas of regulatory control, identified by the ASUNE, and the conditions of the effective licences and permits. The inspection activities are planned by taking into account the operating status of nuclear facilities, the results of previous inspections, and planned modifications, in such a way as to ensure coordination with the activities planned by the operators. Financing of the inspection activities is secured within the NRA budget.

The NRA is trying to apply in its activities a non-prescriptive approach, therefore of particular importance are the systematic contacts with licensees and permit-holders (in the case of NPP - daily), when issues are discussed in an open dialogue. The aim is to assist licensees and permit-holders in implementing the requirements of the Act and the Regulations, so that the planned measures shall be acceptable to both parties. Enforcement and administrative penalties are imposed only if all other possibilities have been unsuccessful. Discussions shall take place on a routine basis both at the NPP site, and the NRA headquarters, at the initiative of one of the two parties. The NRA Chairman authorises certain officials from the administration of the Agency (inspectors) to carry out control under the ASUNE, in accordance with their powers of authority. Inspectors have the following rights:

- Free access to the controlled entities and sites, at any time, to check the status of nuclear safety, radiation protection and the technical status of the nuclear facilities, and the ionizing radiation sources;
- To require from the respective officials the necessary data, information, explanations, and other operational information, including measurements and tests in order to clarify the technical conditions and the operational status of the facility, including staff qualification, and any other safety related information;
- To draw up statements on administrative violations;
- To make proposals to the NRA Chairman for modification, suspension, termination or revocation of the permits, licences or individual licences issued;
- To issue improvement notices for ensuring nuclear safety and radiation protection.

Inspection results are recorded in a Protocol of Findings, to which the evidences collected, explanations and results of monitoring, measuring and/or testing are attached. Improvement notices given by the inspectors are obligatory. The results of inspection and control activities of NRA and the specialized control authorities are published in the NRA annual report, which is

submitted to the Council of Ministers, state authorities, non-governmental organizations and the public.

Review and assessment of safety

The NRA carries out safety review and assessment both in the process of issuing licences or permits, and periodically during the implementation of the activity. The process of review and assessment of documents, supporting applications for licences and permits, can be summarized in the following steps:

- Reception and registration of the application and its attached documentation;
- Determination of a programme and a team of experts to review and evaluate the documentation and, in some cases, specific methodological instructions for the task;
- Review and assess the applications and respective attachments for compliance with the requirements in force, and where appropriate to the relevant documents of the IAEA or other regulatory authorities. If necessary, the applicant is required to submit additional information for the assessment;
- Results of expert evaluation are summarized and documented, and on the basis of the conclusions a proposal is made to issue the licence/permit or a motivated refusal instead;
- The final decision on the issuance of a licence/permit, or a motivated refusal, lies within the responsibility of the NRA Chairman.

In cases where the documents contain information, the assessment of which requires special knowledge, the NRA Chairman may contract additional review and assessment of these documents to be done by external consultants. Experts from the respective departments prepare the ToR for the expertise and participate in its adoption procedure.

When a non-compliance with the safety requirements is identified in the documentation submitted, detailed notes are sent to the applicant for their incorporation. In such cases, it is a well-established practice to organize meetings with representatives of the applicant, in order to discuss and clarify questions and comments.

On-going (periodic) review of compliance with nuclear safety and radiation protection is carried out through review and assessment of licensee reports on operating parameters, operating events, and through on-site inspections for compliance with the requirements for safe operation.

Analysis and evaluation of operational events

The requirements for providing information by the licensee and the permit-holder to the NRA, including the requirements for mandatory notification to the Agency in case of an event, incident or accident are defined by a Regulation. The Regulation defines the cases when the regulatory body shall be notified for violations of the requirements on nuclear safety and radiation protection. The Regulation also determines the procedure and sets time limits for notifying the regulator, the methodology for evaluation and analysis of the events, and also the format and contents of the reports.

A written report shall be submitted within 30 days for each event. All reports of operational events are reviewed and evaluated by the NRA inspectors, as for that purpose a special working group has been established. When necessary, additional information shall be requested or additional analyses and expertise conducted in order to clarify the root causes of the specific event. In case of events important to safety, NRA inspectors participate in the event investigation teams.

Article 4 (2) (d) Enforcement actions, including suspension of operation and modification or revocation of a licence

To prevent and discontinue any administrative violations, or to prevent and eliminate their consequences, the NRA Chairman imposes sanctions (fines and penalties) and enforcement administrative measures. The ASUNE assigns different amounts of penalties, depending on the type of offence. The ascertainment of violations, issuance, appeal and enforcement of penal provisions follow the order specified by the Law on Administrative Violations and Penalties.

Compulsory administrative measures shall be imposed for violations of the requirements for nuclear safety and radiation protection, physical protection and emergency preparedness, in which there is a danger for an accident. Compulsory administrative measures that may be imposed in these cases are:

- Suspension or restriction of the authorisation activity;
- Suspension of an individual licence;
- Order to the licensee to carry out investigations, inspections or tests, modification of established limits and conditions for operation; modifications of design and constructions, review and modification of training courses and conducting of additional training, including verification of personnel knowledge and skills.

Compulsory administrative measures are imposed by an order of the NRA Chairman, based on the findings of the NRA inspectors. The order imposing enforcement measures shall determine appropriate time for their implementation. The order for imposing compulsory administrative measures may be appealed before the Supreme Administrative Court under the Social Insurance Code. Appeal does not suspend execution, unless the court orders otherwise.

Violation of the conditions of a permit or licence is an administrative offence for which the person who committed the offence receives a fine or penalty to the amount as determined by the ASUNE.

Breach or violation of permit or licence condition may give sufficient grounds for revocation of the licence or permit. Revocation of permit or licence shall be made by a resolution of the NRA Chairman, which determines the terms and conditions in which the person may apply for a new permit or licence for the same activity.

The NRA applies enforcement administrative measures and prosecution solely when all other possibilities have been ineffective.

Article 5 Regulatory body

- 1. Member States shall establish and maintain a competent regulatory authority in the field of nuclear safety of nuclear installations.*
- 2. Member States shall ensure that the competent regulatory authority is functionally separate from any other body or organisation concerned with the promotion, or utilisation of nuclear energy, including electricity production, in order to ensure effective independence from undue influence in its regulatory decision making.*
- 3. Member States shall ensure that the competent regulatory authority is given the legal powers and human and financial resources necessary to fulfil its obligations in connection with the national framework described in Article 4(1) with due priority to safety. This includes the powers and resources to:*
 - (a) require the licence holder to comply with national nuclear safety requirements and the terms of the relevant licence;*
 - (b) require demonstration of this compliance, including the requirements under paragraphs 2 to 5 of Article 6;*
 - (c) verify this compliance through regulatory assessments and inspections; and*
 - (d) carry out regulatory enforcement actions, including suspending the operation of nuclear installation in accordance with conditions defined by the national framework referred to in Article 4(1).*

Article 5 (1) Establishment of competent regulatory body

Foundation

In 1957 Bulgaria ratified the Statute of the IAEA and became one of the co-founders of the international organization. In June 1957, by Resolution No. 603, the Council of Ministers established a Committee for the Peaceful Use of Atomic Energy, the mandate of which was to monitor and promote the R&D activities in the use of nuclear energy. After commissioning of the first two units of Kozloduy NPP in 1975, by Decree No. 31 of the Council of Ministers of 15 March 1975, the Committee was given also control functions. In 1985 was adopted the first Act on the Use of Nuclear Energy for Peaceful Purposes. The Act created a Committee for the Use of Nuclear Energy for Peaceful Purposes and determined in detail the functions and the tasks of the organization. An Inspectorate on the Safe Use of Nuclear Energy for Peaceful Purposes was also established.

The Act was amended several times until 2002 when it was fully repealed by the new Act on the Safe Use of Nuclear Energy (ASUNE). The ASUNE is consistent with the current trends in the field of nuclear law, including the legislative practice of the EU countries in this area. In developing the Act, the recommendations of the IAEA experts reviewing the draft were considered. By this Act, the Committee was transformed into Nuclear Regulatory Agency, which is a politically and financially independent regulatory authority.

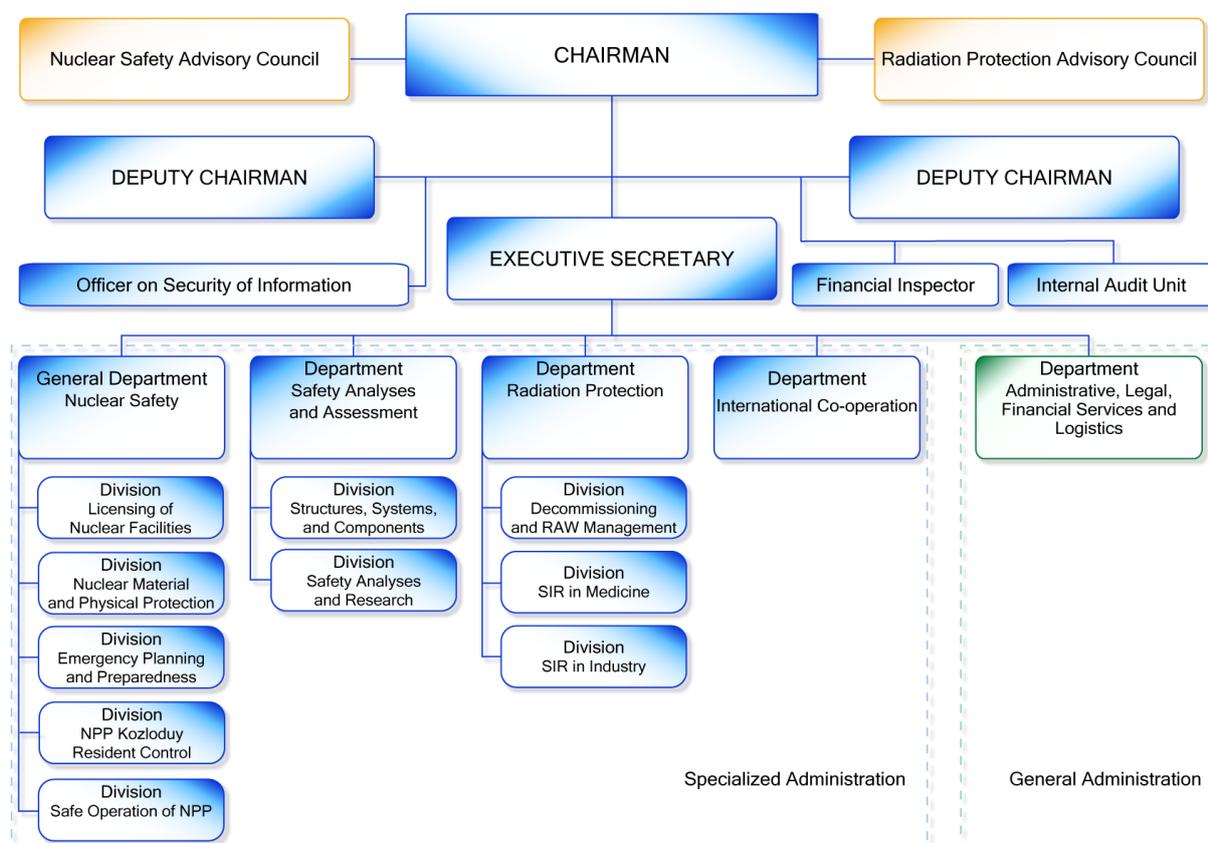
According to the ASUNE, in addition to the NRA Chairman, other state authorities also carry out specialized control over the facilities and activities, associated with the use of nuclear energy and ionizing radiation. In this respect, the law explicitly mentions as specialized authorities the Ministers of Health, Environment and Water, Interior, Defence, Agriculture and Food, Transport,

Information Technology and Communications, Education and Science, and the Chairman of the State Agency for National Security. All of them shall exercise control as per the authorities they have been granted.

Organizational Structure

According to the ASUNE, the NRA Chairman is assisted by an Administration organized in a Nuclear Regulatory Agency. The Agency is a legal person, funded by the state budget and has its headquarters in Sofia. The structure, operation and organization of work of the Agency and its human resources are determined in the NRA Rules of Procedure, adopted by the Council of Ministers upon proposal of the NRA Chairman.

The NRA structure is consistent with the Administration Act, which sets out uniform requirements for the structure of the administrations in the country. The structure takes account of all activities of the regulatory authority, under the powers vested to the Chairman by the national legislation. The NRA Administration is headed by an Executive Secretary. The NRA employees are divided into general and specialized administration. The General Administration provides technical support to the activities of the Specialised Administration and carries out administrative services to citizens and legal persons. The Specialized Administration is organized into four Directorates and assists the Chairman in carrying out his regulatory and supervisory functions related to nuclear facilities, sources of ionizing radiation, nuclear material, radioactive waste, emergency preparedness and international cooperation. The Specialized Administration includes a regional office at the Kozloduy NPP site. The NRA organizational structure is shown on the figure herein.



Mission and objectives

The regulatory functions performed by the NRA in the public interest, determine the organization's mission, namely: “Protection of the individuals, public, future generations and environment from the harmful effects of ionizing radiation”. To achieve its mission the NRA is guided by the internationally accepted principles of nuclear safety and radiation protection and constantly strives to improve its effectiveness and efficiency through implementation of internationally recognized regulatory best practices.

In accordance with the long term objectives, plans, priorities and expected problems, the NRA develops a Strategic Plan for its activity. The plan is submitted to the Government and published on the NRA website. It is the basis for generating the annual plans, which define the scope and the objectives of NRA activities for the respective year. The Strategic Plan is periodically updated as a result of a change in priorities and goals of the organization or as a follow up to the risk analysis.

For the implementation of the main tasks facing the organization, the NRA management has adopted and periodically updates the management “Policy Statement”, which identifies priorities and expectations to staff.

In April 2013, a Full Scope Integrated Regulatory Review Service – IRRS mission was conducted for regulatory activity review in Bulgaria. Information about the mission is presented in Annex 2.

Article 5 (2) Independence of the regulatory body

Legal basis and status of the regulatory body

The status and responsibilities of the Nuclear Regulatory Agency are set by the ASUNE. The state regulation of the safe use of nuclear energy and ionizing radiation, and the safe management of radioactive waste and spent nuclear fuel is effected by the Chairman of the Nuclear Regulatory Agency. The NRA is an independent specialized body of the executive power. The established main regulatory body on nuclear safety and radiation protection performs functions only on regulation and control of facilities and activities on nuclear energy use. Article 12 of ASUNE contains explicit prohibition for conducting activities by state bodies which have control and regulatory functions. NRA Chairman may perform only functions and tasks, defined by law.

The NRA Chairman is approved by the Council of Ministers and appointed by the Prime Minister for 5 years mandate. He/she may be appointed for one more term of office. In exercising its powers, the Chairman is assisted by two deputy-chairmen, who are approved by the Council of Ministers and appointed by the Prime Minister, upon a proposal of the NRA Chairman. The Chairman and the Deputy Chairmen shall meet the following legislative criteria:

- university education on natural and technical sciences on Master degree;
- permanent address on the territory of the state;
- with work experience no less than 10 years in the field of nuclear energy use or ionizing radiation, in the field of RAW or SF management, or in the field of state regulation of safe performance of these activities.

The Chairman and the Deputy Chairmen cannot take the following positions or to perform the following activities:

- trade activities or be managers, trade procurators, trade representatives, procurators, trade mediators, liquidators or assignees;
- members of governing body or control of legal entity with non-economic purpose, trade community or cooperation;

- performing of free profession, except for scientific or teaching activity or performing of author rights;
- leaders of election headquarters of a party, party coalition or initiative committee.

Place of the regulatory body in the governmental structure

In terms of Article 4 of the ASUNE, and Article 19, Paragraph 4 of the Law on Administration, the Chairman of the Nuclear Regulatory Agency is considered an executive authority. As such, it annually submits to the Council of Ministers a report on the status of nuclear safety and radiation protection in the use of nuclear energy and ionizing radiation, and radioactive waste and spent fuel management, as well as the activities of the Agency (responsibility according to Article 5, item 10 of the ASUNE).

Under Rules of Procedure of the Council of Ministers and its Administration (RPCMA), there is a direct line of communication between the government and the authorities specified in Article 19, Paragraph 4 of the Law on Administration, the NRA Chairman being one of them. This communication line is expressed by the RPCMA requirement that any issues for consideration by the government may be submitted only by a member of the Council of Ministers.

As an independent regulatory body within the system of the executive power, the NRA Chairman reports directly to the Prime Minister. In addition, the NRA Chairman shall inform the National Assembly on matters of nuclear safety and radiation protection, and take part in meetings of the Parliament and the Parliamentary Commissions, when invited to do so.

Article 5 (3) Provision of the regulatory body

Authorities and Responsibilities

Under the ASUNE, the NRA Chairman shall have the following authorities and responsibilities:

- Manage and represent the Agency;
- Issue, amend, supplement, renew, suspend and revoke licences and permits for the safe conduct of activities;
- Supervise compliance with the requirements and standards for safe use of nuclear energy and ionizing radiation, radioactive waste management and spent nuclear fuel and the conditions of the licences and permits;
- Issue and revoke individual licenses for work in nuclear facilities or with sources of ionizing radiation;
- Impose compulsory administrative measures and administrative penalties as provided by the ASUNE;
- Contract expert reviews, studies and research, related to nuclear safety and radiation protection, in respect of the use of nuclear energy and ionizing radiation, and management of radioactive waste and spent nuclear fuel;
- Interact with the executive authorities, which have been granted regulatory and supervisory functions in respect of the use of nuclear energy and ionizing radiation, and propose to the Council of Ministers measures to coordinate these activities;
- Carry out the international cooperation of the Republic of Bulgaria in regards of the safe use of nuclear energy and ionizing radiation, and in the management of radioactive waste and spent nuclear fuel;
- Provide the public, legal persons or state authorities with objective information on the state of nuclear safety and radiation protection;

- Submit annual reports to the Council of Ministers on the state of nuclear safety and radiation protection in the use of nuclear energy and ionising radiation, and in the management of radioactive waste and spent nuclear fuel, as well as the activity of the NRA;
- Organize and coordinate the preparation of, and submit to the Council of Ministers, the reports under the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management;
- Organize and coordinate the implementation of the obligations of Bulgaria under the Agreement between the Republic of Bulgaria and the International Atomic Energy Agency for the application of the safeguards, in connection with the NPT and the Additional Protocol;
- Perform the functions of a central authority and contact point for emergency notification and assistance under the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency;
- Develop and propose for adoption to the Council of Ministers the Regulations on the implementation of the ASUNE.

Development and maintenance of human resources

The enormous responsibilities of the NRA staff members to the public determine the higher demands on their qualifications and experience, which are accurately and clearly defined for each particular position. Almost all employees of the Agency have a higher education (Masters' Degree) and long professional experience in the field of regulation, design, construction and operation of nuclear facilities and sites with SIR.

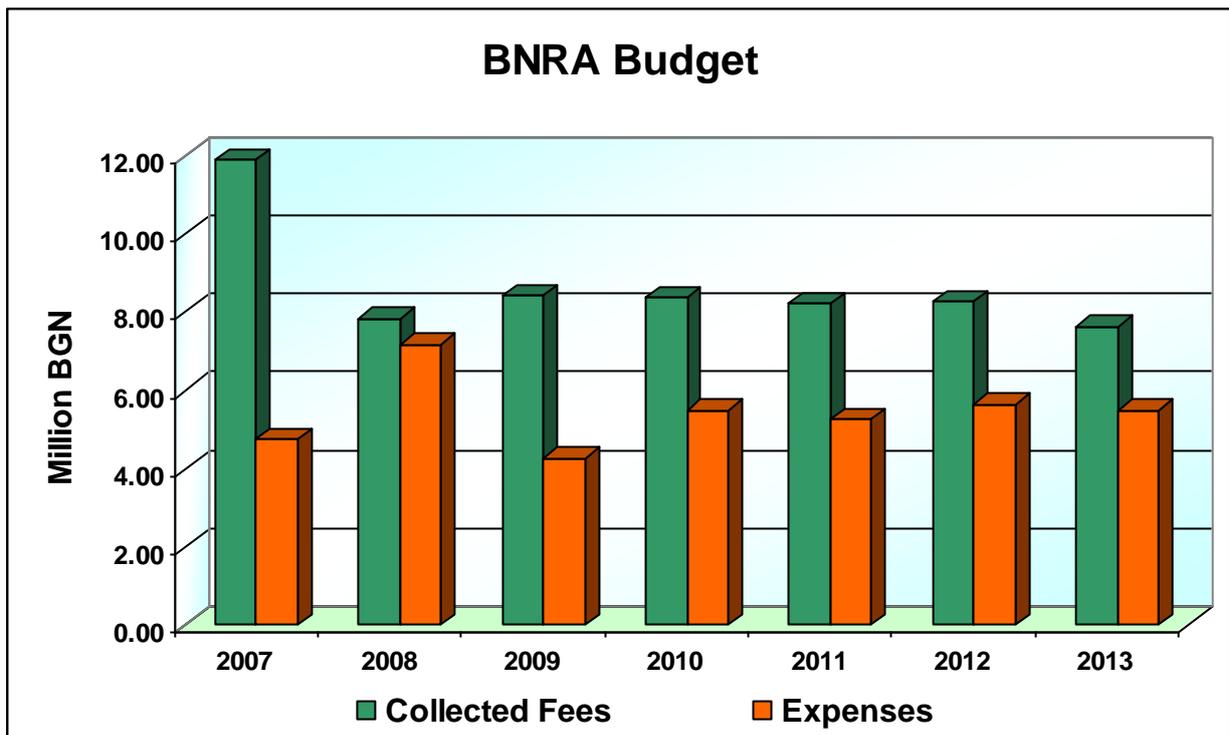
According to the Rules of Procedure, the NRA has 114 staff positions, and as at August 2013 the NRA human resources number is 99 of actually employed staff. Regardless of the NRA's efforts to employ experts for the vacant positions, there are 15 vacancies at present. Analysis confirms that this is due mainly to the high requirements that the NRA puts to the professional competence and expertise of the candidates, as well as the difference between the remuneration rates payable by the Agency and by the basic licence holders.

As a result, the Agency has continued its policy of employing young people, the greater number of whom joins the regulator straight from the university.

Financial resources

The financial independence of the regulatory body is secured by the Act on the Safe Use of Nuclear Energy. Under the Act, the NRA activities are financed from the state budget, and revenues from fees collected under the ASUNE. The NRA Chairman is a primary manager of budget, which means that he/she draws, performs and reports NRA's budget. As a result, in recent years, there has been stability in the financing of the organization.

The diagram shows the trend of the NRA budget in recent years. Stability of funding allows the NRA to carry on its long-term policies, cover all the areas of regulatory control, complete in full the planned activities on safety assessment, and ensure the preservation and the growth of payment of employees.



External technical support

The NRA has a specialized organizational unit (department) for review and assessment of nuclear safety and radiation protection. This unit works in close cooperation with the rest of the specialized units, thus ensuring that experts of the required competence participate in the process of review and assessment. In order to improve the internal expertise in different technical areas, framework contracts have been signed for cooperation and expert support with 19 Bulgarian engineering companies and R&D organizations. To avoid conflict of interests, the contracts contain provisions for informing the NRA about changes of company competences or capabilities, as well as of the contracts awarded by licence-holders.

The NRA is fully responsible for the regulatory decision-making, and has provided human and financial resources to secure the efficient performance of the technical support system through:

- full time experts within the regulatory authority, who are competent and capable to perform regulatory reviews and assessments;
- full time experts that are trained and capable to evaluate assessment reports, performed by the technical support organisations (TSOs);
- availability, within the organization and at the TSOs, of necessary assessment tools and computer codes to carry out the assessments;
- sufficient financial resources to pay for the contracts;
- access of the NRA staff and TSOs to new developments in science and technology;
- continuous improvement of own and TSOs expertise, through training and education programmes, as well as participation in international research and exchange programmes, etc.

Advisory Councils

Pursuant to Article 9, Paragraph 1 of the ASUNE, two advisory councils are established in support of the NRA Chairman:

- Advisory Council on Nuclear Safety;

- Advisory Council on Radiation Protection.

The Advisory Councils have adopted rules for their work, and their meetings are chaired by the NRA Chairman or by an authorized representative. The Advisory Councils support the NRA Chairman by giving advice on the scientific aspects of nuclear safety and radiation protection. Their opinion is only advisory in nature, while the full responsibility for the regulatory decisions rests with the NRA. The main functions and tasks of the Advisory Councils are to:

- Make proposals in the process of establishing of NRA priorities;
- Discuss and give opinions on existing regulations and new drafts;
- Discuss and give advice on programmes and projects to improve the safety of nuclear facilities and sites with SIR;
- Propose implementation of investigations, research and other activities in connection with the safe use of nuclear energy and SIR;
- Assist the NRA Chairman in preparation of the national reports under the international conventions and treaties;
- Assist the dissemination and exchange of information and expertise, including international ones;
- Review and give advice on the quality of the reports from contracted expert reviews or research studies;
- Carry out other activities as requested by the NRA Chairman.

Pursuant to the provisions of Article 9 of ASUNE, the advisory council's staff is appointed by an order of the NRA Chairman. The advisory councils include prominent Bulgarian scientists and experts in the field of nuclear energy and ionizing radiation, management of radioactive waste and spent nuclear fuel. The members of the Advisory Councils have rich academic, research, or operational experience in various aspects of nuclear safety and radiation protection, nationally and internationally.

Article 6 – Licence holders

1. Member States shall ensure that the prime responsibility for nuclear safety of a nuclear installation rests with the licence holder. This responsibility cannot be delegated.
2. Member States shall ensure that the national framework in place requires licence holders, under the supervision of the competent regulatory authority, to regularly assess and verify, and continuously improve, as far as reasonably achievable, the nuclear safety of their nuclear installations in a systematic and verifiable manner.
3. The assessments referred to in paragraph 2 shall include verification that measures are in place for prevention of accidents and mitigation of consequences of accidents, including verification of the physical barriers and licence holder's administrative procedures of protection that would have to fail before workers and the general public would be significantly affected by ionizing radiations.
4. Member States shall ensure that the national framework in place requires licence holders to establish and implement management systems which give due priority to nuclear safety and are regularly verified by the competent regulatory authority.
5. Member States shall ensure that the national framework in place requires licence holders to provide for and maintain adequate financial and human resources to fulfil their obligations with respect to nuclear safety of a nuclear installation, laid down in paragraphs 1 to 4.

Article 6 (1) Responsibilities

Formulation in the legislation assigning the prime responsibility for safety

The responsibilities of licensees are specified in the Act on the Safe Use of Nuclear Energy, and the Regulation on providing the safety of NPPs.

Through the ASUNE amendments in 2010, the explicit principle that 'the responsibility for ensuring nuclear safety and radiation protection, lies in full with the persons responsible for the facilities and the activities, and may not be transferred to other persons' is established.

The licences and permits, issued by the NRA, include requirements that regulate the performance of the main activity. For example, each licence defines the activity scope and type; the basic requirements for carrying out the activity; the obligations to maintain the necessary financial, human and other resources, as well as specific requirements referring to:

- nuclear safety, radiation protection, physical protection, quality assurance, emergency preparedness, management of radioactive waste and spent fuel, mitigation of deviations and accidents;
- providing information to the regulator about: the operations, including fulfilment of license conditions; the procedure for notification in case of change of the circumstances in which the license was issued; the procedure for licence amendment or extension of its validity;
- the obligations of the licensee in connection with the regulatory control, carried out by the NRA, the applicable legislation, interfaces with other permits or licences; etc.

According to the Regulation on providing the safety of NPP: 'The operating organization bears the full responsibility of ensuring safety, including when other entities implement activities or provide services to the NPP, as well as in relation to the activities of the specialized regulatory authorities, in the fields of nuclear energy and ionizing radiation'. The same Regulation requires the operating organizations to establish justified organizational structure for the safe and reliable operation, with clearly defined responsibilities, powers and lines of interaction of the staff, which carry out safety related activities. Also, there is a requirement towards any change in the

organizational structure that is important to safety. Such changes shall be justified in advance, systematically planned, and evaluated after their implementation.

The Regulation for safety of radioactive waste management defines the requirements, norms and rules of safety during implementation of radioactive waste management activities. The Regulation defines also the requirements, norms and rules for safety of site selection, design, construction, commissioning, operation and decommissioning of the RW management facilities. The Regulation defines the responsibility of the persons generating RW for safe management of the waste from the moment of their generation to the moment of their transfer to the SC “RW” or their clearance from regulatory control.

For issuing a permit or a licence, the applicant has to demonstrate that: the organizational structure will ensure the maintaining of a high level of safety; compliance has been ensured of facilities and activities with the rules and regulations on nuclear safety and radiation protection; a system for maintaining a high level of safety culture and work arrangements are in place, which ensures that radiation doses to workers and the public will be kept as low as reasonably achievable.

Allocation of the prime responsibility for safety

The allocation of responsibilities by the licence holder is described in the Kozloduy NPP internal organizational documents. The internal document entitled “Rules for the Organization and Operation of the Kozloduy NPP” specifies the overall organizational structure; management priorities; management bodies and their functions; principles underlying the organizational structure; functions and tasks of different structural units; and lines of interaction. The Directorates, in which the company has been subdivided, have their own rules for organization and activity, compliant with the general Rules of the plant.

The procedure for making changes to the administrative and organizational structure of the company is specified by an administrative instruction: ‘Management of organizational changes in Kozloduy NPP’. This document defines the procedure for making changes to the organizational structure, sets criteria for assessing their impact on safety, responsibility for planning, execution and analysis of their effects. The impact of changes on different groups of staff is also assessed.

The responsibilities of personnel are defined by job descriptions for each job position, while those for the operating personnel are also included in job instructions.

Regulatory body requirements for prime responsibility for safety by the licence holder

The Nuclear Regulatory Agency carries out control over the fulfilment of the licensee obligations, using various approaches, including control over changes to internal documents, on the basis of which the licence has been issued.

In case of changes to internal documents, it shall be demonstrated that the regulatory and legal requirements have been met, and that the changes comply with the procedure for introducing of changes adopted by the plant. If substantial changes have been made to internal rules for performing the activity, the regulatory body shall issue separate permits.

When changes important to safety are being made to the organizational structure, before issuing a permit for modification, the NRA shall check and verify that those changes have been justified in advance, whether they comply with the statutory requirements, and whether they have been planned and systematically assessed, as per the internal documents established for the purpose.

Article 6 (2) Regulatory requirements

Overview of the measures and regulatory requirements regarding policies and programmes to ensure priority of safety

One of the fundamental principles specified by the Act on the Safe Use of Nuclear Energy, states: ‘During the use of nuclear energy and ionizing radiation, and the management of radioactive waste and spent fuel, nuclear safety and radiation protection have priority over all other aspects of this activity’, while observing the following basic issues: the responsibility for ensuring nuclear safety and radiation protection lies in full with the licensees and may not be transferred to other entities; the licensees establish and maintain an efficient system of safety management.

The requirements for the safety of the facilities for RAW management, the conformity with which is subject of demonstration by the safety assessment, are determined in *Regulation on the safety during RAW management*. It identifies the types of the safety assessments, required for the deferent stages of the life of the facility.

The Regulation on Providing the Safety of Nuclear Power Plants requires the Management Body of the operating organization to adopt a document, defining the safety policy, which gives highest priority to safety over all other activities, and assumes a clear commitment to continuously improve safety, and encourages staff to have critical attitude towards the activity in order to achieve the highest results. To implement the safety policy, the operating organization should develop a strategy that contains goals, objectives and methods that can be easily implemented and monitored.

Pursuant to the Regulation on the Procedure for Issuing Licences and Permits for Safe Use of Nuclear Energy, the applicant shall attach to his application for approval of the nuclear facility technical design, the results from an independent review (verification) of the safety analysis.

Overview of arrangements and regulatory requirements to perform comprehensive and systematic safety assessments

ASUNE requires by the licensees to perform an assessment of the nuclear safety and radiation protection of the nuclear facilities and to undertake actions and measures for their enhancement, taking into account the plant and the international experience, and scientific achievements in this area.

The Regulation on the Procedure for Issuing Licenses and Permits for Safe Use of Nuclear Energy requires a preliminary, interim or final safety analysis report (SAR) in the following cases:

- preliminary SAR – for the sitting approval;
- interim SAR - for the technical design approval;
- final SAR – for the issuing of the operation licence or the renewal.

In case a modification permit is applied for, the Regulation also requires the submission of the amended parts and sections of the safety analyses report, which are related to the planned modification. The specific requirements regarding the modifications in NPPs are presented in the Regulation on Ensuring the Safety of Nuclear Power Plants. These requirements stipulate that modifications leading to changes in the unit configuration or in the operating limits and conditions shall be evaluated by independent experts, other than those implementing the respective design or modification. These evaluations should include deterministic analyses - Safety Analysis Report (SAR), and probabilistic safety analyses (PSA), to confirm the design bases and Defence in Depth.

Operating organizations shall keep the safety analysis report up to date, in accordance with the modifications of structures, systems and components important to safety, new analyses of transients and accidental modes, the current safety requirements, as well as in compliance with the quality assurance programme. Computer programmes and analytical methods used in safety analyses shall be verified and validated and the results uncertainties shall be quantified. The programmes and methods should be used in a way to ensure greater confidence than the method of best estimates for obtaining results targeted at a more favourable direction.

For the purposes of PSA and the development of emergency procedures, analyses shall be carried out, which realistically describe transients and accidents evolution. Detailed requirements for the development of transients and accidents are presented in the NRA "Guide for Performing Deterministic Safety Assessments". The detailed requirements for risk assessment are presented in the NRA guides on "PSA Use in Support of the Safety of Nuclear Power Plants" and "Development of PSA".

In connection with the implementation of the National Action Plan and taking into account the lessons learnt from the Fukushima NPP accident, a review of the overall regulatory framework is pending, including the Regulation on Ensuring the Safety of Nuclear Power Plants and the NRA regulatory guides.

Safety assessments within the licensing process and SARs for different stages in the lifetime of the nuclear installations (e.g. site selection, design, construction, operation);

Kozloduy NPP, Units 5 and 6

SARs of Units 5 and 6 are developed in accordance with the national legislation, the relevant contemporary Russian and American standards, and the IAEA guidelines. The main instrument used was the Russian document "Requirements to the Contents of SAR of NPPs with WWER Reactors (ИИХАЭ Г-1-036-95). In order to keep the SAR up-to-date, Kozloduy NPP has established structural units responsible for periodic update, as well as for coordination of amendments and supplements, after an agreement with the NRA. The "Methodology for Keeping the SAR up-to-date", introduced by the operator in 2009, is used for the SAR annual update.

For the period 2010 till the beginning of 2013 the SARs of units 5 and 6 were updated in relation to the following changes:

- Organizational changes in Kozloduy NPP;
- Implementing new technical modifications;
- Replacement of equipment;
- Update of the data for the collective effective dose at EP-2 for the period 2004-2011;
- Update of the PSA;
- Additional thermo-hydraulic, thermo-mechanical and radiological analyses, related to the use of fuel with greater burn-up;
- Additional topical reports.

The activities for development and use of PSA are planned and carried out in accordance with the requirements of the Regulation on Ensuring the Safety of Nuclear Power Plants. Under these requirements, PSA shall include all operational modes - full power, low power and shut down state.

In 2010, an update of PSA Level 1 for full power, low power and shut down reactor was completed, including the state with the nuclear fuel located in the spent fuel pool. The PSA reflects the configuration of units 5 and 6 towards the end of 2007. Risk is analysed for internal events, internal floods, fires and earthquakes. When updating the PSA Level 1 definite goals of

the analysis were followed, related to increasing the quality of the PSA Level 1 model itself, so that the requirements set can be satisfied, such as:

- Change of the conservative assumptions with realistic ones, wherever possible;
- Taking into account the comments and recommendations to the model and the documentation of the study, provided by the independent review;
- Development of an integrated model (which allows for obtaining results for both full power PSA Level 1 and PSA Level 1 for low power and shut down reactor);
- Development of a symmetric model, as far as the accounting of the symmetry does not result in the creation of an excessively large and difficult for quantitative analysis model.

A further update of the PSA Level 1 is planned, which should cover all external events (except for earthquakes), that are site-specific for Kozloduy NPP.

In 2013, actualization of PSA Level 2 was completed for full power and its scope for low power and shut down reactor was extended. The remarks of NRA's independent review of PSA Level 2 are taken into account.

In 2012 the operator submitted to the NRA an application for modification of the operation licences for units 5 and 6, in connection with the planned uprating of the thermal output of the reactor installation up to 3120 MWt. The applications for the licence modifications are complemented by documents, justifying the plant safety in the transition to the new output, as well as documents, justifying the necessity to make equipment modifications in this connection.

Periodic safety assessments using deterministic and probabilistic methods of analysis

Kozloduy NPP, Units 5 and 6

In accordance with the provisions of the Regulation on Ensuring the Safety of Nuclear Power Plants, the existing design and the operation of a Nuclear Power Plant should be regularly reconsidered, to identify deviations from the requirements in force and the internationally recognized operational experience. The decisions for design modifications, improvements or other measures are made depending on the relevance of safety for the established deviations.

The scope of the periodic safety assessment should cover at least the following areas of review:

- site characteristics, taken into account in the project, and if necessary their reassessment based on new data obtained and new methods used;
- the nuclear power plant design in its status at commissioning and the actual status of SSCs, while taking into account the modifications made, the ageing effects and other effects which impact safety and the design lifetime;
- existing analytical methods for safety analysis and new safety requirements applicable;
- operational experience and feedback effectiveness during the period under review;
- operations organization;
- safety performance indicators and effectiveness of safety and quality management;
- quality, level of staff training and qualification;
- emergency preparedness;
- radiological impact of the nuclear power plant on environment.

In accordance with the requirements of the Regulation on Ensuring the Safety of Nuclear Power Plants and the provisions of the operation licenses, in 2008 a reassessment of safety of Units 5 and 6 was carried out. When carrying out the periodic safety review the IAEA Guide NS-G-2.10 "Periodic Safety Review of Nuclear Power Plants" recommendations were applied, as well as the

documents related thereof, relevant to the defined areas, which are subject to the review. The identified unconformities are assessed in accordance with the "Methodology for Categorization of Unconformities with the Requirements for Reassessment of Kozloduy NPP Units 5 and 6 safety"; and eliminated within the framework of the safety enhancement programmes, under the NRA supervision.

The licensee intends to operate units 5 and 6 beyond their design lifetime, and in accordance with the provisions of the operation licences is obliged to perform a complex assessment of the actual condition of the equipment and facilities within the scope and deadlines agreed with the NRA in advance. The procedure for a complex assessment of the actual condition and rest lifetime assessment of the equipment and facilities of units 5 and 6 was started in February 2011.

Up till now, the following important steps are fulfilled towards the lifetime extension of the two Units:

- general plan was developed for implementation of lifetime extension activities of Units 5 and 6 of Kozloduy NPP.
- a relevant theme was developed in the Investment program of the company.
- a relevant licencing plan for Unit 5 was also developed.

After the conduction of contractor selection procedure, a relevant contract is signed with P&A-EDF consortium.

The implementation of the Unit 5 complex investigation was performed in 2012-2013 period on methodology which meets the high level needed for a EU member state, ensuring indisputability of justification for life extension of Units 5 and 6 by executers with the necessary experience from projects already executed in EU. The complex investigation included:

- analysis of main systems, constructions, hydro technological facilities and determination of main (critical) components, which are subject to evaluation;
- determination of the most important mechanisms which affect the ageing processes and degradation of main (critical) components and clarification and development of methodologies for control and ageing processes reducing;
- development of procedures and methodologies relevant for evaluation of the residual resource of the main constructions and components;
- residual resource evaluation of separate systems, components and constructions;
- justification of recommendations and measures packages for ensuring the resource and for maintaining the qualification of constructions, systems and components of the safety systems and systems important for safety of Units 5 and 6, integrated in a program for lifetime extension of Units preparation.

On preliminary evaluation, after investigation performed of Unit 5, the larger part of elements included in the investigation have the necessary resource, except for the elements which are subject to replacement, pointed in an annex to the final report. Also, element are defined for which performing of additional evaluation activities for confirming the residual resource on special methodologies and programs of specialized organizations is needed.

The results of the complex investigation (analyzing the documents, operation history, ageing mechanisms, defects and failures, existing system for technical service and repair, water-chemistry regime, visual investigations) allow making the conclusion that the technical condition of Kozloduy NPP Unit 5 meet the requirements of the existing operational, designing and regulatory documentation in Kozloduy NPP. Taking into account the program realization for Unit preparation for additional term of operation, all of this gives the opportunity the lifetime extension of Unit 5 to be continued above the design-based resource up to 60 years. The

clarification of the operational lifetime of Unit 5 above the design-based resource will be performed after implementation of activities which are provided in “Program for Kozloduy NPP Unit 5 preparation for lifetime extension PLEX-DQA-KNPP-0003-01”. The program is coordinated with NRA. In the program the following measures are planned:

- **Groups A and B:** Replacement or reconstruction of components which are out of their resource;
- **Group C:** Additional analyses and justification of residual resource of irreplaceable components;
- **Group D:** Correction of procedures for technical justification, repair and operation of components in the light of their continuous operation.

In 2013 the NRA developed and adopted “Position for carrying out a periodic safety review for long term operation of Kozloduy NPP units 5 and 6, in the context of Fukushima NPP accident”. The position underlines the necessity to reconsider the site-specific external hazards, the concept for continuous enhancement of safety, including the implementation of measures for severe accidents management. It defines also the NRA requirements as regards the form and the content of the periodic safety review documents, in compliance with the new specific IAEA Guide SSG-25 and the documents related to it, and which concern the areas (factors) that will be subject to the periodic safety review.

Regulatory review and control activities

The NRA performs reviews and assessments of the following documents, which Kozloduy NPP shall submit under the operational licenses conditions at least 15 days before the unit outage:

- Programme for in-service control of the base metal, built-up surfaces and welded joints of equipment and pipelines;
- Maintenance schedules and programs;
- Report of the neutron-physical characteristics of the new reactor core.

The procedure for unit start-up, following the plant outage, is determined by the provisions of the operational licence conditions. According to the operational licence, not less than 7 days prior to the start-up of the unit, the licensee is obliged to notify the NRA Chairman. In this relation an order is issued by the NRA Chairman to set up a Commission (inspection team) to verify the unit preparedness for start-up and operation, in accordance with an approved programme, including at least the following topics:

- State of the core and the unit towards the time of the inspection;
- Implementation of measures to increase the unit safety, functional tests and modifications in the operational documentation;
- Implementation of the planned and additional maintenance activities, as well as testing proving systems operability;
- In-service control of the equipment and pipelines metal, carried out during the Planned Annual Outage;
- Control of the facilities of high risk, relevant to nuclear safety;
- Metrological verification;
- Radiation protection during outage, accumulated RAW and preparedness of the radiological control systems;
- Water chemistry and corrosion investigation of Primary and Secondary circuits;
- Analysis of operational events, implementation of the approved corrective measures;

- Fulfilment of the license conditions and ensuring qualified and licensed personnel;
- Conditions of systems, operational documentation on the working places and housekeeping.

Under the licence conditions, the licensee could start-up the unit following refuelling only after the NRA Commission grants a positive assessment on the implementation of the conditions for safe start-up and power operation of the unit, approved by an order of the NRA Chairman.

Within one month after the notification of the NRA Chairman for the unit start-up after refuelling, the licensee shall submit for review and assessment a summary report on:

- Results from the implemented programme for in-service control of the base metal, built-up surfaces and welded joints of equipment and pipelines;
- Results of leak tightness inspection of loaded fuel assemblies;
- Results from the comparison analysis of calculated core neutron-physical characteristics and the unit operational data;
- Resource of fuel;
- Residual lifetime of the reactor pressure vessel and equipment, for which the rest lifetime is assessed;
- Results of the test programme;
- Results of the programme for neutron control of reactor vessel;
- Results of the unit start-up programme.

During units' power operation, the NRA on-site inspectors control the implementation of the periodic Safety Systems tests, the planned annual maintenance activities and the elimination of defects and failures in SSCs that are important to safety.

Article 6 (3) Radiation protection, designing and establishment

Regulatory requirements for radiation protection at nuclear installations

The general requirements for licensees and holders of permits and the basic principles, norms and rules to ensure radiation protection that shall be observed in carrying out activities in nuclear power plants are set out in the ASUNE, the Regulation on Basic Norms for Radiation Protection (RBNRP), the Regulation on Providing the Safety of Nuclear Power Plants.

According to the ASUNE, nuclear energy and ionizing radiation are used in accordance with the requirements and principles of radiation protection to ensure the protection of population and environment from the harmful effects of ionizing radiation. During the use of nuclear energy and ionizing radiation and radioactive waste and spent fuel management, the ionizing radiation exposure of the staff and the population is maintained to as low as reasonably achievable level.

The new Regulation on the Basic Norms for Radiation Protection dated 2012 has been prepared on the basis of the new ASUNE dated 2010, Issue No. 103 of the International Commission on Radiological Protection (ICRP) (2007), Issue "GSR Part 3" of the IAEA (2012) and the Draft on European Basic Safety Standards, published by the European Commission in 2012. The Regulation defines:

- general principles, requirements and radiation protection measures;
- main (principal) dose constraints for external and internal exposure;
- derivative (secondary) constraints for external and internal exposure;
- boundaries for the purposes of radiation monitoring and protection planning;
- rules and limits for free-release of materials.

The changes in the new RBNRP are generally the following:

- The limit of the effective dose from occupational exposure for each individual year has been changed from 50 mSv to 20 mSv. The limit for the annual equivalent dose for the eye lens for staff has been changed from 150 mSv to 20 mSv;
- The annual equivalent dose limit for the eye lens for students and trainees at the age from 16 to 18 years of age who due to the nature of the training need to conduct it in environment with sources of ionizing radiation, has been changed from 50 mSv to 20 mSv.
- The individuals accredited by the Executive Agency "Bulgarian Accreditation Service" for the performance of individual staff monitoring, register the monitoring results and submit Protocols to the relevant enterprises within 15 days after processing the individual measurement with periodicity which corresponds to the conducted individual monitoring.
- The accredited individuals are obliged to send up-to-date data for the enterprises, the number of the staff working for them, the periodicity of the monitoring and the type of the measurement equipment used to the National Register which is kept by the NCRRP.
- In case of accidental dose exposure the imparted dose and its distribution within the body should be assessed by a Radiation Protection Expert.
- The NCRRP has the right to require from the enterprises the necessary data for assurance of full identification of the individuals who are subject to individual monitoring.
- When external personnel are admitted to work in the controlled area, the plant shall provide protection means and individual monitoring equipment as the ones envisaged for its own staff.
- Chapter 3 from the Regulation is completely revised on the basis of Issue GSR Part 3 of the IAEA. The following is given as attachment:
 - the levels of activity and the specific activity of materials for relevant number of radionuclides (exemption levels) for which, for definite activities with them, there is no requirement for issuance of licenses and permits (for quantities up to 1000 kg);
 - the levels of the specific activity of the human-induced radionuclides (clearance levels) for which a given radioactive material is not subject to regulatory control and can be free-released (for quantities over 1000 kg);
 - the levels of the specific activity for natural radionuclides for which a given material can be free-released;
 - the levels of the specific activity for human-induced radionuclides for which metals, subject to recycling, can be free-released.
- The radiation and the tissue weight factors for assessment of internal and external irradiation, given in attachment 3 of the Regulation are in accordance with Issue No. 103 of the ICRP.

In line with the Regulation on Providing the Safety of Nuclear Power Plants the basic requirements and criteria for providing the radiation protection in a nuclear power plant (NPP) are the following:

- radiation impact under all operating conditions of the NPP (consisting of normal operation and anticipated operational events) is maintained lower than the regulatory range of dose limits from external and internal exposure of workers and the public and is at reasonably achievable low level. In all conditions of normal operation and anticipated operational events, the annual effective dose to members of the public due to liquid and gaseous radioactive discharges from the site of the NPP to the environment shall not be greater than 0,15 mSv irrespective of the number of nuclear facilities on site.

- in the event of severe accident in the NPP (BDBA which results in significant damage to the reactor core) the activity of vented cesium-137 to the atmosphere should not be greater than 30 TBq, which does not enforce restrictions on long-term use of soil and water in the surveillance area around the NPP. The combined discharge of other radionuclides should not cause in a long-term perspective, beginning three months after the accident, risk greater than the risk due to the release of cesium-137 with activity of 30 TBq.
- regarding NPPs commissioned before the Regulation on Providing the Safety of Nuclear Power Plants became in force, the annual effective dose to members of the public due to the impact of liquid and gaseous discharges into the environment should be less than 0,25 mSv in all operating conditions of the NPP.

Areas with special status are established around the nuclear facilities. These areas are as follows:

- Preventive Protective Measures Area - the territory around nuclear facilities which is established for the limitation of the exposure of the population in the event of accidents;
- Surveillance area - the territory outside the boundaries of the Preventive Protective Measures Area in which the radiation monitoring for the purposes of radiation protection is carried out.

The boundaries of the Preventive Protective Measures Area and the Surveillance area are defined in the course of licensing of the nuclear facilities.

The annual effective dose for members of the public on the border of the Preventive Protective Measures Area and beyond should not be greater than 5 mSv for the first year after design based accident. If one site has two or more nuclear facilities it is necessary to consider their total radiation impact while maintaining the established dose quota for the site. The Surveillance Area is established via an Order by the Chairman of the NRA.

The design of the NPP should include automated radiation monitoring system in the NPP and radiation monitoring system within the Preventive Protective Measures Area and the Surveillance Area around the NPP. These systems shall provide the necessary information on the radiation environment, the state of the protective physical barriers and the activity of the radionuclides, as well as information for predicting the dynamics of the processes in case of emergency.

The Automated Radiation Monitoring System should include technical means for:

- Radiation technological control;
- Radiation dose monitoring;
- Radiation monitoring of the premises and site of the NPP;
- Radiation monitoring to limit the spread of radioactive contamination.

The Radiation monitoring in the Preventive Protective Measures Area and the Surveillance area is a responsibility of the licensee and covers as the minimum the measurement of:

- A dose rate from external gamma radiation;
- Gross and specific activity of liquid and gaseous discharges into the environment;
- Specific activity of ground-air, atmospheric depositions, topsoil and vegetation (flora);
- Specific activity of the surface and groundwater and water supply networks and facilities;
- Specific activity of plant and animal materials and products;
- Radioactive contamination of vehicles;
- Meteorological parameters.

The scope and volume of the radiation monitoring is approved by the competent authorities - Ministry of Health (MH) and Ministry of Environment and Water (MEW). The monitoring of the radiation parameters of the environment and the agricultural production within the Preventive Protective Measures Area and the Surveillance Area, as well as assessment of the exposure of the population is carried out by the licensee and the independent bodies of the executive power.

Overview of arrangements and regulatory requirements concerning the design and construction of nuclear installations

The main criteria and rules for nuclear safety and radiation protection, as well as organizational measures and technical requirements for ensuring safety in the siting, design, construction, commissioning and operation, are defined by the Regulation on Ensuring the Safety of Nuclear Power Plants. Under this regulation, the safety of nuclear plants shall be ensured by consistent implementation of the concept of defence in depth, which is based on using a system of physical barriers in the pathways of ionizing radiation and radioactive substances distribution; and a system of technical and organizational measures to protect barriers and maintain their effectiveness and for protecting the public, staff and the environment. The system of physical barriers of any unit include: fuel pellet, fuel elements cladding, reactor coolant boundaries, and the containment. It is required that the system of technical and organizational measures shall cover all levels of protection:

- first level - prevention of anticipated operational events;
- second level - prevention of design based accidents on systems for normal operation;
- third level - prevention of beyond design basis accidents with safety systems;
- fourth level - management of beyond design basis accidents;
- fifth level - development and implementation of internal and external emergency plans.

The concept of Defence in Depth applies at all stages of activities, related to ensuring the safety of NPPs. Measures to prevent adverse events on first and second levels of protection have priority over other safety related measures.

This regulation specifies the requirements on the design bases and safety assessments of a nuclear power plant. It is required that design bases shall determine the necessary features of the NPP, which to ensure that in all operational states and design basis accidents shall not exceed the limits for internal and external exposure of personnel and population, and the limits on discharges of radioactive substances into the environment. Design bases shall include design limits, NPP operating states, safety classification of the SSC, design key assumptions, and in some cases special methods of analysis.

The Regulation requires that, as a minimum, design limits shall include:

- Radiological and other technical criteria for acceptability under all operating and emergency conditions;
- Criteria to protect fuel elements cladding, including: fuel temperature; departure from nuclear boiling margins; cladding temperature; tightness of fuel elements; and acceptable fuel damage under all operating conditions and Design Basis Accidents (DBA);
- Criteria for protection of reactor coolant boundaries, including maximum pressure, maximum temperature, thermal and mechanical transients and loads;
- Criteria for protection of the containment of the reactor installation, including temperature, pressure and leak rate, in order to provide the adequate margins, which to ensure containment integrity and tightness in extreme external events, severe accidents and combination of initiating events.

To determine the boundary conditions, under which safety important SSC are designed, manufactured and installed, design shall define DBA initiating events. Selection of postulated initiating events shall be based on the use of deterministic and probabilistic methods.

The Regulation requires that postulated internal initiating events shall be grouped into separate categories of NPP states, depending on the expected frequency of occurrence in a year. Also, NPP design shall analyse, as initiating events, possible human errors and possible combinations of internal and external events based on realistic assumptions.

It is required that NPP design shall take account of specific environmental conditions and loads to safety important SSC, resulting from internal events and site specific external events and hazards.

In addition to the design basis, unit behaviour in Beyond Design Basis Accidents (BDBA) shall be analysed. List of BDBA without significant damage to the core is defined, which shall be considered by the design, if not prevented by the inherent safety features of the reactor system and its construction principles.

If the analysis of severe accidents consequences does not confirm the performance criteria for the radiological exposure of the population, identified in the Regulation, the design shall provide additional technical means for severe accidents management, in order to limit their consequences. Furthermore, the NPP shall be designed in such a way that the frequency of large radioactive releases into the environment, which require implementation of urgent public protective measures, to be extremely low.

SSCs important to safety, shall withstand, the postulated initiating events with sufficient margin. In order to determine the case where the principles of diversity, redundancy and independence shall be applied to achieve the required reliability, NPP design shall analyse common cause failures modes. NPP design shall prevent to a practically achievable level:

- Conditions leading to degradation of physical barriers;
- Failure of a physical barrier, if there are conditions under item 1;
- Failure of a physical barrier, as a consequence of the failure of another physical barrier.

It is required that under all operating modes and accident conditions, the unit shall be able to fulfil the fundamental safety functions and other related functions. The Design shall use the principles of diversity, self-testing of safety systems and elimination of inter dependencies between SSC to the extent practicably possible.

Postulated initiating events shall be analysed using the criteria for an initiating event, independent single failure of an active or a passive component of the safety systems, which has the most negative impact on situation development or a single initiating event independent staff error. Hidden failures leading to violation of safety limits are additionally considered.

Regulatory review and control activities

Implementation of the authorization procedure, as required by the Act on the Safe Use of Nuclear Energy, is carried out following the requirements of the Regulation on the Procedure for Issuing Licenses and Permits for Safe Use of Nuclear Energy. The Regulation, among others, establishes the process of issuing of a design permit for a nuclear facility and a permit for construction of a nuclear facility.

Modifications of SSC important to safety are carried out after authorization by NRA under ASUNE and conditions specified in the Regulation on the Procedure for Issuing Licences and Permits for safe use of Nuclear Energy. The Regulation defines the documents that must be submitted by the applicant for review and evaluation. Follow-up control of the completed modification is accomplished by conducting inspections.

The process of making a regulatory evaluation and analysis covers the following main activities:

- Establishing the conformity with the statutory requirements of the design bases and operation of structures, systems and equipment, including high-risk facilities related to nuclear safety;
- Review and evaluation of documents submitted to NRA in fulfillment of statutory requirements, conditions of licences and permits and made improvement notices, and other documentation required by NRA;
- Review and evaluation of performed external independent expertise, studies and researches;
- Review and evaluation of all other documents necessary for making regulatory decisions on the safety of nuclear facilities.

In the evaluation process, when necessary and at the discretion of the Chairman of the Agency may be performed:

- Inspection of the facility site, subject to the stated activity;
- Use of external consultants;
- Support of the process of decision making by the consulting boards.

Overview of the arrangements and regulatory requirements for on-site and off-site emergency preparedness

The emergency preparedness in case of nuclear or radiological event in the Republic of Bulgaria is a part of the general national arrangements for protection in case of disaster. The main legislative and regulatory requirements for the structure and organization of the emergency preparedness are specified in the Disaster Protection Act (DPA), the Act on the Safe Use of Nuclear Energy (ASUNE), the Ministry of Interior Act (MIA), and the Regulation on emergency planning and emergency preparedness in case of nuclear and radiation accident.

The Disaster Protection Act establishes at national level unified approach and organization in planning, maintaining emergency preparedness and response during disasters. The Act is harmonized with ASUNE as regards the requirements for development of emergency plans, their contents, the human resources required, material and technical support, etc.

According to the DPA, the Council of Ministers establishes the state policy and adopts a National Plan and a National Programme for protection in case of disasters; it also introduces a National System for Early Warning and Notification of the executive authorities and population in case of disaster and determines, through a Regulation, the conditions and the procedure for its implementation, provides for financial resources for protection, including in case of nuclear or radiological emergency situation.

The general management of the activities related to the protection of the population and environmental preservation in case of disaster is implemented by the Council of Ministers.

The requirements for emergency preparedness during operation of nuclear facilities are specified in the Act on the Safe Use of Atomic Energy. In accordance with ASUNE, entities implementing activities related to the operation of nuclear facilities are obliged to undertake measures to prevent emergencies and accidents and to mitigate the consequences thereof.

The measures for emergency planning are established by the emergency plans, as follows:

- for protection of the population (off-site emergency plan), which regulates the emergency planning zones and determines the actions to be taken by the competent authorities to protect the population, property and environment in case of an accident;

- for nuclear facility (on-site emergency plan), which determines the actions to be taken by the licensee or the permit holder to mitigate the accident and eliminate the consequences thereof, according to the off-site emergency plan.

In case of an accident, the licensee/permit holder is be obligated to:

- immediately warn the population and the mayors of municipalities within the emergency planning zones and other competent authorities;
- take actions for mitigation and remediation of the accident consequences;
- control and regulate the exposure of the persons engaged in the accident mitigation and liquidation;
- ensure continuous monitoring of the radioactive releases into the environment.

The Regulation for Emergency Planning and Emergency Preparedness in Case of Nuclear and Radiation Accident sets:

- the conditions and the procedure for developing Emergency Plans, the persons responsible for their application and their obligations, the actions and measures for limitation (localization) and liquidation of the consequences of a nuclear or radiological accident, the methods for informing the general public, the procedure for maintaining and testing the emergency preparedness.
- risk categories of the sites, facilities and activities, as well as classification of the emergencies. IAEA recommendations in GS-R-2 "Preparedness and Response for a Nuclear or Radiological Emergency" are observed.
- the intervention levels as values of the predicted dose and averted dose for a certain period of time, the dose rate and the specific activity values, whose reaching initiates the implementation of protective measures.

The Regulation defines emergency planning zones, which are as follows for Kozloduy NPP:

- on-site emergency planning zone – protected area (zone No.1, Kozloduy NPP site);
- off-site emergency planning zone, divided as follows:
 - precautionary action zone (PAZ) - with a 2 km radius and centre between the vent stacks of units 5 and 6 (zone No.2);
 - urgent protective action planning zone (UPZ) - with conditional radius of 30 km around Kozloduy NPP (zone No.3);
 - long-term precautionary measures zone (LTZ) - no definite external boundary (zone No.4).

In addition to these legislative acts, the requirements for emergency planning are set in:

- REGULATION on the conditions and procedure for establishing of special-statutory areas around nuclear facilities and facilities with sources of ionizing radiation;
- REGULATION on basic norms for radiation protection;
- REGULATION No. 28 on the conditions and procedure for medical insurance and medical norms for persons in case of radiation accident;
- REGULATION on the procedure for construction, maintenance and use of collective means of protection;
- REGULATION on the conditions and procedure for functioning of the National System for Early Warning and Notification of the executive authorities and the population in case of disaster and for notification in case of air hazard;

- REGULATION on the procedure for establishment, storage, renewal, maintenance, delivery and recording the stocks of emergency kits;
- REGULATION No. 11 on the determination of the requirements towards the limits of radioactive contamination of food in case of radiation accident.
- REGULATION on the conditions and procedure for notification of the Nuclear Regulatory Agency about events in nuclear facilities and sites with sources of ionising radiation.

Overview of arrangements and regulatory requirements on procedures for responding to anticipated operational occurrences and accidents

Regulation on Ensuring the Safety of Nuclear Power Plants requires that actions of staff in DBA and BDBA shall be defined by instructions, which shall be developed on the basis of the Final SAR, OLC and further studies and analyses of plant behaviour under accident conditions. Personnel actions provided in the instructions shall lead to recovery of the unit to a safe state or to ensure maintaining of the plant in a safe state for an extended period after the accident. Personnel actions to diagnose the unit condition, to restore or compensate degraded safety functions, and the prevention or mitigation of core damage consequences, shall be specified by SBEOP and SAMGs. The SBEOP should include procedures to diagnose conditions, for optimal recovery in transients and design basis accidents, to monitor the conditions, and to restore safety functions. They shall clearly identify transition to SAMGs.

Form, structure and content of SBEOP are specified. Requirements to use specific units' data have been established. Emergency operating procedures shall be verified and validated by independent experts. Procedures shall be validated with computer programs and models in respect of operators' actions effectiveness. Implementation of operating steps shall be validated by means of simulators. Procedures shall be updated periodically. After modification, procedures shall undergo re-validation.

Establishing of event based and symptom based emergency operating procedures

SBEOP were introduced for use in September 2009, after successfully carrying out the process of verification, validation and staff training. They replace the existing event oriented emergency instructions. Since the beginning of 2012 after a successful process of verification, validation and training of staff are in place the SBEOP at low power and a sealed reactor. Since the beginning of 2013 after a successful process of verification, validation and training of staff are in place for the SBEOP at depressurized reactor.

SBEOP sets include:

- Diagnostic instruction;
- Instruction for operation at total blackout;
- Instructions for optimal recovery;
- Instructions for functional recovery, based on the control of critical safety functions and their degradation;
- Operating instructions in case of degraded barrier, covering BDBA.

Introducing SBEOP was preceded by a significant analytical work, justifying the critical safety functions and their degradation, as well as main and alternative operator actions, included in the instructions. Important projects are:

- International Nuclear Safety Program (INSP) of the U.S. DOE. Within program framework, which purpose was to develop SBEOP for WWER-1000, theoretical justification analysis (analytical substantiation) of SBEOP of Kozloduy NPP was carried out by PNNL-USA, OKB Gidropress, Energoproekt and INRNE-BAS (in the period 1997 -

2003). These analyses were used to develop the first and second revision of the SBEOP at power;

- In 2002, in the task “Identification of critical safety functions and their degradation at Kozloduy NPP Units 5 and 6” was completed are were justified the critical safety functions, and their rates of degradation, and the analyses results were used in the next revision of the SBEOP;
- In 2006, analyses of postulated ruptures of steam generators feeding water piping were carried out. Analyses results were used to justify the modifications associated with introducing new protections and interlocks and design changes to steam generators feeding water system. The results of the analyses are used to justify modifications related to introduction of new protections and interlocks and design changes in the makeup water loop to the SGs and amendments to existing SBEOP.
- In 2011, was completed a project "Extension of symptom-based emergency operating procedures for applicability to all conditions determined by technical specifications (low power and shutdown unit) for Units 5 and 6 of Kozloduy NPP." Within this project was carried out analytical validation and identified the critical safety functions for the states of “low power performance and sealed reactor "and "shutdown and depressurized reactor." Based on these analyses have been developed SBEOP for these two states.

In addition to SBEOP are prepared also instructions for elimination of violations of normal operation and accidents - these are emergency procedures covering accidents and transients that do not lead to activation of the reactor emergency protection or a safety system and are introduced into operation at the end of 2009.

Establishing of procedures and guidance to prevent severe accidents or mitigate their consequences

An extensive study was carried out in the period 2003-2004 on “Study of phenomena and development of guidelines for management of severe accidents”, financed by a PHARE project. As a result of the study were defined key strategies for protection against severe accidents, prototypes of SAMGs were developed and technical measures for management of severe accidents were identified.

Guides are designed for severe accident management (SAMG) and after successful process of verification, validation and operator training they are put in place by the end of 2012. SAMG consist of two sets - one for the MCR (two-column format) and one for the ERC (in graphical text form – in the form of flow-charts). Introduction of SAMG is preceded by significant analytical work and implemented design changes with respect to severe accidents.

Within the implementation of the National Action Plan after the "stress tests" it is foreseen in 2014 to complete the implementation of the analyses of the phenomena during a severe accident in the SFP and of a shut down and open reactor and on this basis will be extended the SAMG scope and developed SAMG for SFP and for a shutdown open reactor. It was decided that the project entitled "Study for locating the melt during severe accidents" to refer to the WANO MC to form a unified approach to tackle this issue by all operators of WWER-1000.

Description of activities, taken by the licensee for upgrading the safety, is given in Annex 4.

Regulatory control and review activities

The NRA gives methodological guidance and controls the process of developing SBEOP since the beginning. All licensee documents related to elimination of deviations from normal operation and accidents prevention are part of the documents on which operating licence is issued and are subject to assessment by the NRA. In all cases, in which the licensee applies for modifications to SSC or to operational documents, assessment is made of impact on SBEOP or SAMGs.

The NRA coordinates the implementation of the National Action Plan after the "stress tests." In 2012 and 2013 were performed three inspections to verify the funding and implementation of the measures.

Emergency plans for nuclear facilities sites

The emergency plans for the main SF and RAW management facilities are in place:

- National action plan for disaster protection, Part III – Off-site emergency plan of Kozloduy NPP, 2012;
- Emergency action plan of Kozloduy NPP, 2013. It includes facilities for SF management on the site (SFP, SFSF) and takes into account SERAW facilities located on Kozloduy NPP site;
- Emergency action plan SDRAW-Kozloduy, 2012;
- On-site emergency action plan of SD “Decommissioning - Kozloduy”, 2013;
- On-site emergency action plan of SD “Radioactive waste management – Units 3 and 4”, 2013.

The last two action plans will be active till the adoption of already developed Emergency action plan of SD “Decommissioning of Units 1-4”, 2014.

The nuclear facilities of KNPP are classified category I, for which the initiating events for the site are postulated, such with very low probability of initiating, can lead to significant release in the environment and sever deterministic effects outside of the site.

The nuclear facility, operated by the SE RAW is classified in risk category III, for which the emergency events at the site can lead to exceeding of the dose limit for the staff in normal conditions and/or contamination with radioactive substances at the site and application of urgent protective measures.

The Emergency Plan of SE RAW-Kozloduy SD has been connected with the one for Kozloduy NPP. In case of emergency event the Chief Unit Shift Supervisor of KNPP Units 5&6 must be informed; he shall evaluate the event on the basis of the data received and, if the criteria are reached, activate the KNPP Emergency Plan. Both plans have been tested during drills and exercises.

Emergency exercises and drills

The regulatory provisions require the licence holders and the holders of pursuant to the ASUNE to hold periodically emergency exercises and drills. Regarding sites and activities with threat category I, II and III at least once per year a general drill and emergency exercise shall be held. Except that a separate training for the separate emergency teams are conducted. The performance of the trainings is done according to annual programme, which maintaining is a licensing condition for the operators of NF for management of SF and RAW.

Article 6 (4) Priority of safety

Provisions and regulatory requirements

According to the ASUNE, persons who perform activities in the use of nuclear energy are required to establish and maintain an effective system for the activities management, which gives priority to safety and ensures high safety culture, as well as to maintain high level of quality of activities performed.

Kozloduy NPP Management system

Status with regard to the development and implementation of an integrated management system

In accordance with the licence conditions for units five and six, the licensee is obliged to undertake the necessary actions to develop Integrated Management System and introduce it by the end of 2012. In this respect, an integrated management system was established based on IAEA standards GS-R-3:2006 "Management System for Facilities and Activities", SSR-2/2:2011 "Safety of Nuclear Power Plants. Commissioning and operation", as well as other applicable IAEA standards and guidelines and the Bulgarian standards: BDS EN ISO 14001:2004 "Environment Management Systems", BS OHSAS 18001:2007 "Occupational Health and Safety Management System", BDS EN ISO 9001:2008 "Quality Management Systems Requirements", and Nr.13 - "Recommendations for nuclear safety as regards physical protection of nuclear material and nuclear facilities" (INFCIRC 225/ Rev.5). The system is described in a Management System Guide.

In compliance with the conditions of the issued licenses and permits for safe use of nuclear energy, quality assurance systems are introduced in the organizational units of Kozloduy NPP, which operate nuclear facilities: Electricity Production-2 and Spent Fuel Storage Facility. Complete continuity is ensured with the management system in place, based on process approach, interdependences and process management, and the activities for achieving high effectiveness in management. Kozloduy NPP management system integrates all management aspects and ensures concordance in the implementation of the requirements regarding safety, health and safety at work, environment, security, quality and economics, so that safety is guaranteed top priority.

Main elements of the management system

The long-term intentions of Kozloduy NPP are set in the Management Policy and the Statement on the Company Management Policy. The main objective stated by the management, is safe, efficient and environmentally friendly electricity generation of guaranteed quality and security of supplies, in compliance with the national and international requirements and the licences issued by the regulatory authorities. In pursue of this objective policies have been developed that are appropriate to the Company activity and in compliance with Kozloduy NPP Management Policy. Kozloduy NPP management assigns paramount priority to safety and declares its commitment to maintain and constantly improve the Safety Management Policy, together with the stated priorities in the Policies on: Environment Management; Health and Safety at Work Management; Security Management; Quality Management; Finance And Economics Management; Staff Training And Qualification; Fire Safety; Human Resources.

These stated policies reflect the higher management commitment to achieve specific goals in these areas, identify the approach and the principles applied to achieve the goals, express the management aspiration for continuous improvement. Maintaining and continuously increasing of safety culture level, together with open communication and good awareness of the staff are among the major principles.

The Policies and the Policy Statement are disseminated, clarified and brought to the whole staff's knowledge. Each staff member is responsible for applying those principles in his/her activity. Kozloduy NPP policies are reviewed periodically, to confirm their up-to-date status and applicability when reviewing the Management System.

Based on the policies and the strategies, the business tasks and conditions, set by the Utility, the company management develops a three year business programme of Kozloduy NPP, in compliance with the applicable regulations, the licences issued and the Company internal documents.

The report on the business programme implementation comprises an analysis of the Company's activity during the reporting period, identifies the risks and the problem areas and is used in the process of decision making, including in undertaking actions in case of deviation from the programme. The reported results on the business programme implementation evaluations are an important part of the input information for review of the management system.

The Management System covers 30 processes (3 managerial, 5 main and 22 auxiliary), which comprise all the activities related to: business and planning; management of materials, financial, human resources and knowledge; safety management (nuclear safety and radiation protection, industrial safety and emergency preparedness, environment and security); operational experience; design integrity; surveillance and maintenance, nuclear fuel cycle management; purchase and delivery of products/services; RAW management; organizational changes management; measurement, evaluation and improvement of the management system. The required resources, criteria and methods of functioning, management, monitoring and measurement are provided for all processes, with defined functions of a responsible person, a coordinator and a leader.

A graded approach is applied to the activities and the results thereof (product, service) for each of the processes, based on the evaluation of certain factors on: the importance and the complexity of each individual product or activity; the impact of each product or activity on safety, health, environment, quality, security, economics; the possible consequences of the improper execution of the activity or inconformity of the product. Based on the evaluation, the management system requirements are applied to a different degree to the activities and the results thereof. Applying a graded approach allows for directing the resources and the attention towards the activities/processes and the equipment of higher importance to safety, which results in reducing of the total costs in the process of safety enhancement.

The requirements towards the external organizations and the activities they perform are defined in a way to ensure that:

- the activities performed are in compliance with Kozloduy NPP policy for maintaining high level of safety, continuous enhancement of safety culture, as well as observing the requirements of the applicable regulations;
- there is a well-established organization, clear distribution of responsibilities within the external organization, as well as between the external organization and Kozloduy NPP;
- the external organization develops and submits to Kozloduy NPP for agreement a QA Programme for the executed activities;
- the external organization has appropriate equipment in good working order, special tools and emergency kits, necessary for the performance of the activity;
- the activities are executed by qualified and certified personnel, having the required experience;
- an overall assessment of the external organization ability to execute the activities in compliance with the requirements, norms and rules for nuclear safety, radiation protection, physical protection, technical and fire safety and environmental management, that are effective at Kozloduy NPP.

Constant monitoring and evaluation of the executed activities, periodical inspections and independent assessments of all processes, self-assessment on behalf of the managers at all managerial levels preclude deterioration of the safety condition. The results are used for early detection of unfavourable trends, due response to established unconformities, as well as for identification of new opportunities for enhancement of safety and improvement of the

management system. Once per year the Management System is reviewed by the Kozloduy NPP management, followed by a report with improvement proposals.

Article 6 (5) Financial and human resources

Mechanism for providing financial resources to ensure the safety of the nuclear installation

The main principles in the financing of measures to improve safety at Kozloduy NPP are:

- Priority in providing financial resources to ensure safety of the nuclear installation throughout its design lifetime;
- Sufficiency of the secured financial resources for the safety policy measures implementation;
- Timely provision of financial resources for implementation of measures to improve safety, in order to maintain consistency between the current state of the nuclear facility and the continuously increasing regulatory requirements;
- Establish and maintain adequate organizational structure, organizational relations and internal company relations in the financial and economic administrative units, to ensure implementation of safety commitments.

To permanently maintain the NPP status in conformity with the current requirements on safety, reliability and efficiency, the Kozloduy NPP carries out, on an annual basis, a set of activities, financed by own funds or loans.

For the period 2010-2013 financial expenses utilized are towards the acquisition of fixed assets for permanent increase of operational safety and reliability of Units 5 and 6. In the frame of adopted annual investing programs, for the period 2010-2013, 136 113 BGN are utilized.

In 2014, Kozloduy NPP is planning investments for increasing the operational safety and reliability of Units 5 and 6 in the amount of 4 205 000 BGN. For the period January-May 2014, means accounted are 818 000 BGN. In the period 2015-2016, investments for increasing the operational safety and reliability of Units 5 and 6 are predicted in the amount of 21 673 000 BGN.

In 2012 started the implementation of investment activities for realization of the strategic objectives for long term operation of units 5 and 6, continuing the nuclear facilities modernization process, and improving their operational safety.

The basic principles for providing funding for the decommissioning and management of SF and RAW, throughout the commercial operation of the nuclear facilities are as follows:

- Prudence in ensuring financial resources for the subsequent nuclear facility decommissioning and management of spent fuel and radioactive waste. Funds are being allocated on a monthly basis to the Nuclear Facilities Decommissioning Fund (NFDF) to finance the decommissioning activities, and to the Radioactive Waste Fund (RAWF)– for the management of radioactive waste;
- Purposeful spending of the money in the NFDF and RAWF. Funds are spent only for targeted funding, according to the annual programme for decommissioning of nuclear facilities, to ensure the storage and final disposal of radioactive waste, and for other activities specified by the Act on the Safe Use of Nuclear Energy.

The assets in DNF fund are formed of persons installments who operate nuclear facilities, national budget means, defined annually with the National Budget Act for the year relevant, etc., and the means accumulated are spent targeting only the financing of decommissioning of nuclear facilities project and activities. The incoming assets in RAW fund are formed by installments of persons who as a result of their activity generate RAW, which are subject to handover, national

budget means, etc. information on the financial resources about the activity on DNF fund and RAW fund are given in Annex 5.

At national level, six Grant Agreements, totalling 342,442 million euro about funds from the Kozloduy International Decommissioning Support Fund have been signed, in the period 2003-2011.

Additionally, 300 million euro have been allocated for 2010-2013, as per (EURATOM)

Regulation No. 647/2010 of the Council, regarding financial aid of the Union for the decommissioning of KNPP units 1-4. In the period to the end of 2013, according to the provisions of the Memorandum and the Regulation, 40% of these funds shall be spent on measures for energy efficiency enhancement, and other measures, to compensate for the negative impacts from the early shutdown of the units; 60% are foreseen for decommissioning measures inclusive management of RAW generated from decommissioning. The actual percentage of the funds for decommissioning was 56% of the total amount as at the end of 2012.

In 2014-2020 the country is expected to receive from the EU additionally about 260 M EURO for decommissioning activities. Bulgaria will also count on extension of this aid beyond 2020.

Statement on the adequacy of financial provisions

The State Energy and Water Regulatory Commission (SEWRC) Regulation on the Licensing of Activities in the Energy Sector requires the development of a five-year plan, which guarantees the proper use and allocation of funds, including those for safety enhancement.

The Business Programme is the fundamental document for the management to state the strategic and business objectives of the plant. Kozloduy NPP issues a three-year business programme and a five-year business plan, in compliance with the licence conditions for electrical power generation. The budgeting and planning system in place guarantees that the funds planned, secured and spent on these activities are adequate in terms of amount and timeliness. In preparing the annual programmes, priority is given to allocation of the necessary funds for improving the safety of Units 5 and 6.

The programmes are subject to regulatory review of SEWRC and NRA. Annual review is performed on the operational goals, priorities and activities for the coming year, and the three-year business programme is updated accordingly. The provided information shows that funds have been spent consistently through the years and in amounts, completely covering the safety improvement measures.

Financial provisions assessment process

The procedures for identifying, collecting, spending and control of funds and the amount of contributions are determined by Regulations, adopted by the Council of Ministers.

Kozloduy NPP contribution fee has been determined in accordance with the Regulation on the procedure for defining, collecting, spending and control of funds, and the amounts due to the Nuclear Facilities Decommissioning Fund (NFDF).

The amendments made to this Regulation require each licence holder - operator of a nuclear facility, to propose to the Minister of Economy and Energy a draft methodology for determining the costs for decommissioning funding, and respectively, defining the amount of contribution due. This methodology shall take into account the technological aspects, the requirements of nuclear safety and radiation protection. Until this methodology has been approved, the nuclear facility operators shall have their contribution defined as per the currently effective procedure – 7.5% of assets from electrical energy sells on the regulated and free market.

The legal and physical persons, that as a result of their activity have generated radioactive waste from nuclear applications, are obliged to pay a fee to the RAW Fund, the amount of which is

determined by a methodology of the Radioactive Waste State Enterprise (SE RAW) and approved by the managerial board of the RAWF, on the basis of estimates for the total annual costs for management of the radioactive waste volumes and radioactivity inventory. The fees of Kozloduy NPP, payable to the RAWF, are 3% of the price of the electricity sold on the regulated and the deregulated market.

Arrangements and regulatory requirements concerning staffing

In accordance with the ASUNE requirements, activities that affect the safety of nuclear facilities shall be carried out by professionally qualified personnel, holding Individual Licences (Certificates of Competence). The NRA Chairman issues Certificates of Competence to:

- Individuals who carry out activities related to assurance and/or control of nuclear safety and radiation protection, throughout the nuclear installation operation;
- Instructors at full-scale simulators and qualified experts in radiation protection.

The Regulation on Ensuring the Safety of Nuclear Power Plants has the following requirements:

- Operation of a nuclear power plant shall be carried out by sufficient number of qualified staff, who know and understand the design bases, safety analysis, design and operational documents of the power unit for all operating states and emergency conditions;
- Adequacy of staff and their qualifications shall be analysed and confirmed in a systematic and documented manner;
- Any change in staff numbers, which could be significant for safety, shall be planned and justified in advance, and evaluated after implementation;
- Preparation and training of staff shall ensure sufficient knowledge about the characteristics and behaviour of the SSCs important to safety, and the nuclear plant as a whole, in all operational states and emergency conditions;
- The plant operational staff shall be prepared and trained to occupy a higher operational position, after duplication of the job for a reasonable period of time;
- The operational staff of the MCR shall pass a full-scope simulator training at least once a year, while the operating shifts shall undergo periodic emergency drills;
- The maintenance personnel shall be trained on mock-ups or real components for the improvement of professional skills and reducing the duration of activities with radiological hazard;
- Pre job briefings of personnel involved shall be conducted before the implementation of safety important operations and tests of SSCs important to safety.

The Regulation on the Conditions and Procedure for Acquiring Professional Qualification defines as follows:

- the requirements to personnel selection and qualification;
- the conditions and procedure for acquiring professional qualifications to perform activities in nuclear facilities and with ionizing radiation sources;
- the job positions for which certification is required, and the requirements for educational background, qualification and experience to hold a given position;
- the procedure for issuing, amending, renewal, termination or revocation of licences to undertake specialized training for activities on a nuclear facility or with ionizing radiation sources;

- the conditions and procedure for holding exams to acquire certificates to perform activities on nuclear facilities and facilities with ionizing radiation sources;
- the procedure to control the implementation of the licence conditions for specialized training and certification.

In order to ensure qualified and competent personnel, Kozloduy NPP has developed and implemented procedures for personnel selection and qualification that include as follows:

- carrying out of occupational selection;
- medical and psychophysiological selection;
- ensuring of specialized initial and refresher training;
- maintaining a high level of safety culture;
- initial and periodic knowledge test;
- control on the adherence to the requirements for specialized training and professional qualification.

The professional selection is performed in accordance with the requirements to workers in nuclear facilities, requirements in the job descriptions and in accordance with the system for selection and qualification of Kozloduy NPP personnel.

To ensure that the staff is qualified and competent, a system for selection is applied that requires the following, namely:

- Checking the health status and permission to work in an environment of ionizing radiation, which is done by their own occupational health service;
- Conducting psychophysiological examination for correspondence of the personal qualities of the candidates for operative personnel working with radioactive waste and spent fuel with the necessary requirements for the job position and a subsequent issuing of a conclusion. This examination is performed by qualified psychologists and the Ministry of Health provides methodological guidance to this process.
- Conducting professional selection – checking of the compliance of the applicants with the requirements of the job description with regard to the level of education, acquired specialty, ensuring an acquired minimum of knowledge and the required working experience.

Persons are not allowed to work in the company, who don't meet the regulatory requirements for working in the field of ionizing radiation and an obligatory medical surveillance of workers is defined, which is performed: preliminary – before employment in the field of ionizing radiation and periodically – during work in field of ionizing radiation. The performance of initial and periodic psych-physiological tests is in accordance with the Ministry of Health methodological instruction requirements for professional selection of NPP operators on psych-physiological and psychological qualities. The requirements are set in the Regulation on the terms and procedure for obtaining of vocational qualification and on the procedure for issuing of licenses for specialised training and of individual licenses for use of nuclear power. Psych-physiological tests are performed according to defined methodologies and an expert conclusion is issued about the psych-physiological availability for taking the relevant position.

The licensees have the full responsibility for ensuring the facilities and activities safety. The organizational units and officers responsibilities in Kozloduy NPP during nuclear facilities operation are clearly divided and documented.

For the purpose of carrying out specialized training and maintaining the staff qualification, Kozloduy NPP has its own training center and has a license for specialized training.

Article 7 – Competency and skills for nuclear safety

Member States shall ensure that the national framework in place requires arrangements for education and training to be made by all parties for their staff having responsibilities relating to the nuclear safety of nuclear installation in order to maintain and to further develop expertise and skills in nuclear safety.

According to ASUNE, persons who perform activities on using the nuclear energy with sources of ionizing radiation and on RAW and SF management are obliged to ensure personnel training as well as qualification improvement and control.

Kozloduy NPP

Methods used for the analysis of competence requirements and training needs

In terms of qualification requirements, Kozloduy NPP staff is differentiated into 4 groups (A, B, C, D) in accordance with the functions and relationship with nuclear safety, radiation protection, and the operated facilities and systems. The job positions related to safety are included in the first two groups.

Input to the planning and conducting of training are the results from an analysis of the specialized training needs. Different analytical methods are used, including job and tasks analysis, competence analysis, and analysis using a combined methodology. The training needs analysis is performed on the basis of:

- the requirements for appointment to any job position, the key functions and duties, rights and responsibilities as described in the job descriptions;
- the requirements defined in the regulatory documents;
- data and requirements regarding the manner of implementing the activities, described in the internal rules, instructions and procedures;
- rules and requirements in terms of nuclear safety, radiation protection, and occupational safety of the personnel in the controlled area, etc.

Personnel engaged in activities related to ensuring and control of nuclear safety and radiation protection is licensed by the Nuclear Regulatory Agency.

Arrangements for initial training and retraining of operational staff, including simulator training

The training process starts from the moment of signing of the contract between the candidate and the Kozloduy NPP, and continues until the end of employment. Before admission to work alone, newly recruited workers and professionals need to complete an initial training in order to: acquire knowledge and skills related to operation and maintenance of specific SSCs, procedures, technologies and operating instructions, specific requirements for nuclear safety and radiation protection, and also to form relationships, ensuring high safety culture. Knowledge and skills, obtained after the initial training is maintained, further developed and build within continuous training – periodic and extraordinary, to carry out specific or rarely occurring tasks.

The initial training for a job position (for newly appointed workers or as preparation for taking a new position related to safety) is conducted as an off-the-job training.

Refresher training for groups A and B staff is held annually on the basis of training programmes. Training is carried out only off-the-job. Topics include refresher courses, topics of the initial training programmes, modifications to SSCs, regulations and internal documents, etc.

For the rest of the personnel, refresher training is conducted on the basis of schedule plans or individual requests. It varies in duration according to the position type, the needs of

individuals/jobs, changes to SSCs, documents, etc. It can be either on-the-job training or off the job training.

Training on a full-scope simulator (FSS) is mandatory for shifts personnel Group A, and its duration differs depending on the job. The initial FSS training lasts from 20 days to 3 months, while the annual refresher training takes from 5 to 10 days. The scope and duration of simulator training are specified in the programmes for specialized training - initial and refresher.

Capability of the simulator to accurately reflect processes, systems and components and the scope of the simulated processes

The requirements for establishing and maintaining the compliance of the full-scope simulator with the reference unit are provided in the Regulation on the Conditions and Procedures for Acquiring Professional Qualification. For developing and maintaining the physical and functional accordance of FSS for WWER-1000 with the prototype unit – Kozloduy NPP Unit 6, international, national and factory regulatory documents and standards are followed, such as IAEA TECDOC-685, ANSI/ANS-3.5.

The scope and quality of simulation models in the full-scope simulator for units 5 and 6 (FSS-1000) ensures its adequate functioning as a training and engineering tool for initial and periodic training and evaluation of operations personnel. The man-machine interface (MMI) is a copy of the main control room, while the simulation model supports capabilities to operate under different modes, such as normal operation, transients, and design basis accidents. This creates the conditions needed for the operators to perform the same actions and the same procedures for control of the processes and systems on the reference unit.

The technical characteristics of FSS-1000, allows the facility to be used also as an engineering tool for the validation of symptom-based emergency operating procedures, testing of design modifications, testing of technical solutions, testing of operations instructions and procedures, and analysis of operational events. For the operations of FSS-1000, have been developed and implemented internal documents such as “Instruction to Ensure Compliance of the Engineering Tools for Training with the Equipment at the Workplace”, “Instruction for Elimination of Simulator Non-compliances”, and the “Simulator Functional Testing Procedure”.

At the end of each year, an annual plan is prepared, related to maintain the FSS-1000 in conformity with the reference unit. The plan includes analysis of the planned changes and modifications on the unit, associated with the FSS-1000 configuration, description of the necessary activities and conditions, deadlines and responsible persons for their completion.

Arrangements for training of maintenance and technical support staff

The arrangements for training of the maintenance and technical support staff are similar to the activities, described in the section above: “Arrangements for Initial Training and Retraining of Operational Staff”. Kozloduy NPP has facilities for training of maintenance personnel, equipped with appropriate mock-ups and technical means. Before the implementation of complex maintenance operations or operations with increased dose rates, trial activities are carried out on mock-ups in order to familiarize the maintenance personnel with the implementation of the work.

Prior to the implementation of significant modifications, and in case of necessity, extraordinary pre-job briefings are conducted for the personnel to get an insight, and after the modification implementation, the personnel is briefed on the analysis of the maintenance activity performed.

Improvements to the training programs as result of safety analyses, operating experience, development of training methodologies and practices, etc.

The annual analyses performed on the training efficiency, are the basis for planning and taking of corrective actions to improve all activities, associated with the training process. The training

efficiency assessment is a joint activity between the training organization and the plant organizational units. The training efficiency is evaluated on the grounds of data analysis from various sources.

- Feedback or inquiry forms filled in by trainees, observers or managers;
- Results from the training;
- The reflection in the training process of modifications to SSCs, operations procedures, operational experience, etc.

The results from the training efficiency analysis serve as a basis for assessment of the needs of: personnel training; training programmes development, improvement or updating; organizing and holding of initial, refresher or extraordinary training; development, improvement and keeping up-to-date of training materials and engineering training means.

Nuclear Regulatory Agency

Measures for competency developing and maintenance

The NRA leaders with the “Declaration for policy about personnel qualification” have declared that a key factor for implementation of the main regulatory body mission is the continuous development of highly competent and well-motivated personnel.

In accordance with these requirements, NRA implements consistent approach for increasing the effectiveness of employees work and for achieving the strategic aims of the organization. Education and training to improve expertise and skills take into account the specificity of individual positions and the future challenges, facing the organization. In order to implement a systematic approach at all stages, a Competency and Training Management System is being developed at the NRA. Currently, in accordance with the NRA organizational structure, competence matrices have been developed and adapted for the main positions and directions. A program is developed for determining the need of personnel training on the base of IAEA document TECDOC-1254, taking into account the NRA specifics and on the base of Safety Standards Series No.GS-R-1 and IAEA-TECDOC-525 requirements. A Software Tool Kit has been developed and implemented for statistical data processing to allow determining the needs for periodic training and setting appropriate priorities.

The personnel training includes training for administrative skills increasing, performed by the Institute for Public Administration and European Integration, as well as specialized training for increasing the expert knowledge and skills. Regulator’s employees are involved in trainings and specializations organized by IAEA, EU and other international organizations. Each year, an annual plan for training of administrative employees is developed, as it is obligatory for newly employed staff and those assigned for a first time on a leader position.

As a result, the Agency has continued its policy of employing young people, the greater number of whom joins the regulator straight from the university. Each newly recruited employee is developed an individual training programme on the basis of his/her job description and analysis of the necessary competences and skills. The programme consists of theoretical training, practical training and coaching. As an example of practical training, in 2012 for six newly employed inspectors was conducted a three-month training on Kozloduy NPP site with preliminary agreed programmes. The training provided the young inspectors with the opportunity to get close knowledge on the Kozloduy NPP site and the facilities located there, as well as to take part in the on-site inspection activities.

NRA makes periodic re-assessment of the risk of loss of knowledge due to retirement or leaving of key staff, or inefficient transfer of knowledge and skills within the organization. It should be noted that nearly half of the employees are up to 45 years of age, allowing for continuity of knowledge and professional experience.

Article 8 – Information to the public

Member States shall ensure that information in relation to the regulation of nuclear safety is made available to the workers and the general public. This obligation includes ensuring that the competent regulatory authority informs the public in the fields of its competence. Information shall be made available to the public in accordance with national legislation and international obligations, provided that this does not jeopardise other interests such as, inter alia, security, recognised in national legislation or international obligations.

The open dialog with all stakeholders on the issues of using atomic energy for peaceful purposes, clearness of actions in taking decisions, ensuring the access of information to the society, are key issues for the regulatory activity effectiveness in Bulgaria.

According to the ASUNE, the NRA provides the public with information about the condition of the nuclear safety and radiation protection in normal operation, as well as in emergency situations. In addition, in accordance with the Regulation on emergency planning and emergency response in case of nuclear or radiological emergencies, NRA is obliged to inform the society in case of emergency and periodically to inform till the final liquidation of emergency's consequences.

NRA tools for informing the society are the following:

- Web-page;
- Annual report;
- Interaction with the media;
- Press-releases.

The web-page is one of the main communication channels for information giving to the society. There is information about the status of nuclear safety and radiation protection, actual public information about the events at nuclear facilities and events with sources of ionizing radiation, as well as the NRA activities. On the web-page, the NRA annual reports are also published since 2003 till now, Republic of Bulgaria National reports on the implementation of state's obligations related to the Convention for Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Reports on implementation of state's obligations related to IAEA codes and in implementation of European Directives in the field of radiation protection are also available. The information mentioned is available in Bulgarian as well as in English.

On the web-page public registries are also available of licences and permits issued for nuclear facilities and activities with sources of ionizing radiation, licences for conduction specialized training and certificates of competency for performing activities with sources of ionizing radiation and for working in nuclear facilities.

The NRA annual report is another mechanism, used by the regulatory body for informing the society. In it information about NRA activity is presented, including interactions with other parties in the field of upgrading the nuclear safety and radiation protection. The document is spread in the government, among the main licensees, foreign regulatory bodies and all stakeholders. The report is also available in English.

NRA has the task to guarantee the timely informing of the media for all that happens in the field of nuclear safety and radiation protection. The communication upgrading between specialists expert language and this of an ordinary man on such an important topic is a challenge. For this purpose, NRA organizes seminars for journalists training in which traditionally participate representatives of the national media as well as public relation experts of stakeholders. On these seminars, the journalists become familiar with the terminology and innovations in nuclear

technology and its applications which helps for more correctness in electronic and paper media publications.

If necessary, NRA organizes press-releases for giving information about:

- NRA activities;
- Activities and events in the field of nuclear safety and radiation protection which are interesting for society;
- Incident or accident in nuclear facility or with source of ionizing radiation in the country or neighbor country in increased public interest;
- Major accident in nuclear facility or with source of ionizing radiation beyond state borders, but with global consequences;

The expert responsible for public communication is also a member of the NRA emergency team and his/her responsibilities and obligations during an emergency are described in separate document. The information needed to be prepared in such case contains the following:

- What has happened (brief, understandable and clear description of the event);
- Is there an increase of the radiological gamma-background and where;
- Are there people hurt;
- Is there a risk for the population and environment. If there is danger, what measures should be implemented at this stage;
- Preliminary evaluation of the event on the IAEA INES scale (Integrated Nuclear and Radiological Event Scale).

In accordance with the Act for Access to Public Information, NRA developed an instruction for ensuring the availability of official and professional information. Cases of refusal and mechanisms for appeal are described in the Act for Access to Public Information.

After the Fukushima accident, NRA reviewed the existing bilateral agreements with the neighboring countries for early notification and information exchange in case of radiological incident. In process of preparation are new bilateral agreements for signing with the regulatory bodies of Turkey, Greece, Serbia and Romania. In March 2014 a new agreement was signed with Russia. In this way Bulgaria fulfills the requirements of the second extraordinary meeting on CNS from August 2012 and of the IAEA Action Plan for nuclear safety.

According to these agreements, NRA gives the information requested and assures the means necessary for notification. The Ministry of Interior informs the diplomatic corps and Republic of Bulgaria representatives in other countries in case of nuclear or radiological emergency.

List of secondary legislation related to ASUNE

1. Regulation for the procedure for issuing licenses and permits for safe use of nuclear energy
2. Regulation on ensuring the safety of nuclear power plants
3. Regulation on ensuring the safety of research nuclear installations
4. Regulation on basic norms of radiation protection
5. Regulation for radiation protection during activities with sources of ionizing radiation
6. Regulation for radiation protection during activities with radiation flaw detectors
7. Regulation on radiation protection during work activities with materials with increased concentration of natural radionuclides
8. Regulation on the terms and procedure for obtaining of vocational qualification and on the procedure for issuing of licenses for specialised training and of individual licenses for use of nuclear power
9. Regulation for the provision of physical protection of nuclear facilities, nuclear material and radioactive substances
10. Regulation of the conditions and procedure for notification of the Nuclear Regulatory Agency about events in nuclear facilities and sites with sources of ionizing radiation
11. Regulation on emergency planning and emergency preparedness in case of nuclear and radiological emergencies
12. Regulation for the conditions and procedure for establishing of special-statutory areas around nuclear facilities and facilities with sources of ionizing radiation
13. Regulation for the conditions and procedure for transport of radioactive material
14. Regulation for safety of spent fuel management
15. Regulation on safety during decommissioning of nuclear facilities
16. Regulation for safe management of radioactive waste
17. Regulation on the terms and procedure for delivery of radioactive waste to the Radioactive Waste State-Owned Company
18. Regulation on the terms and the procedure for collection and provision of information and for maintaining registers on the activities pertaining to the application of safeguards in Connection with the Treaty on the Non-proliferation of Nuclear Weapons
19. Regulation on the terms and procedure for exemption of small quantities of nuclear material from the application of the Vienna convention on civil liability for nuclear damage
20. Regulation on the procedure for payment of the fees collected pursuant to the Act on the Safe Use of Nuclear Energy

Integrated Regulatory Review Service in Bulgaria

Upon the request of the Government of the Republic of Bulgaria, from 6th to 19th April 2013, a team of leading international experts conducted full scope Integrated Regulatory Review Service (IRRS) of the regulatory activities in Bulgaria. Such missions were conducted in 1997 and 2003. In the mission, representatives of the National Centre of Radiobiology and Radiation Protection (NCRRP) at the Ministry of Health (MH) also took part in terms of their responsibilities for the radiation protection of patients, personnel and the public.

The objective of the mission was to review the effectiveness of the Bulgarian regulatory body and exchange regulatory information and experience in the area of nuclear safety and radiation protection, safety of radioactive waste and transport of radioactive material. The mission provided an impartial assessment on the nuclear regulatory practices against the IAEA Standards and Guidelines, and good international practices. The team was provided by NRA with preliminary materials and documentation, including the results of the Agency's self-assessment (covering the period September 2011 – December 2012) and the Plan for Improvements, issued following the self-assessment.

The mission team consisted of 25 experts (16 senior experts from IAEA Member States, six IAEA staff members and three observers). The review included all regulatory areas, such as: responsibilities and functions of the government; global nuclear safety regime; responsibilities and functions of the regulatory body; management system of the regulatory body; licensing, review and assessment; inspection; enforcement measures; regulations and guides; emergency preparedness and response; control of medical exposures; occupational radiation protection; control of discharges and materials for clearance; transport of radioactive substances; radioactive waste management and decommissioning; environmental monitoring; interface with nuclear security.

The scope of the mission covered all facilities and activities regulated by the NRA: the KNPP nuclear units (two in operation and four in decommissioning); the SF and RAW management facilities; facilities and activities with sources of ionizing radiation; and transport of radioactive substances. The mission review paid special attention to the Fukushima Dai-ichi NPP accident and the respective IAEA Nuclear Safety Action Plan. A number of issues concerning the Bulgarian regulatory practice were reviewed and discussed: Long-term operation of NPPs, and Naturally Occurring Radioactive Material (NORM) legislation and practices.

The mission provided exceptional opportunity for exchange of information and expertise between the team members and their colleagues from the NRA and the NCRRP. To evaluate the regulatory system effectiveness a number of interviews and discussions were held with the NRA staff. The mission team observed also NRA inspection performance on-site of Kozloduy NPP and SE RAW, and two other facilities with industrial and medical sources (the Permanent Repository for RAW at Novi Han, and the Tokuda Hospital in Sofia). Additionally, the team witnessed the emergency response drill at the NRA. In the mission report the team stated they had received full cooperation and support on all matters, and specially highlighted the openness and competence of Bulgarian experts.

The report concludes that:

- Bulgaria has a clear national policy and strategy for safety, supported by a definite security framework;

- NRA operates as an independent regulatory body and conducts its regulatory processes in an open and transparent manner;
- In response to the Fukushima accident, the NRA reacted and communicated promptly and effectively with interested parties.

The mission identified a number of good practices and made some recommendations and suggestions that shall contribute to enhancing the regulatory frame efficiency. Some of the strong points and good practices are as follows:

- A no blame policy is applied for investigation of nuclear events and radiation safety-related events, supported by a regulatory framework;
- The TSOs support system, adopted by the NRA, is a good basis for more efficient use of the competence available;
- The process in effect for developing and revising of Regulations and Guides is well structured and includes active participation of all stakeholders;
- The NRA has a clear policy of public transparency and openness, which covers provision of information on safety related events and the role of NRA in emergencies;
- A National radiation dose registry has been set up, including comprehensive medical and radiation dose information, which allows the conduct of detailed cause-effect analyses.

The team also identified the following issues that require additional attention or improvement:

- Distinguishing of responsibilities among organizations that regulate and control radiation protection activities;
- Filling up vacant staff positions;
- Development of an integrated management system;
- Establishment of formal public consultations in the final phase of the licensing process;
- Improvements on the procedures and instructions for safety assessment and analysis;
- Optimization of the inspection process;
- Development of additional regulatory guides.

The mission report is published on the NRA site. The conduct of this review mission also complies with the IAEA Nuclear Safety Action Plan in terms of strengthening the role of peer reviews. Reporting of the mission conclusions and findings in this report is consistent with the results from the 2nd Extraordinary Meeting under the CNS, in August 2012.

Implementation of regulatory requirements and measures of operating organization for safety verification

As required by the Regulation on Providing the Safety of Nuclear Power Plants, the technical and organizational arrangements of the operating organization shall include responsibility to maintain the SSCs important to safety in good condition. This shall be done through early detection of defects, taking preventive measures, replacing structures and components with expired lifetime, and operation of an effective system for recording of activities and the in-service control.

Structures, systems and components, important to safety, their composition, location and operational status shall ensure fitness for testing, maintenance, repair, inspection and control throughout the lifetime of the NPP, without significantly reducing their operational availability. The monitoring programme of reactor coolant circuit shall ensure monitoring of the impact of irradiation, the formation of cracks by stress corrosion, embrittlement, and ageing of structural materials, especially in places with high levels of radiation and other factors. The status of the basic metal and the welded joints of SSCs important to safety shall be monitored periodically, through qualified non-destructive testing in respect to areas, methods, detection of defects and efficiency, using specifically established procedures.

The operating organization shall develop, periodically review and implement programmes for testing, maintenance, repair, inspection and control aimed at maintaining the availability and the reliable operation of structures, systems and components, important to safety, in accordance with the design and throughout the lifetime of the NPP. The frequency of tests, maintenance, repair, inspection and control should be based on:

- safety importance;
- reliability and the manufacturers' requirements;
- operational experience and results of the in-service control;
- possible impact of the performed activities on the safety of the NPP.

Procedures shall be developed for the implementation of different types of testing, maintenance, repair and inspection and control activities, in accordance with the quality management system.

Main elements of the programmes for continued verification of safety (operational control, supervision, functional test of systems, etc.)

The documents that are used to verify the technical condition of the SSCs of Kozloduy NPP Units 5 and 6 are:

- schedules of activities during annual outages and refuelling for each unit;
- programmes (for start-up and shut-down of the units, testing of equipment during start-up and shutdown, etc.) for annual outages and refuelling;
- programmes for re-licensing of pressure vessels and pipes;
- programmes for in-service control of the basic metal, welded surfaces and joints of primary and secondary circuits equipment and pipelines;
- equipment corrosion condition control programme;
- specific programmes to evaluate the radiation ageing of reactor vessels;
- control programme of reactor installation load cycles;

- control programme of nuclear fuel load cycles;
- programmes for functional testing of systems, important to safety;
- report on neutron-physical characteristics of the new reactor core and analysis of compliance with the accepted criteria.

The programmes are implemented by qualified personnel, mainly from the operating organization. Part of the operational control of the metal, selected maintenance activities and some specific activities are performed by external organizations.

Kozloduy NPP has implemented a Programme for Units 5 and 6 Equipment Surveillance, which covers all the planned activities performed to verify the units compliance with the design operational limits and conditions, and in due time detecting deterioration of SSCs properties, which could result in violation of the conditions and limits for operation.

Surveillance Programme

The objectives of the Surveillance programme of Units 5 and 6 are:

- verification that the design conditions, under which plant safety has been justified, are maintained during operation;
- verification that safety level is in compliance with the requirements and provides for sufficient margins during anticipated operational events, personnel errors and equipment failures;
- maintenance and improvement of equipment preparedness, confirmation of respective operational limits and conditions;
- detection and elimination of any violation from normal operation, before the occurrence of significant implications to safety.

To achieve these objectives, the programme was developed taking into account the requirements of the SAR, the technical specifications, results of reliability analysis of the safety systems (based on real data for failures and defects), operating experience, manufacturers data and requirements, requirements of the control authorities and statutory technical documents related to the specific surveillance activities.

The surveillance programmes pays particular attention to the control of:

- protective barriers condition;
- safety systems availability;
- availability and operability of systems important to safety;
- availability and operability of systems (elements) for normal operation, whose failure could result in decrease of the unit electrical output.

The programme is valid for all activities related to:

- Control of the unit parameters, the unit and the common plant systems;
- Check and calibration of instrumentation;
- Testing of components and systems;
- Evaluation of the results of the above activities;
- Feedback used as a basis to determine the scope and the type of the administrative, technical and practical measures that are undertaken as a result of the established deviations.

Main documents and principles used for the Programme development

The Surveillance Programme was developed on the grounds of the regulations in force, which are relevant to the control and surveillance of systems and facilities in NPP, the Quality Assurance System in Kozloduy NPP and the IAEA recommendations.

The frequency and the scope of surveillance for each SSC is determined on the basis of their relative importance to safety. Furthermore, the access restrictions and the requirements for maintaining the personnel exposure dose as low as reasonably achievable (the ALARA principle), should be taken into account.

Due to the wide range and diversity of the surveillance activities, and the specific requirements of the statutory technical documents for the specific surveillance areas, the management system for the surveillance programme activities was developed at four levels - Technical specification, administrative and operating instructions, operational documents for the implementation of specific activities, and implementation of surveillance and recording the results thereof.

An Annual Report on the activities of Kozloduy NPP units 5 and 6 is prepared at the beginning of each year. It evaluates the control and the surveillance activities during the previous year.

Risk-informed approach

In 2008 the Pilot Project for the operations optimization, maintenance and repair of Units 5 and 6 was completed. It was based on the results of the PSA - the so called Risk-informed Approach. The study covered the following areas:

- Non-destructive control of the equipment;
- Periodical equipment testing;
- Maintenance of the equipment.

The results of the pilot project include the following major sections:

- Changes in frequency, scope and type of non-destructive testing;
- Assessment of the tests scope and frequency;
- Assessment of the maintenance scope and frequency;
- Assessment of the rest lifetime of Safety Systems equipment;
- Reliability analysis of the SS electrical equipment, replaced during the Modernization programme;
- Criteria for testing and acceptance of the SS equipment after maintenance and repair;
- Analysis of the existing legislation on the technical specifications in place;
- Assessment of the respective safety margins.

A Risk Monitoring Model was developed for the daily risk assessment of units 5 and 6. The Safety Monitor (SM) software is used. Based on the update of the integral model of PSA Level 1, the risk monitoring model is also being updated. For that purpose the Risk Watcher software is used.

Elements of the ageing management program:

Kozloduy NPP applies an Ageing Management Programme to identify all ageing mechanisms of SSCs important to safety, and to determine the possible consequences of the processes and the possible measures to restore the operability of the impacted SSCs.

The selection of SSCs, covered by the Ageing Management Programme and subject to monitoring and evaluation of the rest lifetime, was made in respect to safety, based on the following criteria:

- Criterion 1 - SSCs of great importance to safety, i.e. their classification and qualification is taken into account;
- Criterion 2 - SSCs of great importance to plant lifetime – components are considered, which are not important to safety, but the failure of which may prevent the fulfilment of the safety functions;
- Criterion 3 - SSCs which are proven to be able to perform safety functions, when required during their lifetime;
- Criterion 4 - rationality. When selecting the SSCs for lifetime support, realistic possibilities for failures, any possible degradation, inspection interval and functional limitations shall be taken into account;
- Criterion 5 - economic efficiency. SSCs from the Safety Systems and the Safety-related Systems, whose rest lifetime should be maintained, shall be selected in such a way as to have optimum economic efficiency.

The activities related to the establishment, maintenance and review of the qualification status of SSCs important to safety are presented in the Quality Procedure "Kozloduy NPP units 5 and 6 Equipment Qualification Management".

Separate from this, as part of the Qualification Programme for SSCs from the Safety Systems and the Safety Related Systems, a Safety Shutdown Equipment List was developed (SSEL). This document includes:

- Safety Shutdown System List (SSSL);
- Safety Shutdown Equipment List (SSEL);
- Harsh Environment Component List (HECL);
- Severe Accident Management Parameters Control and Measurement List.

The following major measures were implemented on the equipment from the Safety Shutdown Equipment List (SSEL), under the Investment programme of Kozloduy NPP:

- Development of design-technical documentation of the Control Safety Systems, supply, dismantling of old equipment, installation and adjustment of new equipment;
- Replacement of batteries in DG stations with seismically qualified;
- Supply of cylinders for vast isolation valves for the steam-generators make-up system;
- Replacement of breakers in switchgear 0.4 and 6 kV.
- Seismic qualification and strengthening of unqualified equipment on seismic impact equipment of Kozloduy NPP Units 5 and 6, which is necessary for reactor safe shutdown and keeping it in subcritical condition.

A number of new measures are also under the way or planned:

- Seismic qualification of equipment that has not been qualified according to seismic impact, which is required for the safe shutdown of the reactor and for maintaining its subcriticality;
- Supply of pressure pickups qualified for HELB conditions. Replacement of stands, instrumentation sensors leads, cables and cable routes of equipment installed in the area impacted by the HELB environmental conditions;
- Design and installation of a new system for measurement of Primary circuit legs temperature;
- Design, supply and replacement of reliable power supply devices for units 5 and 6 Safety Systems;

- Qualification of Steam Dumps to the Atmosphere to operate with two-phase environment and in HELB mode, etc.

In-service control is performed over the rest lifetime and the SSCs qualification, under approved procedures, within the Maintenance and Operations Programmes, for instance:

- of welded joints, anti-corrosion build-ups, base material in stress concentration areas and areas located against the core, pipelines radius reducers, packing surfaces of covers and bodies, supports, studs, metal in threaded joints and bearing surfaces of hold-down rings, headers welded joints, tube plates of SG, sections with water-steam phase transitions, welded sections of reducers between connections and bodies, connections of pipes and T-junctions to bodies, etc.
- of metal mechanical properties by applying periodic control of surveillance specimens, metal cut-outs (destructive method), determining hardness;
- through monitoring and measurement of various parameters in the process of operation by using diagnostic systems, mechanical or optical measuring devices, thickness testing, ultrasound control, etc.
- by the results from the hydraulic strength and ductility tests;
- of the lifetime based on the number of cycles, hours of failure-free operation, chemical index, etc.

Arrangements for internal review by the licence holder of safety related cases to be submitted to the regulatory body:

Consideration of issues and solving of safety related problems shall be subject to review and discussion by a wide range of specialists. This is organized through Expert Councils, with the appropriate status and rights. Depending on the scope of the issues under review, the following types of councils are established:

- Safety and Quality Council - on issues, common to the company, related to the safety and quality during operation, maintenance and reconstruction, management of the nuclear-fuel cycle and radioactive waste, maintaining emergency preparedness, decommissioning of nuclear facilities.
- Safety Council - on issues relating to:
 - units start-up and shut down programmes, functional testing, design modifications, documents concerning the systems important to safety;
 - analyses of events, corrective and preventive measures, including the operational experience of other NPPs;
 - matters related to the quality assurance system;
- ALARA Council;
- Operational Experience Council;
- Expert Technical Council - on issues related to technical or technological developments and proposals for design modifications to equipment and systems in particular specialized areas.
- Safety Culture Council - on issues related to the safety culture.

Measures of operating organization for safety improvement

Kozloduy NPP Units 5 and 6 designs were developed in the early 80's, in the former USSR, based on the unified reactor design WWER-1000/V-320. Safety principles and criteria on which the original design is based are included in the part of the design "Technical justification of safety". The basic design principles and safety criteria are defined in compliance with "General Provisions for Ensuring the Safety of Nuclear Power Plants during Design, Construction and Operation" (ОПБ-88/97) (ИИАЭ Г-01-011-97), Moscow, 1998" ("General Provisions for Ensuring the Safety of Nuclear Power Plants during Design, Construction and Operation").

The main principle incorporated in the design is to provide protection of the staff and public from external and internal exposure and protection of environment from contamination by radioactive substances. The project was developed based on a conservative approach and provides inherent safety of the reactor. The design provides technical measures and means, directed to ensuring safety in case of a single failure of a normal operation device, which may coincide with a long lasting hidden failure of another normal operation device. Together with the failure of a normal operation device, a failure of one of the independent active protection devices and one of the independent active localization devices is considered. Protective and localisation devices perform their safety functions in all design accident conditions, including the so-called "maximum possible design basis accident" and they have characteristics, sufficient to perform their functions, and have triple redundancy, including power supply. The primary coolant boundary is located completely in the containment. All containment penetrations are equipped with localizing devices and individual testing devices are provided for penetrations which have seals to withstand design pressure.

The technical design specifies as a Maximum DBA the sudden guillotine break of a main coolant pipeline, in the case of a complete loss of internal power supply, and in the event of a maximum design earthquake (SL-2).

Existing Units 5 and 6 symptom-based emergency operating instructions (EOPs) and severe accidents management guidelines (SAMG) define staff actions for diagnosis of the unit status, restoration or compensation of violated safety functions and prevent or mitigate the consequences of core damage.

At the end of 2011, as a result of the Fukushima accident are reviewed and updated the existing site internal and external emergency plans. A secured Emergency Response Centre (ERC) is situated on site, which is equipped with means for continuous monitoring of the parameters of the nuclear facilities and the site, the meteorological situation and emergency means of communication. The communication tools allow emergency personnel to carry out coordination activities with local and national structures. Under the National Action Plan following the Fukushima accident, an additional off-site Emergency Response Centre is planned.

The used basic design principles and safety criteria, including application of independence, redundancy and diversity, as a whole fulfil the main concept for Defence in depth, as defined by IAEA INSAG-3, revised by INSAG-12.

The results of the updated safety analysis, including accident analyses carried out using up-to-date computer codes, as well as the periodic safety reassessment show that are ensured reliable levels of protection, including maintaining of normal operation, preventing accident development and mitigation of the consequences from design basis accidents. Moreover, the analyses confirm safety is also ensured during BDBA without significant core damage, including Anticipated Transients without Scram (ATWS). Specific components and systems have been installed to reduce the consequences from BDBA, in order to protect the personnel and public.

With regard to external initiating events of natural origin - during the stress tests at Kozloduy NPP was indicated that the margin of Units 5 and 6, in terms of earthquake, represents 0,13 g or 65% compared to RLE (PGA = 0,2 g), i.e. the Units can withstand without damage of the fuel an earthquake 1.65 times greater than the RLE. Equipment, which is important for safety and participates in emergency scenarios is analysed for seismic resistance, parameters of functions describing its conditional probability of failure are defined (fragility curves). Certain limit values of seismic acceleration that any nuclear facility can handle without getting to severe fuel damage and release of radioactive substances into the environment. From the above follows that the analysis of beyond design basis seismic impact is sufficiently conservative and gives confidence that in seismic terms, SSC are able to ensure the safety of the plant at the maximum possible for the site seismic impacts.

Also for the purpose of stress testing is defined the maximum water level (MWL) and its duration, the possibility of locking the Danube by ice is examined; the ability of combination of MWL with other hazards is evaluated. Analysis of the results confirms that no overflow of Kozloduy NPP is possible.

Degree of use of design principles

The design of Kozloduy NPP Units 5 and 6 SSC, important for safety, uses design solutions based on a passive principle of actuation, fail-safe principle and inherent safety features (self-control, thermal inertia and other natural processes). The presence of internal self-protection and passive elements of safety systems provide significant safety margins for a successful and long-term reactor cool down.

Specific technical solutions, applied in the design of safety systems, are related to the implementation of the basic requirements of the regulations – multi-channel structure (redundancy), physical separation and diversity. Multi-channel design allows the safety system to perform its functions independently of any failure of one channel (single failure). Automatic devices are triggered by signals, generated by comparing several measurements, in order to prevent spurious actuation of the safety systems in accidental deviation in measurements. Physical separation of channels is achieved through the placement of each channel in separate rooms with separate cable runs. This feature allows the successful work of the safety system, even in the event of failure of one channel due to internal events (fire, explosion, heat, flood, etc.). Diversity of physical principles in safety systems design is applied by using both active (pumps, electric valves) and passive devices (pressurized tanks, return valves), in order to eliminate the possibility of failure of all safety systems, due to common cause (power supply, working environment, etc.). The combination of redundancy, diversity and physical separation ensures safety systems protection from common cause failures.

Implementation of design measures or modifications to prevent beyond design basis accidents or to mitigate radiological consequences

As part of Units 5 and 6 design modifications, over the past five years have been installed additional systems for monitoring, qualified for conditions of beyond design and severe accidents:

- system for measuring the temperature at the exit of the core and the level in the reactor vessel, with a working range of the sensors to 1200 ° C;
- sensors with extended measurement range of the radiation within the containment, with measuring range 109 ÷ 1015 Bq/m³ and 102 ÷ 106 Gy/h;
- system for wide-ranging temperature control of the reactor vessel, with measuring range 500 ÷ 1300 ° C.

Data from the measurement channels of these systems enter into a Display System of parameters that are important for safety and a critical parameters monitoring system (PAMS), which are

installed in the main control room (MCR), the emergency control room (ECR) and the Emergency Response Centre (ERC). In connection with the installed alternative feeding water system for the steam generators, in case of accidents with total loss of electrical power (blackout), measures have been taken to provide additional power supply from 2 Mobile DGs for the two units. The existing batteries at units 5 and 6 had been replaced, thereby the time for which they provide power consumers was increased from 30 minutes to 2 hours. Tests conducted, after the Fukushima accident, on the new batteries show that capacity is sufficient to provide up to 11 hours of power to required users. As a result of the analysis on the necessary equipment for severe accidents management, the power supply of the valves of the emergency gas removal from the primary circuit and the fast acting valves between the primary circuit and the hydro-accumulators was changed, as at present they are powered by the batteries.

Implementation of these measures together with the developed SAMGs result in improved the protection of primary circuit and containment boundaries, so as to reduce the consequences of severe accidents, to reduce discharges of radioactive substances to the environment and to bring reactor installation into controlled state.

Improvements implemented for designs for NPPs as a result of deterministic and probabilistic safety assessments

In Kozloduy NPP, additional analyses and studies are performed, aimed at improving the sustainability of Units 5 and 6, in terms of beyond design basis and severe accidents. In this regard analysis and evaluation of the possibility of using part of the existing at Units 3 and 4' equipment, related to the management and mitigation of beyond design basis and severe accidents, were performed. As a result decisions were taken to implement the following measures:

- Installation of PAR of hydrogen, in addition to the existing ones at Units 5 and 6, in order to allow for the recombination of generated hydrogen, as a result of the interaction between concrete and core melt at the outer vessel phase of a severe accident.

An implementation is provided for:

- Expansion of the system for volumetric measurement of the concentration of gases and steam at units 5 and 6, in order to support decision making by operators in the event of a severe accident.

Based on the results of the probabilistic safety analyses were made suggestions for changes to improve the safety of Units 5 and 6 of Kozloduy NPP in the following major areas:

- Emergency procedures and training;
- Planning of annual outages and maintenance schedules, and organization and control of maintenance activities;
- Systems design and technological requirements;
- Evaluation of seismic risk;
- Analysis of risk of internal and external fire.

The main part of the performed modifications required to bring the units in accordance with the international recommendations, regarding the safety and reliability are the result of the implementation of the modernization program of Units 5 and 6 (completed 2008). This program included 212 measures to improve safety, operations and reliability of the units.

Two thirds of the modernization measures were directed to improvement of units' safety and equipment reliability. Various studies were conducted in different aspects of safety such as:

- 5 neutron-physical analyses;

- 32 thermal-hydraulic analyses;
- 4 radiological analyses;
- 7 mechanical strength analyses.

In the frames of the modernization program, significantly had been expanded the spectre of analyses to determine the capabilities of the units to control the design and beyond design basis accidents.

The most important results of this analysis are:

- Survey on the risk of brittle fracture of the reactor vessels confirmed that the operational lifetime of the reactor pressure vessels is provided for a long enough period of time, under the current schemes of core refuelling. Moreover, after the implementation of the recommendations of the reports on other measures of the Program, the resources of the vessels can be further increased;
- Modified algorithms for certain protections and interlocks (level control in the SG, management of reactor power), improve the sustainability of the unit in dynamic transients. Thus, reducing the possible deviations of parameters from the operational limits reduces the frequency of occurrence of emergency processes;
- Analyses of various transient processes, as a result of initiating events with extremely low incidence, demonstrate the inherent safety of the reactor core;
- The considered large, medium and small leaks from the primary circuit and the radiological consequences of inter system leaks, confirm the ability of the current safety systems to bring the units in a safe subcritical condition, to ensure core cooling and limit radioactive releases within the established norms.
- Sufficient seismic stability and margins of the civil structures related to safety at the designated site new seismic impact $SL-2 = 0.2g$. For this purpose 27 analyses were performed on equipment and 47 analyses of the pipelines.

A number of measures are implemented to fix known design deficiencies of Units of WWER-1000/V-320 type. Entirely new systems, not included in the initial design are installed, such as:

- A system for continuous monitoring and recombination of hydrogen, which prevents the possibility of explosion, due to accumulation of hydrogen in the containment in the event of a design basis accidents;
- Strengthening of the main steam and feeding water piping, against local mechanical effects due to tears;
- System to measure and control the level of the coolant in the reactor vessel, needed for the management of transients (accidents with small loss of coolant, leaks from the primary to the secondary circuit and cooling without running main circulation pumps);
- Automatic system for protection from cold overpressure of the reactor vessel during shut down and start-up operation modes;
- Filtered ventilation system to protect the containment from loss of structural integrity and minimize radioactive releases to the environment in terms of beyond design basis accidents;
- System for continuous monitoring the insulation of 6 kV motors in standby mode;
- System for alternative feeding the steam generators, powered by mobile diesel generators;
- System for wide-ranging temperature control of the reactor vessel;
- Additional diesel generator for each Unit, supplying the sections for normal operation.

Financial resources on NFD and RAW activities

Kozloduy NPP payments to “NFD” Fund and “RAW” Fund, (thousand BGN)

No.	Period	NFDF	RAWF	Total for NFDF and RAWF
1	1999 – 2012	1 192 506	321 970	1 514 476
2	2011 – 2013	177 544	71 025	248 569
3	2014 (planned)	55 446	22 179	77 625
	2014 (report Jan-May)	26 577	10 631	37 207
4	2015 – 2016 (planned)	117 655	47 062	164 717

Kozloduy NPP

The activities on management of SF, RAW and decommissioning of nuclear facilities and the ensuring and maintaining of safety in the facilities for management of SF and RAW are funded by various sources as follows:

Own resources

To prevent the risk for SF accumulation on the site and as to ensure conditions for safe operation of Units 5 and 6 in accordance with the licences issued by NRA and in implementation of the national “Strategy for safe management of SF and RAW till 2030”, adopted with a Council of Ministers decision from 05.01.2011, Kozloduy NPP should transport minimum 50 tones HM (heavy metal) per year of SF for technological storage and processing till the end of units operational lifetime.

The expenses made by the Kozloduy NPP on SF management, for its storage, transportation and technological processing in Russia, are deductible in determining the price of electricity as stipulated by the sectorial regulator - the State Energy and Water Regulatory Commission. Accordingly, these expenses are financed with own funds - revenue from the sale of electricity.

The unused funds recognized in the price formation for the current are put into savings. The management of these funds is as follows: they are entered into a special account opened by the Kozloduy NPP in a bank under terms approved by the MEET. The accumulated funds in the account shall be used only to cover expenses related to transportation, technological storage and processing of SF, that have remained non completed from previous years.

Fund "RAW" and fund "DNF"

The order for collecting and spending of financial resources in the funds is determined in the Regulation on the order for establishment, collecting, spending and control of funds and on the amount of contributions to fund "RAW" and the Regulation on the order for establishment, collecting, spending and control of funds and on the amount of contributions to fund "DNF".

For the period from 1 January 2008 to 31 May 2014, the contributions of the Kozloduy NPP to the funds, as well as the expenditure made by them are as follows:

"RAW" Fund - collected/spent by the Kozloduy NPP, BGN		
Year	Collected	Spent
2008	22 008 699	0
2009	22 326 047	0
2010	22 164 424	0
2011	25 127 843	0
2012	24 169 127	0
2013	21 728 170	0
by 31.05.2014	10 630 713	0
Total:	148 155 023	0

"NFD" Fund - collected/spent by the Kozloduy NPP, BGN		
Year	Collected	Spent
2008	56 801 506	2 152 171
2009	85 842 654	31 063 999
2010	66 571 599	2 927 290
2011	62 819 608	0
2012	60 422 819	894834
2013	54 301 369	5171
by 31.05.2014	26 576 782	0
Total:	413 336 337	37 043 465

Kozloduy International Decommissioning Support Fund (KIDS Fund)

With resources of the KIDS Fund is financed or co-financed the preparation and implementation of projects on decommissioning of units 1-4 of Kozloduy NPP. For the period 1 January 2008 to 31 May 2014 the expenditure made by the Kozloduy NPP, funded by the KIDS Fund, are as follows:

Expenditure made by the Kozloduy NPP, funded by the International Fund Kozloduy								
According to accounting data, BGN								
Year	2008	2009	2010	2011	2012	2013	01-05.2014r.	Total
Sum	49 040 763	78 113 949	107 679 030	50 350 824	35 546 217	12 952 075	17 911 487	351 594 345

CONTENT

A: Introduction	1
National policy	1
National Nuclear Program	3
Brief information about the nuclear facilities in Bulgaria	4
B: Reporting article by article	8
Article 4 – Legislative, regulatory and organisational framework	8
Article 4 (1) Establishing and maintaining a legislative, regulatory and organisational framework	8
Article 4 (2) (a) National requirements for nuclear safety	10
Article 4 (2) (b) Licensing system	11
Article 4 (2) (c) System of nuclear safety supervision	12
Article 4 (2) (d) Enforcement actions, including suspension of operation and modification or revocation of a licence	15
Article 5 Regulatory body	16
Article 5 (1) Establishment of competent regulatory body	16
Article 5 (2) Independence of the regulatory body	18
Article 5 (3) Provision of the regulatory body	19
Article 6 – Licence holders	23
Article 6 (1) Responsibilities	23
Article 6 (2) Regulatory requirements	25
Article 6 (3) Radiation protection, designing and establishment	30
Article 6 (4) Priority of safety	39
Article 6 (5) Financial and human resources	42
Article 7 – Competency and skills for nuclear safety	46
Article 8 – Information to the public	49
Annex 1	51
Annex 2	52
Annex 3	54
Annex 4	59
Annex 5	63

LIST OF ABBREVIATIONS

ASUNE – Act on Safety Use of Nuclear Energy
BDBA – Beyond Design Basis Accident
BNRP – Basic Norms on Radiation Protection
CM – Council of Ministers
CR – Control Room
DBA – Design Basis Accidents
DNF – Decommissioning of Nuclear Facilities
DoE – Department of Energy
DPA – Disaster Protection Act
DSFSF – Dry Spent Fuel Storage Facility
EMC – Emergency Management Center
ENSREG – European Nuclear Safety Regulators Group
EPA – Environmental Protection Act
EU – European Union
FSS – Full Scale Simulator
GSR – General Safety Requirements
HA – Health Act
IAEA – International Atomic Energy Agency
ICRP – International Commission for Radiation Protection
INES – International Nuclear Events Scale
INRNE-BAS – Institute for Nuclear Research and Nuclear Energy – Bulgarian Academy of Science
IRRS – Integrated Regulatory Review Service
MEW – Ministry of Environment and Water
MH – Ministry of Health
MI – Ministry of Interior
MS – Management System
NCRRP – National Center for Radiobiology and Radiation Protection
NF – Nuclear Facility
NFDF – Nuclear Facilities Decommissioning Fund
NRA – Nuclear Regulatory Energy
PAO – Planned Annual Outage
PSA – Probabilistic Safety Analysis
RAW – Radioactive waste

RAWF – Radioactive Waste Fund
RI – Reactor Installation
SAMG – Severe Accident Management Guides
SAR – Safety Analysis Review
SBEOP – Symptom Based Emergency Operating Procedures
SCEWR – State Commission for Energy and Water Regulation
SERAW – State Enterprise “Radioactive waste”
SF – Spent fuel
SFP – Spent Fuel Pool
SFSF – Spent Fuel Storage Facility
SIR – Source/s of Ionizing Radiation
SIS – System/s Important to Safety
SS – Safety System/s
SSC – Structures, Systems and Components
WANO – World Association Nuclear Operators
WENRA – Western European Nuclear Regulators Association
WWER – Water-water Energy Reactor