NATIONAL
ATOMIC ENERGY
AGENCY

NATIONAL REPORT OF POLAND
ON COMPLIANCE WITH THE OBLIGATIONS
OF THE CONVENTION ON NUCLEAR SAFETY

Polish 8th national report as referred
To in Article 5 of the Convention on Nuclear Safety

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1. Introduction

This report has been prepared, according to the guidelines established by the Contracting Parties under Article 22, to fulfill the obligations of the Article 5 of the Convention on Nuclear Safety (CNS), signed by Poland on 20th September 1994 in Vienna and ratified by the President of the Republic of Poland on 10th May 1995. Present Report is the eight one, following national reports issued in September 1998, October 2001, September 2004, September 2007, August 2010, August 2013 and August 2016. Previous reports were presented during Review Meetings of the Contracting Parties of the Convention on Nuclear Safety held in Vienna in 1999, 2002, 2005, 2008, 2011, 2014 and 2017. Moreover, in May 2012 Poland prepared special report describing "post-Fukushima" actions which was presented during 2nd CNS Extraordinary Meeting held in Vienna in August 2012.

Although **Poland is a contracting party without nuclear installations according to the Article 2(i) of the Convention**, in the current report as well as in the previous ones, information regarding application of provisions of the Convention for Polish nuclear installations (research reactor and spent fuel storages) is presented. Compliance with all articles referring to legal framework as well as establishment, functioning and independence of the Regulatory Body (which in Polish case is the National Atomic Energy Agency - PAA) is also described.

In 2009 the Government prepared "Resolution no. 4/2009 of the Council of Ministers of 13th January 2009 on nuclear power development activities" in which the willingness to embark on nuclear power was made public. On 28th January 2014 Polish Nuclear Power Programme (PNPP) has been adopted by the Council of Ministers. PNPP is a strategic document which presents the roles and responsibilities of the institutions responsible for the implementation of the programme, as well as issues related to nuclear safety and radiological protection. Currently PNPP is subject to review and update with i.a. an aim to align the PNPP with a draft of the *Polish Energy Policy until 2040* (PEP2040), released by the Ministry of Energy in 2018.

Taking into consideration governmental decision on embarking on nuclear power, extensive development of Polish legal framework was performed over last couple of years resulting in amendments of Atomic Law (Journal of Laws of 2018, item 792, as amended, latest amendment in 2019). Most of the supporting regulations establishing more detailed safety requirements have been published between 2011 and 2015. This report presents current legal status of Polish regulatory framework, but it must be taken into account that most of the introduced safety requirements (especially those referring to siting and design requirements) have not yet been used in practice.

During the 7th review meeting 2 challenges were given to Poland:

1. Poland to continue developing its framework to ensure safe implementation of its first nuclear power plant project meeting the harmonized safety expectations (e.g. WENRA safety objectives for new reactors)
2. PAA to continue strengthening its safety culture requiring challenging attitude

Abovementioned challenges have been taken seriously by PAA. Results of activities focused on implementing challenge 1 are described in subsection 7.1 legislative and regulatory

framework. Information on actions taken in relation to challenge 2 are described in subsection 10.1 which deals with safety culture in regulatory body.

President of the 8th Review Meeting informed Contracting Parties on the expectations of reporting on Vienna Declaration principles. Relevant articles and subsections in which Poland reported on principles are presented below:

1. Principles 1 of Vienna Declaration – refer to subsections 17.1, 18.1
2. Principle 2 of Vienna Declaration – refer to subsection 14.1
3. Principle 3 of Vienna Declaration – refer to article 19

During 7th Review Meeting Contracting Parties established nine major common issues arising from Country Group Discussions. The President of the 7th Meeting recommended that Contracting Parties take these issues into account when preparing their National Reports for the 8th Review Meeting. Established common issues with relevant articles and subsections in which Poland reported are presented below:

1. Issue 1 – safety culture – subsection 10.1 – covered by challenge 2 for Poland
2. Issue 2 – international peer reviews - summary
3. Issue 3 – legal framework and independence of regulatory body – subsection 8.2
4. Issue 4 – financial and human resources – subsections 8.1.5 and 8.1.7
5. Issue 5 - knowledge management – subsection 8.1.6
6. Issue 6 – supply chain – article 13
7. Issue 7 – managing the safety of ageing nuclear facilities and plant life extension - subsection 14.2
8. Issue 8 – emergency preparedness – article 16
9. Issue 9 – stakeholder consultation & communication - subsection 8.1.9

Poland is actively participating in international cooperation, in order to improve preparation for introduction of Nuclear Power Poland hosted INIR and IRRS missions in 2013, INIR follow-up mission in 2016 and IRRS follow-up mission in 2017.

IRRS mission has been conducted in Poland in Spring 2013. The IRRS review compared polish regulatory framework for nuclear and radiation safety against the IAEA Safety Standards and addressed **all facilities and activities regulated by PAA**, including research reactor, radioactive waste management facilities and radiation source facilities. In addition, the IRRS review addressed **preparations for the development of the nuclear power program** from the regulatory point of view.

Poland has received 15 recommendations and 16 suggestions. The suggestions and recommendations from 2013 IRRS mission mostly related to CNS are presented below with relevant articles and subsections:

- Introduce human resources development plan – subsection 8.1.5
- The government should consider strategies and mechanism to enable PAA to attract and retain high quality trained personnel – subsection 8.1.5
- PAA's safety goals as well as mission and vision should be reflected in management system – subsection 8.1.8
- Establish PAA strategy for increasing transparency with the public – subsection 8.1.9

- PAA should consider clarifying the steps necessary in the licensing process to elaborate on the existing provision of the Atomic Law, and communicate them internally and external – subsection 8.1.9
- PAA should consider reviewing the availability of external support across the range of technical and other disciplines needed to support the delivery of regulatory functions relating to NPP programme – subsection 8.1.10
- PAA should develop procedures covering the review and assessment of new facilities, design modification and SAR amendments for research reactors – subsection 14.1
- Various recommendations and suggestions on emergency preparedness – article 16
- PAA should consider extending bilateral exchange agreements to share experiences with other countries embarking on, or expanding, its NPP programme. - subsection 17.4
- Establish internal process for using feedback from operating experience – subsection 19.7

IRRS mission final report as well as PAA action plan have been published on PAA website in subsection about IRRS mission (in polish).

In 2017 PAA has hosted IRRS follow-up mission. Based on the progress made by PAA and other stakeholders in implementing the IRRS action plan all 15 recommendations as well as all 16 suggestions were closed. The team stated that "PAA has made significant progress on near-term activities and initiatives, to enhance its ability to plan and execute PAA's mission, while adapting in a timely and effective manner to a dynamic environment (including development of the PNPP and the National Plan on Radioactive Waste and Spent Nuclear Fuel Management)". IRRS follow-up team offered 3 new suggestions:

- PAA should consider planning, budgeting and resource needs to support ongoing implementation of the Integrated Management system – subsections 8.1.5
- PAA should consider providing guidance for the use of exemption and clearance levels – outside of scope of CNS
- PAA should consider developing guidance on emergency planning zone sizing in more detail than the general provisions of the Atomic Law – article 16.

IRRS follow-up mission report has been posted on PAA's website.

The 2013 INIR mission had provided five recommendations and six suggestions for concluding Phase 1 of nuclear infrastructure development. INIR follow-up mission from 21st to 23rd of June 2016 assessed Poland's progress in its infrastructure development activities concluding that **Poland has implemented all the recommendations and suggestions** of a 2013 INIR mission. The main achievements identified by the expert team were:

- The Council of Ministers adopted the updated Polish Nuclear Power Programme in 2014, which shows Poland's commitment to safety, security and non-proliferation and includes policies on radiological protection, energy security and waste management;
- Poland has facilitated and strengthened the coordination among the main stakeholders, which are the Ministry of Energy, the regulatory body PAA and the future owner/operator, PGE Polska Grupa Energetyczna S.A., with due respect to the regulatory body's independence;
- Poland has invested efforts and financial resources in human resource development, training and equipment purchase to identify the needs of the main stakeholders and to strengthen emergency preparedness and response;

- Poland has enhanced its mechanisms so that all entities dedicated to safeguards and handling of nuclear materials understand their obligations under the comprehensive safeguards agreement and the additional protocol;
- A revision of the Atomic Law, addressing security and non-proliferation issues, has been prepared and submitted for legislative work by the parliament.

Poland's INIR mission report is publicly available on IAEA website.

Important Notice: All information presented in this report are up to date as of 5th of July 2019 (unless otherwise stated in the text)

2. COMPLIANCE WITH ARTICLES 6 – 19

Article 6. Existing nuclear installations

Each Contracting Party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact.

At the moment Poland has no nuclear installations according to definition in Article 2(i) of the Convention. There is neither NPP in operation nor in construction in Poland. The one planned in Żarnowiec (construction of two units of WWER-440/V213, started in 1985, and terminated in 1990) was finally cancelled in the year 1991. At present time Poland has only one research reactor in operation which has been given a new 10-year licence for operation in 2015. The licensee prepared new Safety Analysis Report which was carefully assessed by the PAA in first part of 2015. The other research reactors, operated in the past, had been either permanently shut down or decommissioned - see **Annex no.1** for details.

An upgrade in the safety instrumentation of MARIA research reactor took place in 2018. A set of thermocouples was installed at each cooling channel's outlet. New alarm signals based on the temperature rise in each single cooling channel were introduced into reactor's safety system.

Based on the license for operation issued in 2015 operator of research reactor "Maria" should perform periodic safety review after 4 years of operation. PAA has received periodic safety review report on 2nd of July 2019 and now will begin the process of regulatory review.

Regarding future nuclear power programme *Resolution no. 4/2009 of the Council of Ministers of 13th January 2009 on nuclear power development activities* stated among others that:

- Nuclear Power Program for Poland will be prepared and implemented (after public discussion and government's approval);
- Government Commissioner for Nuclear Power in Poland will prepare Nuclear Power Program for Poland (1st draft of this document was published in August 2010);
- PGE Polska Grupa Energetyczna SA (Polish Energy Group SA) will play a leading role in the implementation of Nuclear Power Program for Poland;
- At least 2 nuclear power plants will be built; first NPP will be commissioned in 2025.

On 28th January 2014 the Council of Ministers passed a resolution regarding the Polish Nuclear Power Program, developed by the Ministry of Economy. The Program sets forth a list of tasks ensuring safe use of nuclear power in Poland. **Annex no. 2** gives information on the implementation of nuclear power in Poland prepared by the Ministry of Energy for the needs of this national report.

In December 2015 the Ministry of Economy, acting previously as a Nuclear Energy Programme Implementing Organisation, has been transformed into the Ministry of Energy and Ministry of Economic Development. All competences in the field of nuclear power possessed previously by the Ministry of Economy has been transferred into the newly created the Ministry

of Energy. The main responsibility of the Ministry of Energy in this field is to plan and coordinate the implementation of the State's strategy for development of nuclear power in Poland

Principles of Vienna Declaration will be followed and implemented during Polish Nuclear Power Programme, nevertheless main provisions of law that already fulfil those principles are discussed in articles 14, 17, 18 and 19. As there are no nuclear installations in operation in Poland according to CNS definition, so there is no significant experience in this field, the answer to the challenge concerning safety improvements can be found in article 14 and mainly apply to safety assessment and verification.

Article 7. Legislative and regulatory framework

Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations. The legislative and regulatory framework shall provide for:

i. the establishment of applicable national safety requirements and regulations;
ii. a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence:
iii. a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;
iv. the enforcement of applicable regulations and of the terms of licences, including suspension, modification or revocation.

7.1. National safety requirements and regulations

The issues of nuclear safety of nuclear facilities are regulated in the Act of 29th November 2000 "*Atomic Law*" (Journal of Laws of 2018, item 792, as amended). The Atomic Law and its supporting regulations contain provisions that regulate the requirements related to:

1. radiological protection (of staff, society and patients);
2. nuclear and radiation safety, including
   - safety of nuclear facilities,
   - proceeding with nuclear material and sources of ionising radiation,
   - related to radioactive waste and spent nuclear fuel,
   - related to transport of nuclear material and radioactive sources, and spent nuclear fuel and radioactive waste,
   - assessment of radiation level and emergency actions,
3. physical protection (of nuclear facilities and nuclear material);
4. non-proliferation of nuclear material and technology (safeguards);
5. civil liability for nuclear damage.

Annexes no. 3 & 4 give summary of entire Atomic Law and complete list of supporting regulations issued by Council of Ministers, Minister of Health, Minister of the Internal Affairs and Administration, Minister of Finances and Minister of Environment.

The act incorporates a number of international regulations, such as:

- Convention on Early Notification of a Nuclear Accident, Vienna, 26th September 1986 (Journal of Laws of 1998, No. 31, item 216) (INFCIRC/335);
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, Vienna, 26th September 1986 (Journal of Laws of 1998, No. 31, item 218) (INFCIRC/336);

- Convention on Nuclear Safety, Vienna, 20th September 1994 (Journal of Laws of 1997, No. 42, item 262) (INFCIRC/449);
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, Vienna, 5th September 1997 (Journal of Laws of 2002, No. 202, item 1704) (INFCIRC/546);
- Convention on the Physical Protection of Nuclear Material, including annexes I and II, open for singing in Vienna and New York on 3rd March 1980 (Journal of Laws of 1989, No. 17, item 93) (INFCIRC/274/Rev.1);
- Amendment to Convention on Physical Protection of Nuclear Material, Vienna, 8th July 2005 (GOV/INF/2005/10-GC (49)/INF/6);
- Treaty on the Non-Proliferation of Nuclear Weapons, Moscow, Washington, London, 1st July 1968 (Dz. U. 1970, No. 8, item 60) (INFCIRC/140), and resulting acts:
  - Agreement between the Kingdom of Belgium, Kingdom of Denmark, Federal Republic of Germany, Ireland, Republic of Italy, Great Duchy of Luxembourg, Kingdom of Netherlands, European Atomic Energy Community and International Atomic Energy Agency, on Implementation of Article III, Sections 1 and 4, of the Treaty on Non-Proliferation of Nuclear Weapons, Brussels, 5th April 1973 (Dz. U. 2007, No. 218, item 1617);
  - Additional Protocol to the Agreement between the Republic of Austria, Kingdom of Belgium, Republic of Finland, Kingdom of Denmark, Federal Republic of Germany, Republic of Greece, Ireland, Republic of Italy, Great Duchy of Luxembourg, Kingdom of Netherlands, Republic of Portugal, Kingdom of Spain, Kingdom of Sweden, European Atomic Energy Community and International Atomic Energy Agency, on Implementation of Article III, Sections 1 and 4, of the Treaty on Non-Proliferation of Nuclear Weapons, Vienna, 22nd September 1998 (Dz. U. 2007, No. 156, item 1096);
- Vienna Convention on Civil Liability for Nuclear Damage, Vienna, 21st May 1963 (Journal of Laws of 1990, No. 63, item 370) (INFCIRC/500);
- Joint Protocol Relating to the Application of the Vienna Convention and Paris Convention (on liability for nuclear damage), Vienna, 21st September 1988 (Journal of Laws of 1994, No. 129, item 633) (INFCIRC/402);
- Protocol Amending the Vienna Convention on Civil Liability for Nuclear Damage (Journal of Laws of 2011, No. 4, item 9) (INFCIRC/556).

In addition, the Republic of Poland is a party to the Treaty Establishing the European Atomic Energy Community (Euratom). Based on the treaty, a number of directives have been adopted and implemented in the Polish legal system, including but not limited to:

- Council Directive 96/29/Euratom of 13th May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers resulting from ionising radiation (OJ L 159 of 29.06.1996, page 1; OJ Polish version, chapter 5, vol. 2, page 291),
- Council Directive 89/618/Euratom of 27th November 1989 on informing the general public about health protection measures to be applied and steps to be taken in the event of radiological emergency (OJ L 357 of 07.12.1989, page 31; OJ Polish version, chapter 15, vol. 1, page 366),
- Council Directive 90/641/Euratom of 4th December 1990 on the operational protection of outside workers exposed to the risk of ionising radiation during their

activities in controlled areas (OJ L 349 of 13.12.1990, page 21, as amended, OJ Polish version, chapter 5, vol. 1, page 405, as amended).

- Council Directive 97/43/Euratom of 30th June 1997 on health protection of individuals against the dangers of ionising radiation in relation to medical exposure and repealing directive 84/466/Euratom (OJ L 180 of 09.07.1997, page 22, as amended; OJ Polish version, chapter 15, vol. 3, page 332, as amended).
- Council Directive 2003/122/Euratom of 20th November 2006 on the supervision and control of shipments of radioactive waste and spent fuel (OJ L 337 of 05.12.2006, page 21),
- Council Directive 2006/117/Euratom of 22nd May 2003 r. on the control of high-activity sealed radioactive sources and radioactive waste (OJ L 346 of 31.12.2003, page 57; OJ Polish version, chapter 15, vol. 7, page 694),
- Council Directive 2009/71/Euratom of 25th June 2009 establishing a Community framework for the nuclear safety of nuclear installations (OJ L 172 of 2.7.2009, page 18, and OJ L 260 of 3.10.2009, page 40),
- Council Directive 2011/70/Euratom of 19th July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (OJ L 199 of 2.8.2011, page 48),
- Council Directive 2013/59/Euratom of 5th December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom (OJ L 13, 17.1.2014, p. 1–73) – during the implementation process
- Council Directive 2014/87/Euratom of 8th July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations (OJ L 219, 25.7.2014, p. 42-48) – during the implementation process.

In accordance with article 113a of Atomic Law Act Article the PAA's President shall, not less than every 3 years, make assessment of nuclear regulatory activities and perform an analysis of the current legal status in terms of its adequacy and suitability to nuclear safety and radiological protection. The PAA's President shall, at least once every 10 years, subject the national nuclear safety and radiological protection system, including the nuclear regulatory activities, to external international review.

Regulations might be revised on the basis of the above-mentioned assessment or the internal decision to review of regulations based on new IAEA Safety Standards, WENRA objectives and reference levels and EU directives. Based on current projects being implemented in PAA on verifying readiness to carry regulatory review and assessment of safety documentation for construction license, the work is ongoing on assessing the validity of some of the regulations. If the assessment will result in decision to review and amend the regulations, the actions to draft updated versions of the selected regulations will be made in 2020. This review will be based on the newest IAEA Safety Standards, WENRA objectives and reference levels and other relevant documents.

At the 7th CNS Review Meeting Poland received 2 challenges. This subchapter provided an answer to the challenge “Poland to continue developing its framework to ensure

safe implementation of its first nuclear power plant project meeting the harmonized safety expectations (e.g. WENRA safety objectives for new reactors)".

7.2. Licensing system for nuclear installations

The Act of Atomic Law requires (Art.4.1 p.2) a separate licence for construction, commissioning, operation and decommissioning of any nuclear facility, issued by the President of PAA. The requirements, concerning documentation to be submitted by an applicant and the procedure to be followed to obtain an appropriate licence, have been established in the Act of 29th November 2000 "*Atomic Law*" and in the *Regulation of the Council of Ministers of 30th June 2015 on the documents required for licence application submitted for the practices that involve or could involve radiation exposure or for the notification of such practices* (OJ item 1355). The general procedure of licensing nuclear facilities (including power and research reactors, radioactive waste and spent fuel management facilities), in the phases of construction, commissioning, operation, decommissioning or closure is described below.

Applications for a licence or for an official opinion related to a nuclear facility must be submitted to PAA President. It applies also, with some modifications, to the stage of siting, which does not require PAA President's licence, but only official opinion thereof (see reporting on Article 17 for details). Before applying for a licence, the applicant may apply to the PAA President for a general assessment of the planned organizational and technical solutions and draft versions of documents to be submitted along with the application. In case of the construction licence, the application with an abbreviated safety report is immediately published in the Public Information Bulletin. Members of the public have the right to make submissions and observations within 21 days.

Draft licences and opinions are prepared by the PAA Nuclear Safety and International Programs Department, on the basis of review and assessment of safety documentation supplied by the applicant and also based on inspections performed by PAA regulatory inspectors in applicant's premises if necessary. The reports from each of inspections, performed by PAA inspectors in nuclear installations are submitted to the PAA President. While performing the review and assessment tasks, PAA may use external experts or consultant organizations, but only on the condition that those experts or organizations are free from conflict of interest, i.e. they are not employed by or otherwise dependent on applicant/licensee or shall be excluded from participation in the proceedings by virtue of law. A draft licence or opinion is submitted to the PAA President for approval and for the official granting to the applicant. Before that, the PAA President has to apply to the Council for Nuclear Safety and Radiological Protection to state its opinion on the draft licence. Within one month from receiving this opinion, the PAA President sends the draft licence to the applicant, who can submit his reservations within another month.

In the siting stage of a nuclear facility (including NPPs, research reactors and spent fuel storages), the authority competent to issue the decision on terms of building and area development conditions on the site of a future nuclear facility, issues this decision after obtaining the PAA President's positive opinion on the matters concerning nuclear safety and radiological protection (Art.36). The "siting report" developed by the applicant is reviewed by the PAA President in the course of the proceedings for granting a construction licence (art. 35b s.3). Before applying for a nuclear facility construction licence, the investor must apply to the PAA President for a preliminary assessment of the site of a future nuclear power plant or facility that serves for the purpose of nuclear energy and can apply for a preliminary assessment of

the site of a future facility other than nuclear power plant or facility that serves for the purpose of nuclear energy(Art. 36a).

Apart from issuing licences, the PAA President approves some documents important for nuclear safety of nuclear installations:

- documentation of safety classification of nuclear installation's systems, structures and components (Art. 36j.3),
- documentation of integrated management system of the organizational entity conducting activities involving exposure and consisting in construction, commissioning, operation or decommissioning of nuclear facility (Art. 36k.3),
- nuclear facility commissioning programme (Art. 37a.2),
- nuclear facility commissioning report (Art. 37b.2),
- detailed periodical safety review plan (Art. 37e.3),
- periodical safety review report (Art. 37e.5),
- nuclear facility decommissioning programme (Art. 38b),
- nuclear facility decommissioning report (Art. 38c.1).

Modernization of any nuclear facility system, structure or component important for the nuclear safety and radiological protection, and each reactor start-up following such modernization or fuel load requires a written consent of the Agency's President (Art. 37d).

The authorization process applies also to the staff of a nuclear facility. According to Art.12 of the Atomic Law Act in any facility performing activities involving radiation exposure, the position important for ensuring nuclear safety and radiological protection have to be occupied exclusively by an individual possessing appropriate authorization issued by the PAA President. Licences for such positions are granted on the basis of the qualification process, established by the *Regulation by the Council of Ministers of 10th August 2012 on positions important for nuclear safety and radiological protection and radiological protection inspectors*, and of the exams performed by the Commission for Qualification of Staff for the Posts Important for Nuclear and Radiation Safety, appointed by the PAA President. The Atomic Law provides also for a separate authorization (on similar conditions) of staff performing activities important from the viewpoint of nuclear safety and radiological protection in any organizational entity conducting activities involving exposure and consisting in commissioning, operation or decommissioning of a nuclear power plant (Articles 12c – 12e of the Atomic Law).

Moreover, according to Art.11 of the Act, employees of a nuclear facility have to be duly trained, according to the program prepared by the facility manager, to possess and maintain the knowledge of nuclear safety and radiological protection regulations appropriate for their positions, as well as appropriate skills and qualifications. In nuclear power plants the short and long-term training plans have also to be approved by the PAA President (Article 11b of the Atomic Law).

7.3. Prohibition of the operation without a licence

According to the Art. 2 of the Atomic Law Act, activities involving real and potential exposures to ionising radiation shall be permitted after undertaking the measures defined in appropriate regulations, aimed at ensuring the safety and protection of human life and health, as well as protection of property and the environment.

The Art. 4 s.1 p.2 requires that each subsequent stage, i.e. construction, commissioning, operation and decommissioning, requires separate licences, granted by the PAA President after ascertaining that the requirements and conditions relevant to radiation and nuclear safety at the given stage were met and fulfilled. Pursuant to Art. 34, no activities

involving exposure and consisting in construction, commissioning, operation or decommissioning of nuclear facilities can be conducted by an organizational entity which fails to comply with the requirements concerning nuclear safety, radiological protection, physical protection and nuclear material safeguards. It means, in particular, that the operation of a nuclear installation without a licence is prohibited.

The applicant/licensee must submit at each of the stages, together with his application for the licence to the PAA President, a proper safety documentation for the nuclear facility. Results of the review and assessment of this documentation provide the regulatory body with the basis for preparation of a licence with relevant requirements and conditions.

The head of the organisational entity, who without the required licence, or in violation of the conditions stipulated therein, engages in the construction, commissioning, operation and decommissioning of a nuclear facility, is subject to fine (Art.123), imposed by the PAA President.

7.4. Regulatory inspections and assessment of nuclear installation

According to the Act of Atomic Law, Regulatory Body responsibilities include in particular conducting inspections in nuclear facilities and in other facilities possessing (or involved in activities with) nuclear materials, ionizing radiation sources, radioactive waste and spent nuclear fuel (Art. 64 s.4 p.2). PAA President performs regulatory tasks through nuclear regulatory inspectors. Nuclear regulatory bodies can carry out (Art. 65a.):

1. periodical inspections – as per inspection plan approved by PAA President;
2. reactive inspections – whenever circumstances arise which may have a substantial impact on the nuclear safety and radiological protection at a nuclear facility subject to inspection;
3. continuous inspections - at nuclear power plants by virtue of permanent authorization.

In the context of conducted inspection, the regulatory Inspectors are entitled to (Art.66 s.1):

- access at any time to the means of transport and to the sites, facilities and premises of organizational units, where nuclear materials, ionizing radiation sources, radioactive waste or spent nuclear fuel are produced, used, stored, disposed or transported (in particular – to nuclear installations),
- access to the documents and other data carriers relevant for nuclear safety and radiological protection in inspected organizational unit,
- request copies of the documents and data carriers mentioned above to be produced or provided,
- check whether the activity / practice referred to in Art. 4 s.1 of the Atomic Law (subject to obtain licence or to be notified to the regulatory body) is conducted in compliance with the nuclear safety and radiological protection regulations and with the requirements and conditions specified in the licence,
- conduct, if necessary, independent technical and dosimetric measurements,
- request written or oral information, when it is necessary for clarifying a concern,
- collect samples for laboratory tests,
- inspect the site, facilities, premises and installations of the inspected organizational entity and its transport vehicles,
- record the processes and results of inspection using audio-visual recording systems,
- secure and request securing (confirming security) documents and other proofs,

- during inspections of nuclear power plants – to request the assistance of expert laboratories and organizations authorized by the PAA President, and during inspections of other organizational entities – to request the assistance of experts, specialists and laboratories.

The head of the organisational entity being inspected is obliged (Art. 66 s.2) to take all necessary measures to allow the nuclear regulatory authorities to carry out the inspection. The employees of the unit being inspected have to give the inspectors oral or written explanations on the questions related to the subject of inspection. Should an inspection reveal a direct threat to nuclear safety or radiation protection, the President of PAA nuclear regulatory inspectors are obliged by Art. 68 of the Atomic Law Act to give immediately applicable orders or bans to impose emergency measures designed to eliminate the danger.

In the performing regulatory inspection also the international guidelines and experience from former inspections of nuclear facilities are taken into account. The primary purpose of regulatory inspection is the independent determination of how the licensee complies with the general nuclear safety and radiation protection requirements, with the licence terms, additional regulatory requirements and good engineering practices; the inspection also is a check of the implementation of the quality assurance programme.

Radiological Protection Department and Inspections and Oversight Department have specific procedures and instructions regarding regulatory inspections. Inspections need to be planned (excluding necessary reactive inspections), authorized by the PAA's President, prepared by the leading inspector, proceeded following prepared instructions and properly documented. This process ensures the effectiveness of routine regulatory inspections. The programme and scope of such inspections is formulated prior to visiting the site, relevant procedures are evoked or, if necessary, prepared by the inspectors. The personnel designed to carry out each inspection is selected and notified beforehand to provide adequate time to become acquainted with applicable instructions and appropriate background material. Inspection need to be properly reported, which includes naming inspectors, informants, describing scope of the inspection, procedure and results of the inspection, issued orders, bans or recommendations and conclusions of the inspection. When it is necessary post-inspection notice shall be issued by the PAA President.

7.5. Enforcement provisions

The Act of Atomic Law gives regulatory body adequate powers to enforce compliance with safety requirements imposed by laws, regulations and licence conditions (Art. 5.5). According to its Art. 5.11 the PAA President may revoke a licence or modify it as needed. In particular Agency's President shall revoke a licence if nuclear safety and radiation protection requirements imposed by applicable regulations and of the terms of licence have not been fulfilled. Depending of regulatory assessment of situation, the following enforcement actions can be undertaken:

(1) oral or written immediately applicable order (Art.68),
(2) issuance of a written order or a recommendation to the licensee (Art.68a, Art. 68b),
(3) ordering the licensee to curtail activities (Art.37b.1, Art. 37c.3),
(4) revoking the licence (Art.5.11),
(5) fines enforced by mean of administrative enforcement proceedings (Art.123),
(6) punishment by fine or detention (Art.127).
(7) recommendation of prosecution through the courts of law.

The nuclear regulatory inspectors have been equipped by art.68 of the Atomic Law Act with the authority to take on-the-spot decisions.

7.6 Act of Parliament amending the Atomic Law Act and the Act on fire protection

On June 13th 2019, the Sejm, i.e. the lower house of Parliament in Poland, passed the act amending the Atomic Law and the act on fire protection. The Act is designed to ensure the highest achievable level of nuclear safety and radiological protection in Poland in conformity with the IAEA and European standards.

The solutions proposed in the Act can be essentially assigned to three areas:

I. Implementation into national law of the provisions of Council Directive 2013/59 / Euratom of 5th December 2013 laying down basic safety standards to protect against risks arising from exposure to ionizing radiation (the so-called BSS directive). This is the most comprehensive and highly technical in nature part of the Act. Issues indicated in the BSS Directive requiring implementation into Polish law can be divided into two groups:

1. Issues previously regulated in the Atomic Law Act requiring legislative changes;

The most important issues related to this problem solved in the Act are:

a) regulation of non-medical imaging of people from the general public:

• establishing a list of permissible non-medical imaging situations with a division into non-medical imaging using medical radiological equipment and other radiological devices,

b) changes in regulations concerning radiological protection of workers and people from the general public in connection with new results of studies on the influence of ionizing radiation on the human body:

• adaptation to the requirements of the Directive on effective and equivalent effective dose limits as well as requirements regarding the inclusion of specific radiation doses to the dose limits,

• defining the rules of radiological protection for air crew members exposed to an effective dose, which may exceed 1 mSv per year and an effective dose that may exceed 6 mSv per year,

• introduction of dose limitation of ionizing radiation,

• setting reference levels for effective doses received by members of emergency teams,

• setting reference levels for external exposure of humans to gamma rays emitted by indoor building materials,

c) increasing protection against ionizing radiation of external workers:

• coverage of external radiological protection requirements for external workers performing work not only in the controlled area (as before), but also in the supervised area,

d) clarifying the duties and rights of persons exercising internal supervision over activities,

e) increase the transparency of the activities of nuclear regulatory bodies by providing the public with a program of regulatory inspections,

f) raising awareness of the possibility of coming into contact with an abandoned source, informing about actions to be taken in such a situation and training of officers of relevant services who may come across such sources,

g) increasing the safety of medical use of ionizing radiation:

- introduction of a new system of continuous trainings in the field of radiological protection for patients performing or supervising the performance of diagnostic tests, treatments and treatment using ionizing radiation,
- introduction of requirements for new types of ionizing radiation in medical exposure,
- specifying additional requirements regarding the conduct of medical experiments and clinical trials using ionizing radiation,
- defining the requirements for conducting screening tests using ionizing radiation,
- introduction of a requirement to justify the exposure of carers and persons accompanying patients undergoing medical exposure,
- introduction of the obligation to use diagnostic reference levels for medical radiological procedures and the obligation to periodically review these levels,
- extension of responsibility for medical exposure to all persons involved in performing medical radiological procedures in accordance with the activities performed by these persons,
- regulating the procedure for the development and publication of standard medical radiological procedures and detailed medical radiological procedures,

h) changes in regulations regarding preparation and response in the event of radiation emergencies:

- in particular, the new law imposes an obligation on the head of the organizational unit, Voivode (regional governor in Poland) and minister competent for internal affairs to develop a management system for situations of radiation emergency. A solution is proposed where hazard analysis based on hazard categorization and criteria for hazard analysis will be performed first, then conclusions from this hazard analysis will be taken into account when developing an appropriate emergency plan, and the emergency response plan and hazard analysis will be one of the elements which are part of the radiation emergency management system.

2. Issues not regulated in the Atomic Law and requiring introduction into the Polish legal framework.

Issues that have not been regulated in Polish law are primarily issues related to exposure to radon in residential buildings and workplaces, issues related to the use of naturally occurring radioactive materials (NORM) or the introduction by the Directive of an additional form of regulation of activities with exposure in the form of notifications (in addition to licences and registration so far required).

II. Implement the provisions of Council Directive 2014/87 / Euratom of 8th July 2014 amending Directive 2009/71 / Euratom establishing a Community framework for the nuclear safety of nuclear installations.

This directive was created as a result of drawing conclusions from the accident at the Japanese nuclear power plant in Fukushima Daiichi in 2011. In order to implement it in the Polish legal order, the Act provides for example:

- arrangements for extending the responsibility of the head of an organizational unit authorized to build, commission, operate or decommission a nuclear facility for contractors and subcontractors whose activities may affect the safety of a nuclear facility;
- introduction of requirements for nuclear facilities to be designed, located, built, commissioned, operated and decommissioned in a manner that would prevent accidents as much as possible;
- solutions for management systems that give the highest priority to nuclear safety and measures to support and increase the level of an effective nuclear safety culture;
- solutions enabling the peer review of nuclear facilities in the EU based on a specific nuclear safety issue.

III. Other issues that need improvement in terms of nuclear safety and radiological protection.

The proposed solutions in this respect are essentially the implementation of the recommendations indicated in the 2013 IRRS mission report. In order to implement the recommendations of the mission, the Act provides for, among others:

- modification of the national planning system and emergency response in the event of a radiation emergency;
- introduction of strategic planning in the field of nuclear security of the country;
- amending the regulations on the physical protection of nuclear facilities.

To enter into the force the Act must be adopted by the Senate, signed by the President and published in the official journal of laws.

Article 8. Regulatory body

1. Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.
2. Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.

8.1. Establishment of the regulatory body

8.1.1. Legal foundations and statue of the regulatory body

The President of the National Atomic Energy Agency (PAA) constitutes the central organ of the governmental administration, competent for nuclear safety and radiological protection based on article 109 of Atomic Law. The activities of the President of National Atomic Energy Agency are regulated on the basis on the Act of Parliament on the Atomic Law (article 110) and its secondary legislation. The President of the National Atomic Energy Agency as the central organ of public administration is independent in taking decisions with regard to tasks entrusted to him on the basis of the Atomic Law Act. Since 1st January 2002 the supervision over the PAA President has been exercised by the Minister competent for the environmental matters on the basis of Article 28, Section 3 of the Act of Parliament on Governmental Administration Departments of 4th September 1997 and article 109 section 4 of the Atomic Law. PAA President is appointed for indefinite period of time. The Agency's President is nominated and recalled by the Prime Minister (Art.109.2).

The Agency's President is executing his tasks through the National Atomic Energy Agency (PAA). The PAA's internal organization is determined by Order of the Minister of Environment of 9th January 2019 on Granting Statute to the National Atomic Energy Agency (pursuant to Article 113 Section 1 of the Atomic Law). This document determines departments which are included in the PAA's structure and perform particular functions.

8.1.2. Mandate, mission and tasks

Mandate, authority and particular responsibilities of PAA are defined in the Chapter 13 of the Atomic Law Act. In accordance with the Article 110 of the Atomic Law the scope of activities of the Agency's President includes the tasks that involve ensuring national nuclear safety and radiological protection, in particular:

1) preparation of draft documents related to national policies involving nuclear safety and radiological protection, taking into account the programme for nuclear power development and both internal and external threats,
2) exercising regulatory control and supervision over the activities leading to actual or potential ionizing radiation exposure of humans and environment, including the issuance of decisions on licences and authorizations and other decisions, as provided in this Act,
3) promulgation of technical and organizational recommendations concerning nuclear safety and radiological protection,
4) performing the tasks involving the assessment of national radiation situation in normal conditions and in radiation emergency situations, and the transmission of relevant information to appropriate authorities and to the general public,
5) performing the tasks resulting from the obligations of the Republic of Poland concerning accountancy and control of nuclear materials, physical protection of nuclear materials and facilities, special control measures for foreign trade in nuclear materials and technologies, and from other obligations resulting from international agreements on nuclear safety and radiological protection,
6) activities connected with public communication, education and popularization, scientific, technical and legal information concerning nuclear safety and radiological protection, including activities consisting in providing the general public with

information about ionizing radiation and its impact on human health and the environment and about feasible measures to be implemented in the event of radiation emergency – excluding the promotion of the use of ionizing radiation, and in particular, the promotion of nuclear power sector;

7) cooperation with governmental and local administration authorities in matters involving nuclear safety and radiological protection, and in matters concerning scientific research in nuclear safety and radiological protection;
8) performing the tasks involving national and civil defence and the protection of classified information, which result from other regulations,
9) preparing opinions, for the purposes of governmental and local administration, concerning nuclear safety and radiological protection with regard to the proposed technical activities involving peaceful uses of atomic energy;
10) cooperation with suitable foreign national entities and international organizations within the scope stated herein;
11) developing the drafts of legal acts on the issues covered by this Act and conducting the process of establishing their final form, according to the procedures established in the working rules for the Council of Ministers,
12) issuing opinions on the draft legal acts developed by authorized bodies,
13) submitting to the Prime Minister annual reports on the activities of the Agency's President and the assessments of the status of national nuclear safety and radiological protection.

PAA's internal document entitled "Mission, Vision and Operational Strategy of the National Atomic Energy Agency" determines the objectives, requirements and efforts undertaken to ensure that any activity which might lead to ionising radiation exposure is handled in a manner safe for the staff and the society.

8.1.3. Authorities and responsibilities

The Atomic Law requires that **activities involving real and potential ionising radiation exposures** from man-made radioactive sources, nuclear materials, equipment generating ionizing radiation, radioactive waste and spent nuclear fuel, **are supervised** and **controlled** by the State and can be permitted on the condition of employing regulatory means for the safety and health and life protection of humans, and also for the protection of property and environment (Art.2). This includes the **obligation of obtaining an appropriate licence**, excluding the cases when such activities may be performed on the basis of notification or do not have to be licenced or notified according to the criteria established in the regulation of the Council of Ministers of 6th August 2002 (amended in 2004), based on the Article 6.1 of the Atomic Law.

Under the Atomic Law (Article 4), the following activities / practices involving exposures require a licence or notification (with reservation as above):

1) manufacturing, processing, storage, disposal, transport or use of nuclear materials, radioactive sources, radioactive waste and spent nuclear fuel, as well as the trade in these materials, and also isotopic enrichment,

2) construction, commissioning, operation and decommissioning of nuclear facilities,

3) construction, operation, closure and decommissioning of radioactive waste repositories,

4) production, installation, use and maintenance of the equipment containing radioactive sources and trade in such devices;
5) commissioning and use of the equipment generating ionizing radiation;
6) commissioning of laboratories and workrooms using ionizing radiation sources, including X-ray laboratories;
7) intentional addition of radioactive substances in the processes of manufacturing consumer products and medical devices, medical devices for in-vitro diagnostics, equipment for medical devices, equipment for medical devices for in-vitro diagnostics, active medical devices as defined in Act of Parliament on Medical Devices of 20th May 2010 (Journal of Laws of the Republic of Poland No 107 Item 679) and trade in such products, and also the import into the Republic of Poland's territory, and export from this territory, of consumer and medical products to which radioactive substances have been added;
8) intentional administration of radioactive substances to humans and animals, for the purposes of medical or veterinary diagnostics, therapy or research

According to Article 5, Articles 36-39 and Article 63 of the Atomic Law Act, legal authority to issue licences, binding opinions and to perform regulatory inspection of the siting, design, construction, commissioning, operation and decommissioning of nuclear facilities in Poland is given to the President of the National Atomic Energy Agency.

The President of the National Atomic Energy Agency issues the licences and accepts the notifications related also to other activities / practices that are listed above, with only the following exceptions: the licences for commissioning and use of X-ray equipment for medical purposes[1] and for commissioning of the laboratories using such equipment are issued by the state regional sanitary inspector or – for organizational units subordinated or supervised by the Minister of National Defence, the commander of the military preventive medicine centre, or – for organizational units subordinated or supervised by the Minister for internal affairs – the state sanitary inspector in the Ministry of the Internal Affairs and Administration.

As a consequence of the above exceptions also the **supervision and control** in the area of nuclear safety and radiological protection over the activities / practices resulting in actual or potential ionizing radiation exposures of people and environment, are executed by (Art. 6.2):

1) **"regulatory bodies" (as defined below) – in the cases** when the licence is issued or notification accepted by the President of the Agency;
2) regional sanitary inspector, commander of the military preventive medicine centre or state sanitary inspector in the Ministry of the Internal Affairs and Administration in the sphere of activities / practices licenced by these bodies.

According to definitions in the Art.64.1 of the Act of Atomic Law, the "regulatory bodies" consist of:

1) the President of PAA, as the supreme nuclear regulatory body,
2) regulatory inspectors.

Atomic Law Act defines tasks of the regulatory bodies in its Chapter 9. They include in particular (Art.64.4):

[1] In the following scope: medical diagnostics, invasive radiology, surface radiotherapy and radiotherapy for non-cancerous diseases.

- **issuing licences and other decisions** in issues related to the nuclear safety and radiological protection, according to the principles and methods established by the Act;
- **conducting inspections** in nuclear facilities and organizational units which possess nuclear materials, ionizing radiation sources, radioactive waste and spent nuclear fuel,
- **issuing on-the-spot orders** if during the inspection it is found that nuclear safety and radiological protection are endangered,

8.1.4. Organizational structure of the regulatory body

The current structure of the PAA (Fig. 1) is determined by:

1) Act of Parliament the Atomic Law
2) Order of the Minister of Environment of 9th January 2019 on Granting Statute to the National Atomic Energy Agency
3) Order no 1 by the President of National Atomic Energy Agency of 18th January 2019 on Establishing Organizational Bylaws of the National Atomic Energy Agency.

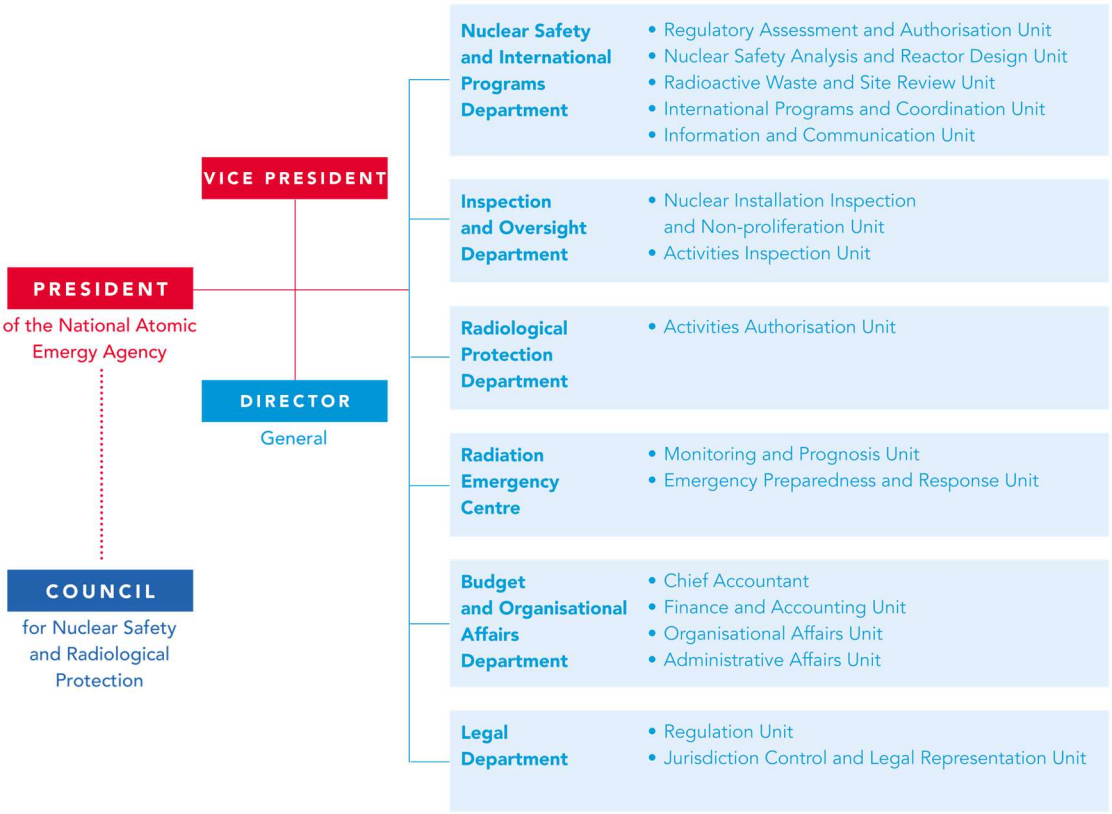

Fig. 1. Organizational Structure of the National Atomic Energy Agency (as of 5th of July 2019)

8.1.5. Human resources development

The discussion provided below provides also the answer to part on human resources of common issue 4 from 7th Review Meeting.

After the governmental decision in 2009 to embark on nuclear power PAA started self-assessment process which included an identification of the PAA needs in the Polish Nuclear Power Programme. As a result of this process, a document entitled “Guidelines for programme of necessary actions to be taken in the National Atomic Energy Agency” was prepared. The needs for recruitment and training of the staff were identified, so that PAA could meet the requirements of a nuclear regulatory body posed by the Polish Nuclear Power Program. In June 2011 the document entitled “A few notes on the tasks, organization, development and financial issues of the National Atomic Energy Agency (Nuclear Regulatory Body) in the perspective of the construction of a nuclear power plant in Poland” summed up the results of analyses performed with regard to necessary organizational changes and development of the staff. These analyses took into account expected new tasks of the regulatory body relating to safety assessment of documentation submitted by an investor/operator in order to obtain opinion and licence of the PAA President at different stages of the nuclear power plant life. The identification of the need for additional staff was the result of comparison of the workforce of similar regulatory bodies in other states possessing a nuclear power sector with the number of the PAA staff and including budgetary capabilities. On the basis of this analysis the plans and costs of the staff development were identified till the end of 2014. According to those estimates the number of jobs in PAA should be increased by 39 new positions. The founds (called “specific provision”) for hiring 39 employees were provided by the government. In January 2015 process of employment for those 39 positions was finished successfully. Since then the biggest challenge for the PAA was to maintain these personnel, which had gained a lot of experience both during work and trainings. In 2017 PAA has prepared “Plan for employee hiring and development of human resources for the years 2017-2019”. This plan covers 3 main areas: forecast of demand for employees (internally and overall employment situation in the fields related to PAA’s scope of work), supply and demand in PAA, implementation of the optimization of the human resources. It is also worth noting that a need was also identified by Polish Nuclear Power Programme document (without presenting a financial estimate) to raise salaries in nuclear regulatory body in order to enhance its competitiveness in the labour market, which is necessary for the recruitment of new employees and for the retention of trained staff.

Overall human resources changes during last 3 years (2016-2019) are presented below:

2016 – 120 employees in PAA, 26 nuclear safety inspectors

2017 – 123 employees in PAA, 26 nuclear safety inspectors

2018 – 113 employees, 26 nuclear safety inspectors

During 2013 IRRS mission Poland received Recommendation on human resources development:

“PAA should further develop a staffing plan for the current and future scope of regulatory functions that aligns the number of staff necessary and the essential knowledge, skills and abilities for them to implement the organizational goals and priorities. Such a staffing plan should leverage internal resources and external support.”

Suggestion from the 2013 IRRS mission’s report regarding attracting experienced staff:

“The government should consider strategies and mechanisms to enable PAA to attract and retain high quality trained personnel.”

In 2017 PAA prepared a new Human Resources Development (HRD) Program for the years 2017 - 2019. It includes a report on human resource management (structure of employment, qualifications, annual changes in number of personnel in previous 4 years), sets priorities, describes areas of human resources management and sets annual objectives for the period of 3 years in identified areas. Identified areas of human resources include: human resources management organization, recruitment and introduction to work, motivating, development and training and termination of employment. Based on adoption of this document and "Plan for employee hiring and development of human resources for the years 2017-2019" IRRS follow-up mission in 2017 closed this recommendation.

8.1.6. Competence development and maintenance

PAA management is very committed to developing competence of PAA staff. PAA has various agreements with regulatory bodies of countries with developed nuclear programmes like USA, France, United Kingdom, Republic of Korea, Canada or Finland. Thanks to this agreements and special funds both from Polish government and International Atomic Energy Agency 28 "on the job trainings" has been successfully completed by PAA staff in years 2015 - 2018. Nuclear inspectors underwent trainings in USA, Canada, UK, Republic of Korea, Slovakia, Czech Republic, France and South Africa. Employees of Nuclear Safety Analysis and Reactor Design Unit received training in USA and France. Employees of Radiation Emergency Centre were trained in France, UK, Canada, Slovakia and Czech Republic. Additional trainings are planned for 2019 and 2020. This program allows PAA's staff member to familiarize with regulatory framework, regulatory decision making, approach to inspections, safety assessment in countries experienced in oversight of NPPs.

As previously stated in 8.1.5 PAA prepared Human Resources Development (HRD) Program for the years 2017 – 2019. Hiring and retention of highly skilled workers is one of the key elements of the strategy for employment. One of the priorities established in the HRD is "ensuring qualified staff through systematic development, promotion and recruitment of new employees"

One of the common issues identified during 7th Review Meeting was knowledge management. In order to maintain competence and knowledge various initiatives were taken by PAA. The database of materials and reports from trainings, workshops and conferences is developed. PAA is also starting the coaching/mentoring support schemes for newly employed personnel. They will be mentored by highly experienced members of the staff. One of the human resources management areas identified in HRD Programme is "development and trainings". Activities in this area include preparing Individual Career Development Plans for each staff member, assessment of trainings needs, post-training implementation support, training effectiveness assessment, knowledge cascading and use of IT technologies.

8.1.7. Financial resources

The discussion provided below provides also the answer to part on financial resources of common issue 4 from 7th Review Meeting.

The President of PAA is an administrator of his own part of the state budget - "National Atomic Energy Agency." Therefore, PAA's budget is determined separately every fiscal year. All fees and penalties provided for in the Atomic Law Act constitute income of the state budget and cannot be used directly for the maintenance of the nuclear regulatory body.

Yearly expenditures for years 2016-2018 are provided below:

- 2016 – 31.9 million PLN
- 2017 – 32.9 million PLN
- 2018 – 32.9 million PLN

Supreme Audit Office (NIK) which is the top independent state audit body whose mission is to safeguard public spending, have inspected PAA's expenditures in all those years and found no misconducts.

In Polish Nuclear Power Programme adopted in 2014 chapter 6.8.1 is devoted to "adapting PAA to be a regulatory body suited to implementing nuclear power". This chapter describes that the state has an obligation to finance PAA properly to avoid loss of experienced and trained staff.

8.1.8. Management system

PAA has received three recommendations regarding Management system during 2013 IRRS mission.

- *"PAA should reflect the safety goals throughout its management system documentation and identify the processes used to achieve its mission, vision, and goals, including:*
  1) a process for internal communication
  2) an explicit process for organizational change
  3) an explicit method for performing management system reviews"
- *"PAA senior management should promote an awareness of internal safety culture and ensure that it is appropriately reflected within its management system"*
- *"The PAA should appoint an individual with responsibility and authority for the coordination of the development and implementation of the management system."*

All three recommendations were closed during 2017 IRRS follow-up mission. Nevertheless, new suggestion was made during the IRRS follow-up mission related to resources required for maintenance of Integrated Management implementation project:

- *"PAA should consider the planning, budgeting and resource needs to support ongoing implementation of the Integrated Management system"*

As of 2019 the team on IMS consisting of staff from different departments is working on implementation and upgrading of IMS in PAA. This task is one of the strategic goals of PAA for upcoming years. The description of actions undertaken in recent years is provided below.

The management system of PAA has been developed according to the standards of 'management control' (the standards for management system obligatory in Polish public administration) and the IAEA safety standards (up to 2016 - GS-R-3, The Management System for Facilities and Activities and from the year 2016 - GSR Part 2 Leadership and Management for Safety).

Key elements and areas of the integrated management systems of PAA are as follows:

- Mission, Vision, Safety Policy, strategic objectives
- Management system documentation
- Process management
- The risk management

- Internal Audits programme
- The Management system review and improvement

Mission, Vision, Safety Policy

Mission and Vision of PAA was set in 2012. Safety Policy was approved in December 2016 and constitutes the main policy document for the organization. The Safety Policy covers the elements of regulatory culture (in reference to nuclear safety and radiological protection) and internal safety culture. The President of PAA informed all the staff about the Safety Policy.

Strategic objectives as well as task and measures are set in the "Plan of Actions of President of the PAA" and systematically reviewed in respect of execution and adequacy.

Management System documentation

The PAA's MS Manual referring to the requirements of the GSR Part 2 standard was approved in December 2016.

The structure of documentation and role of particular types of documents was set and described in the Manual. Three levels of documentation are as follows:

- Level I - Directions and main principles (including Statute, Mission, Vision, Safety Policy; Organizational Regulations, MS Manual, long-term programs and strategies)
- Level II - Organization management and process management (President's and DG orders, process general descriptions - charters)
- Level III – Process execution (procedures, instructions, job descriptions

Procedure for control of MS documents was elaborated and implemented. Records are managed according to the legal requirements and internal Chancellery Instruction and Archive instruction.

Process management

Processes carried out in PAA were primarily identified in 2014. Since then the list of process has been verified accordingly and in 2016 it was deeply revised. The present hierarchy of processes includes processes and sub-processes. Processes are classified into 3 groups: operational (core), management, administrative (supporting). For each process and sub-process, the process owner is appointed responsible for describing, setting the goals and measures, monitoring, reviewing and improving the process.

The risk management

The risk management covers identification, analysis and assessment of risks. The Risks register is created once a year and reviewed twice a year. For the risk classified as nonacceptable or serious the mitigating actions are planned and implemented.

Internal Audits programme

Internal Audits programme is under implementation. The auditors were selected and trained and draft procedure for audits was elaborated. Currently the pilot phase is being finished and evaluated.

Management system review and improvement

Since 2012 PAA has been reviewing its management system according to standards of management control. The review (reported as "self-assessment") includes employee opinion survey and assessment conducted by all managers.

First complex yearly management system review, corresponding to GS-R-3 standard requirements, was conducted in 2016 (considering the year 2015).

In 2018 the procedure for review of IMS was elaborated and implemented and the regular comprehensive review has been conducted in the year 2018 and 2019. The yearly review covers the review of all processes and sub-processes, as well as collection and analysis of all applicable information, including results and conclusions from: self-assessment; risks management; implementation of changes; execution of strategies, programs and plans; implementation of improvement initiatives; results of external controls and audits, etc.). The systematic/additional fewer complex reviews of IMS are to be conducted during the year.

The implementation of approved improvement initiatives is being supervised by directors (or Steering Committee in case of a project) and reviewed during the following IMS review (yearly or systematic). Procedure covering planning, implementation and assessment of improvement initiatives was elaborated and implemented.

8.1.9. Transparency and openness

The discussion provided below serves also as the answer to common issue from 7th Review Meeting on "Stakeholder Consultation & Communication".

Suggestions from 2013 IRRS's mission report on communication with public:

- *"The regulatory body PAA should prepare a strategy for increasing transparency with the public about risks and incidents in the different facilities and activities subject to its regulations."*
- *"PAA should consider clarifying the steps necessary in the licensing process to elaborate on the existing provisions of the ALA, and communicate them internally and externally"*

The approach towards openness and transparency in PAA has been maintained since 2016. PAA recognizes openness and transparency issues as ones of key importance. PAA continued its strategic approach towards public communication policy that had been worked out in previous years.

According the Atomic Law Act PAA the scope of activities of PAA includes the tasks that involve activities connected with public communication, education and popularization, scientific, technical and legal information concerning nuclear safety and radiological protection, including activities consisting in providing the general public with information about ionizing radiation and its impact on human health and the environment and about feasible measures to be implemented in the event of radiation emergency. PAA goes beyond the legal requirements and has taken a proactive approach towards both informing the public and understanding its needs.

Ensuring effective and transparent communication with stakeholders is one of four strategic objectives of PAA, which marks the importance of the regulator's transparency and openness in communication with the public

PAA continued using *National Atomic Energy Agency Communication Strategy for 2014 – 2018* that had been adopted in 2014. The implementation of communication plan met the information demand of the public opinion on nuclear safety and radiological protection and helped building authority of the PAA as a professional and efficient institution, holding public trust.

Communication strategy has been divided into three parts:

- Analytical – in which national rules and regulations specifying the disclosure obligations of the PAA and recommendations of international institutions dealing with the dissemination of the highest standards of operation in the nuclear power sector were analysed. It also considers good practices used successfully by foreign Nuclear Safety Authorities in countries with highly developed nuclear industry. In addition, this part formulates PPEJ's stakeholders, media and public opinion information expectations of the PAA.
- Strategic – in this part of the document the communication objectives, target groups, and key information messages were specified, and communication challenges were diagnosed.
- Tactical – containing recommendation of the information activities and precisely planned communication tools that will allow to achieve selected goals effectively.

Communication strategy is based on three pillars:

- Safety – it has absolute priority comparing to other aspects of the nuclear industry and the use of ionizing radiation,
- Competence and professionalism – are reflected in the knowledge and experience of the nuclear regulatory office staff,
- Public confidence - strengthen and maintained through full transparency of activities conducted by the office and the openness to the information demand of public opinion.

Accepted values became the basis for the delineation of the PAA strategic communication objectives, which are:

- improving the effectiveness of communication, information and education activities conducted by the PAA,
- building authority of the PAA as a competent and effective institution, holding the public trust,
- building image of the PAA as a professional, modern and independent office, whose goal is to provide the highest possible standards of nuclear safety and radiological protection.

Properly designed and consistently implemented communication strategy allowed to achieve goals as listed below:

- improving system (and its efficiency) of the nuclear safety and radiological protection,
- improving the functioning of the PAA's office,
- increasing public trust in the PAA and its undertaken actions and decisions,
- raising profile and authority of the office of nuclear regulator.

Properly organized and efficient communication activities of the PAA have become a part of the national system of nuclear safety and will serve to promote safety culture.

Currently new PAA Communication Strategy for 2019-2024 is to be approved.

Some of the currently used communication tools include:

- PAA's website, meeting WCAG 2.0 accessibility standards,
- Public Information Bulletin – a separate website containing all the vital information on structure and functioning of PAA.
- Educational films
- publishing quarterly communications to the general public about national radiation situation, also about radioactive contamination levels in normal conditions and in emergency,
- preparation of annual reports on the activities of the Agency's President,
- publishing a quarterly entitled "Nuclear Safety and Radiological Protection".

PAA also provides current information on radiation situation in Poland publishing measurements from the network of permanent monitoring stations on new created map on PAA website.

Additionally, PAA constantly provides information for the public upon request in accordance with Polish Public Information Act and Act on disclosure on environmental information, public participation in environment protection and on environmental impact assessments answering over 100 of such requests annually.

PAA has also prepared educational films on safety requirements in NPPs and Waste Repositories as well as presentations and leaflets on site selection process for NPPs and construction licensing process for NPPs. This can be found on PAA website.

8.1.10. External technical support and advisory committees

Poland has received one suggestion relevant to external support during 2013 IRRS mission:

- *"PAA should consider reviewing the availability of external support across the range of technical and other disciplines needed to support the delivery of regulatory functions relating to the NPP programme, especially the early steps of the licensing process (review of site documentation; organizational capability and preliminary safety analysis report)"*

Atomic Law Act provides that The Council for Nuclear Safety and Radiological Protection acts as the consulting and opinion-giving body of the Agency's President. The Council consists of 7 experts on nuclear safety, radiological protection and research reactors. The main task of the Council is in particular issuing opinions following the request of the Agency's President with regard to: draft versions of licences to conduct activities, draft versions of legal acts drawn up by the Agency's President, draft versions of organizational and technical recommendations issued by the Agency's President.

PAA has a formal agreement (authorization) with Institute of Heat Engineering of Warsaw University of Technology as the support organization for the performance of safety analysis. PAA does not have any formal agreements with any other Technical Support Organizations. PAA uses the support from various external organizations or experts when needed and orders scientific works in various areas. PAA cooperate inter alia with Office of Technical Inspection, and National Centre for Nuclear Research. The need to have support from national and international TSO's is recognized and legislative works started in 2016 to establish TSO by the Act of Atomic Law. PAA recognized a number of areas in which external

help will be needed during the licensing process. As of 2019 the work is still in progress, with discussion with other interested parties (future TSO, the Ministry of Energy) ongoing.

8.2. Status of the regulatory body

The discussion provided below serves also as the answer to common issue from 7th Review Meeting on "legal framework and independence of regulatory body".

The PAA independence in performing its functions is assured by the law. The President of the National Atomic Energy Agency constitutes the central organ of the governmental administration, competent for nuclear safety and radiological protection matters to the extent specified in this Act" (Article 109 of the Atomic Law Act).

Independence of the regulatory body is guaranteed by clear separation of promotional and regulatory functions:

1. matters related to social and economic use of Nuclear Energy are within the scope of activities of Minister of Energy (pursuant to the Act on Governmental Administration Departments)

2. nuclear safety and radiological protection matters are within the scope of activities of PAA President (pursuant to the Atomic Law Act)

Regulatory decision made by the PAA President cannot be affected by any other organ of governmental administration. This authority is ensured by the Atomic Law. The President of PAA and other nuclear regulatory bodies are independent in performing their regulatory functions, in particular regulation of activities involving exposure (issuance of licences and receipt of notifications) and inspection functions determines President's independence in "exercising regulatory control and supervision over the activities leading to actual or potential ionizing radiation exposure of humans and environment, including the issuance of decisions on licences and authorizations and other decisions, as provided in this Act" (Article 110, Section 2 of Atomic Law) and no other organ can supervise their regulatory decisions except for the Administrative Courts of Law.

Minister of Environment provides administrative supervision of PAA's President and grants the statue of the Agency. PAA President reports annually to the Prime Minister of Poland. At least once in 3 years PAA President need to make assessment of nuclear regulatory activities and perform an analysis of the current legal status in terms of its adequacy and suitability to nuclear safety and radiological protection. Moreover at least once every 10 years, PAA's President shall subject the national nuclear safety and radiological protection system, including the nuclear regulatory activities, to external international review. As mentioned earlier PAA hosted IRRS mission in 2013 and IRRS follow-up mission in 2017. Next IRRS mission is expected to take place in 2023.

Article 9. Responsibility of the licence holder

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.

According to Article 35.1 of the Atomic Law Act "The head of organizational entity authorized to conduct activities involving exposure and consisting in construction,

commissioning, operation or decommissioning of nuclear facilities shall be responsible for nuclear safety, radiological protection, physical protection and nuclear material safeguards". Moreover Article 34. of the Atomic Law Act states that "No activities involving exposure and consisting in construction, commissioning, operation or decommissioning of nuclear facilities can be conducted by an organizational entity which fails to comply with the requirements concerning nuclear safety, radiological protection, physical protection and nuclear material safeguards".

Any activity involving exposure and consisting in construction, commissioning, operation and decommissioning of nuclear facilities require a licence from PAA President. System of periodic assessments, inspections and enforcement will serve PAA as the basis to assess whether the licence holder discharges its prime responsibility for safety. Please refer to compliance with article 7.4 and 7.5 for more details.

Licence holder is obliged to inform each asking individual on the status of nuclear safety and radiological protection of the facility, its impact on human health and natural environment, and of the volume and isotopic composition of radioactive substance emissions from the nuclear facility to the environment (article 35a). At least once in 12 months licence holder must publish such information on the website. Applicant shall open a Local Information Centre, no later than on the day when the application for construction permit is issued. It is established to provide information on the operation of NPP, status of nuclear safety and radiation protection in the area surrounding the facility for the local community. A local community can establish a Local Information Committee which can provide community supervision over the investment implementation, represent the local community in relations with the investor/operator and inform the local community on the activities of the nuclear power facilities**.** The Committee will be authorized to enter the facility and request information or documents concerning the investment implementation.

Company which will be the future licensee - PGE EJ 1 conducts various nation-wide and local activities that aim at dissemination of knowledge about nuclear power, shaping awareness of benefits connected with NPP; challenging stereotypes and building public buy-in for nuclear power in Poland. "*Świadomie o Atomie"* initiative is a programme of educational and information activities launched in 2011, which includes comprehensive communication activities carried out by PGE EJ 1 at the local and national level.

Some examples of PGE EJ 1 involvement in raising transparency and openness of the nuclear sector include:

- *Świadomie o Atomie* knowledge portal
- Cooperation with *Los Wiaheros* travel blog
- *Atom dla Nauki* educational programme at universities
- Preparing information materials
- *Pandora's Promise* documentary (translation, distribution in Poland)
- Science festivals

PGE EJ's regional activities (in potential municipalities) also include:

- Education of children and youth
- Running Local Information Points (LIPs) and Holiday Information Spots (HISs)
- Information stands at local open-air events
- Study visits at home and abroad
- Updating the community on site investigation and environmental surveys

PGE EJ 1 also conducts local and nation-wide surveys focused on level of support for NPP build

Provisions for obtaining appropriate financial and human resources by the licensee are described in Article 11. The financial provisions to cover the possible harms caused by a nuclear accident have been arranged according to Vienna Convention to which Poland is a Party, by means of obligatory third party responsibility insurance required from the nuclear installation's operator, according to *the Minister of Finance Regulation on obligatory third party liability insurance of nuclear installation operator* (Art.103.10), issued on 14.09.2011.

Article 10. Priority to safety

Each Contracting Party shall take the appropriate steps to ensure that all organizations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.

As stated in Article 9 the prime responsibility rests on the head of a licenced organizational entity. In addition to the licensee's obligations, other persons (organizations) involved in the project of a nuclear installation are responsible, in accordance with their duties, for ensuring compliance with the nuclear safety and radiation protection requirements (Art.35.3.).

The Atomic Law Act requires that, beginning from site selection, through construction, commissioning and in operation, such technical and organizational measures shall be taken in accordance with the most updated scientific and technical knowledge, that are necessary to eliminate, in all operational stages of a nuclear facility and in emergency situations, the harmful effects to the facility staff, the public and the environment (Art.35.4.).

Furthermore, any organization involved in construction, operation or decommissioning of nuclear facilities shall have an integrated management system which includes quality policy and quality assurance programme (Art. 36k.). The definition of Integrated Management System included in Atomic Law gives the priority to nuclear safety by making sure that all decisions are adopted on the basis of the results of nuclear safety analysis, radiological protection, physical protection and the protection of nuclear materials. The specific content of the Integrated Management System is described in description of compliance with article 13 of Convention. *Regulation of the Council of Ministers of 30th June 2015 on the documents required to apply for the issuance of licence to conduct exposure-related activity involving ionising radiation* provides that the quality management system should include inter alia description of the strategy for developing, maintaining and establishing the safety culture at every stage of the lifetime of the plant. Moreover, one of the goals of the quality management system is to "promote and support safety culture in the organizational unit of the applicant and in units of the suppliers of items and services".

Regulation of the Council of Ministers of 11th February 2013 on requirements for the commissioning and operation of nuclear facilities provides provisions regarding safety improvements and safety monitoring of activities. § 44 states that experience from the operation of the nuclear facility shall be subject to systematic assessment. It shall refer in particular to extraordinary events in the nuclear facility in order to identify their causes. Information resulting from the examination of events important from the viewpoint of nuclear safety or radiological protection and also conclusions drawn from this examination shall be submitted to the employees of the nuclear facility. It also required that the operator shall have suitable review and assessment system in place enabling the permanent monitoring of nuclear safety issues and the performance of periodic nuclear safety assessments. Moreover,

systematic analyses shall be conducted with regard to operating experience, development of international safety requirements, technological developments and new knowledge. Afterwards conclusions from these analyses shall be used to improve the nuclear safety in the facility (§ 8.).

10.1. Safety Culture in regulatory body

The IRRS follow-up review team underlined that since 2013, PAA has taken positives steps to strengthen internal safety culture. To improve the understanding of safety culture within the organization, PAA developed policies for a healthy safety culture. PAA's Safety Policy (approved in December 2016 by the top management) is the main policy document for the organization. Safety culture is also included in PAA's Management System Manual (approved in December 2016) and priority for safety is also taken into account during work on PAA processes and internal procedures. In April 2017, PAA approved *Action Plan on enhancing safety culture in PAA 2017-2019.* This document is a long-term strategy for safety culture development and consist list of action which are taken by PAA.

In order to get acquainted with best practices in the area of safety culture PAA managers systematically participate in the study visits organized in cooperation with other regulatory bodies and authorities (Sweden SSM in November 2013, UK ONR in May 2014, Swiss ENSI in January 2017, South Africa NNR in December 2017 etc.), which set the international standards. On average twice a year PAA organize a meeting for the PAA employees with a foreign expert (May 2017 – ENSI Expert "Meeting on exchange of good practices in safety culture of regulatory bodies"; April 2018 – IAEA Expert) on enhancement of safety culture in the organization. All employees of the Agency are invited to participate in the workshops, where various aspects of safety culture are discussed. Furthermore, PAA representatives from all departments take part in the meetings and workshops on the topics of management, leadership and safety culture organized by IAEA.

Till 2018 safety culture was incorporated into questionnaire of annual self-assessment (management control). The employee questionnaire covered separate section for evaluation of safety culture and leadership (including among others issues like: treating safety as priority, decision making process, questioning attitude, motivating and supporting the staff, resolving conflicts, cooperation and internal communication). In January 2019 PAA appointed *PAA team to promote Safety culture*. Team is based on PAA staff from different levels of organization (interdepartmental and interunit) with main task to promote Safety culture in PAA. *PAA team* is now responsible for preparation of independent from already mentioned management control, safety culture self-assessment questionnaire. *PAA team* is also responsible for updating *Action Plan on enhancing safety culture in PAA*.

The IRRS follow-up review team observed that PAA senior leadership is proactively prioritizing safety culture throughout PAA' s activities and processes and recognizes the value of continued focus on safety culture. PAA top management support effective collaboration and better internal communication by organizing regular meetings with the President of PAA or open meetings regarding safety culture topics.

At the 7th CNS Review Meeting Poland received 2 challenges. This subchapter provides an answer to the challenge "PAA to continue strengthening its safety culture requiring challenging attitude" as well as to the issue 1 from major common issues identified at 7th Review Meeting.

Article 11. Financial and human resources

1. Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life.
2. Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation, throughout its life.

11.1. Financial Resources

11.1.1. Financial provisions to ensure safety of nuclear installation throughout its lifetime

According to Article 38g section 1 item 2 of the Atomic Law Act the licence to conduct activities consisting in construction, commissioning, operating and decommissioning of nuclear facility shall only be granted to organizational entity which has sufficient funding to cover the costs of nuclear safety, radiological protection, physical protection and nuclear material safeguards at subsequent stages of the nuclear facility operation, until the facility is decommissioned and in the case of a licence granted to build the nuclear facility organizational entity needs to have sufficient founding to finish the construction.

In order to confirm that the required funding for construction of the nuclear facility is available the following documents shall be enclosed to the application: documents confirming the availability or possibility of obtaining funding to finish the construction including the financial plan and financial report featuring estimated costs and expenditure which need to be incurred.

In order to confirm that the required funding to cover the costs of nuclear safety, radiological protection, physical protection and nuclear material safeguards at subsequent stages of the nuclear facility operation, until the facility is decommissioned is available, the following documents shall be enclosed to the application: documents confirming the availability of funding, and in particular, bank account statement, bank guarantee or insurance guarantee, financial report featuring estimated costs and expenditure which need to be incurred.

The licensee's policy regarding appropriate funding of its activities should therefore take into account the above stated requirements. PAA will be assessing financial provision with other documentation required in the licensing process. Assessment will be made either by PAA's staff or contracted external organization which specializes in financial audits.

Principles for financing safety improvements to the nuclear installation over its operational lifetime, are also ensured by the ability to enforce necessary actions by the PAA's President. Renovation of any nuclear facility system, structure or component important for the nuclear safety and radiological protection, and each reactor start-up following fuel load shall require a written approval of the Agency's President (Article 37d. of the Atomic Law). If it is considered necessary from the viewpoint of nuclear safety, radiological protection, physical protection and nuclear material safeguards – especially based on the conclusions from the periodical assessment reports, the Agency's President is authorized to amend the conditions of activities covered by the licence (Article 39h.1).

11.1.2. Financial provisions during the period of commercial operation for decommissioning and management of spent fuel and radioactive waste from nuclear installations

Article 38d of the Atomic Law provides for the system of financing the costs of the spent nuclear fuel and radioactive waste disposal and the costs of nuclear power plant

decommissioning. In order to cover the costs of the spent nuclear fuel and radioactive waste disposal and the costs of nuclear power plant decommissioning, the organizational entity which was authorized to operate a nuclear power plant shall make quarterly payments to a "decommissioning fund", with dedicated bank account assigned to the found. Resources collected on the account can be deposited on fixed-term deposit accounts or invested in bonds emitted by the Minister competent in the matters of public finance.

Amount of the fee to be paid for the decommissioning fund was determined by *Regulation of the Council of Ministers of 10th October 2012 on the amount of contributions to cover the cost of the final management of spent fuel and radioactive waste, and to cover the costs of decommissioning a nuclear power plant made by the organizational entity, which has received a licence for the operation of a nuclear power plant and* is established to be 17.16 PLN for each MWh of electricity produced in a nuclear power plant.

In determining the amount of payments for the decommissioning fund the Council of Ministers took into account expected: life of a nuclear facility, the amount of radioactive waste including spent nuclear fuel produced by the facility, the final cost of disposal of the waste, and the cost of decommissioning a nuclear facility. It should be also noted that with the progress in the implementation of the Polish Nuclear Energy Programme in the future it may be necessary to amend the amount of payments to the decommissioning fund. Deadline for payments was established to be on the fifteenth day of the month following the quarter to which the payment relates, as from the first day of the quarter following the quarter in which the nuclear power plant produced the first MWh of energy, until the start of the decommissioning.

Resources collected on the decommissioning fund may only be allocated to cover the cost of the final radioactive waste and spent nuclear fuel disposal from those plants and to cover the costs of decommissioning the nuclear facility. Therefore, withdrawal of resources from the decommissioning fund will take place only after approval granted by the President of the PAA.

In order to allow the President of the PAA to supervise organizational entity's obligation to make payments to the decommissioning fund, the manager of the organizational unit holding a licence for operation or decommissioning of a nuclear power plant will have to submit quarterly reports to the President of the PAA stating the amount of payments to the decommissioning fund and the amount of megawatt hours of electricity produced in this quarter. The report shall be produced according to the template prescribed in the *Regulation of the Council of Ministers of 27th December 2011 on the template of the quarterly report on the amount of contributions paid to the decommissioning fund*, no later than the twentieth day of the month following the quarter, which it relates to. In the event that organizational entity delays in making payments for at least 18 months, the President of the PAA will be entitled to stop operation of a nuclear power plant.

11.1.3. Arrangements for ensuring that the necessary financial resources are available in the event of a radiological emergency

Article 93 of Atomic Law states that costs of intervention measures and of the elimination of radiation emergency consequences shall be borne by the organizational entity, which caused this radiation emergency. In the event of radiation emergency which has not been caused by an organizational entity, the costs shall be borne by the perpetrator, whereas in the event of emergency caused by an unknown perpetrator or when such costs may not be exacted from

the perpetrator, and also in the event of emergency which has occurred outside the borders of the Republic of Poland - such costs shall be borne by the national budget. If the means at the disposal of the authority that directs the actions aimed at the elimination of the hazard and of emergency consequences are inadequate, this authority may impose the obligation to render personal and material services with respect to relevant regulations concerning the services rendered to overcome natural disaster situations.

Civil liability for nuclear damage is also provided by the Atomic Law Act. Article 101 provides that exclusive liability for nuclear damage caused by a nuclear incident in nuclear installation or related to this installation, shall be borne by the operator, with the exception of damage caused directly by acts of war or armed conflict. The operator is obliged to conclude a contract for insurance against civil liability for nuclear damage. The operator's liability for nuclear damage shall be limited to the amount equivalent to SDR 300,000,000. In the event when the claims for nuclear damage exceed the above-mentioned amount the operator shall establish a limited liability fund. The procedures for the establishment and distribution of this fund shall be regulated, as appropriate, by the provisions of the Sea Code on the limited liability for sea claims.

11.2. Human Resources

The basic requirements concerning competence of the part of the staff of licence holder are specified in the Atomic Law Act:

„Article 12c.1. In any organizational entity conducting activities involving exposure and consisting in commissioning, operation or decommissioning of a nuclear power plant, all positions important from the viewpoint of nuclear safety and radiological protection shall be occupied exclusively by individuals possessing an appropriate authorization.
2. The activities referred to in Section 1 herein shall include activities directly related to the management and operation of a nuclear power plant, and the management of nuclear fuel and radioactive waste at a nuclear power plant.
3. The authorizations referred to in Section 1 herein shall be granted by the Agency's President of by way of administrative decision, to individuals who:

1) have full legal capacity;
2) hold a medical certificate on the absence of contraindications for work in occupational exposure conditions issued according to the regulations issued under Article 229 § 8 of the Labour Code Act of 26th June 1974;
3) hold a medical certificate concerning the absence of mental disorders listed in the Protection of Mental Health Act of 19th August 1994 (Journal of Laws No. 111, Item 535, with later amendments), and the absence of any psychological disorders;
4) have a higher education degree and professional experience necessary to be authorized to conduct the relevant activities at a nuclear power plant;
5) successfully passed the post-training examination, both theoretical and practical, referred to in *Regulation of the Council of Ministers of 10th August 2012 on activities important for nuclear safety and radiological protection in an organizational unit conducting activity which consists in commissioning, operations or decommissioning of a nuclear power plant* ("*Regulation on activities*");

4. The authorizations are granted for the period of 3 years.

Above mentioned *Regulation on activities* specifies inter alia: list of activities important for nuclear safety and radiological protection in an organizational unit; detailed conditions and

procedure for granting authorizations to perform those activities by the President of PAA and required programmes of trainings, including practical trainings and forms of trainings organized. Types of activities which require obtaining the authorization are as follows:

- management of the organizational unit,
- managing of commissioning and operation of NPP
- operating supervision over NPP's operations on the working shift
- control of the reactor/NPP and operations with the fuel in reactor and spent fuel pool.

Candidates who apply for the authorizations to perform those activities need to undertake both practical and theoretical trainings specified in the above-mentioned regulation. Scope of those trainings depend on the type of activity. After completion of training, candidate needs to pass the examinations organized by the President of PAA. Examination consists of theoretical and practical parts. The candidate is allowed to take the practical part of the examination only after passing the theoretical part. Practical exam for candidates applying for authorization for activities in operating supervision and control consists of conducting a selected sequence of activity on a fulltime simulator of a nuclear power plant's unit.

Plans for recruitment, trainings and training programme for employees occupying positions important from the viewpoint of nuclear safety and radiological protection are required to be submitted at stage of obtaining construction licence, and subsequently updated at the stages of commissioning and operation licence.

According to Article 11 of the Atomic Law also other employees of an organizational unit conducting activities involving exposure must have appropriate knowledge, skills and qualifications ensured by undertaking trainings described in training programme. Those preliminary and periodic trainings are provided by the licence holder, in accordance to specified training programme. The head of the organizational unit shall draw up short-term personnel training plans at least once every 3 years, as well as long term personnel training plans at 10-year intervals. Those plans are subject to approval by President of PAA. First assessment is made at the stage of issuing the licence for commissioning of nuclear facility. Scope of training include:

- general radiological protection procedures and undertaken preventive measures, as related to the activities conducted by an organizational entity;
- radiological protection procedures and undertaken preventive measures, as related to a specific workplace;
- procedures of conducting workplace-specific tasks and activities;
- information on the possible consequences of the loss of control over nuclear material, ionizing radiation source or radioactive waste involved in conducted activities;
- for nuclear power plants – trainings involving performance of tasks and activities using simulators of the actual nuclear equipment at the given nuclear power plant
- for research reactors - trainings involving specialist software that imitate the operation of equipment and research reactor.

After finishing the training, the employees need to pass an internal examination organized by head of organizational unit. Employees who failed to pass the exams are forbidden from undertaking work in the organizational unit.

At every stage of licensing the applicant needs to provide statements that employees of organizational unit and contracted personnel involved in works important from viewpoint of nuclear safety and radiological protection have enough qualifications and that the number of

employees is sufficient to handle those tasks. Copies of documents authenticating obtained authorizations of employees shall be submitted along with those statements.

Regulation of the Council of Ministers of 11th February 2013 on requirements for the commissioning and operation of nuclear facilities states that in order to ensure a proper level of nuclear safety and radiological protection at the stage of commissioning and at the stage of operation of a nuclear facility, in the organizational entity which possesses license for commissioning or operation of the nuclear facility the sufficient workforce shall be guaranteed possessing qualifications and professional experience adequate to tasks performed, provided that

a) the number of employees and their qualifications required for the safe operation of the nuclear facility are systematically verified and documented,
b) employees in the positions important for nuclear safety and radiological protection are staffed in accordance with a long-term plan,
c) changes in the number of employees which could significantly affect nuclear safety and radiological protection are planned in advance and assessed after their implementation;

11.2.1. Human resources policies

Article 108a of the Atomic Law obliges the Ministry of Energy to conduct activities aimed at ensuring supply of competent professionals in the nuclear power sector. The Ministry of Energy is responsible for preparing Human Resources Development Plan for Nuclear Power, with the aim to assess staffing needs for Polish nuclear power sector. The document has been prepared in June 2016. More detailed information of the Ministry of Energy activities in the field of human resources development can be found in Annex no.2 – chapter 3.

Currently, several majors/specialties directly related to nuclear energy are already available at Polish universities, although presently there is no comprehensive system of staff training. During years 2012-2014 a project called “Technologies supporting the development of safe nuclear power” was established by Minister of Science and Higher Education. At present with interest in High Temperature Reactor Technology National Center for Nuclear Research have opened the new international interdisciplinary PhD programme within the framework of the project “New reactor concepts and safety analyses for the Polish Nuclear Energy Program”. The project is devoted to the research in the new high temperature reactor technologies: HTGR – High Temperature Gas Cooled Reactor and DFR – Dual Fluid Reactor, which were indicated in the report of the Polish Ministry of Energy Committee for Deployment of High Temperature Reactors.

Article 12. Human factors

Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation.

Polish regulatory system takes human factors into account both on the level of Atomic Law Act and several regulations including: *Regulation of the Council of Ministers of 31st August 2012 on nuclear safety and radiological protection requirements which must be fulfilled by a nuclear facility design* (“*Design Regulation”*) and *Regulation of the Council of Ministers of 31st August 2012 on the scope and method for the performance of safety analyses prior to the submission of an application requesting the issue of a licence for the construction of a nuclear*

facility and the scope of the preliminary safety report for a nuclear facility ("*Safety analysis Regulation*").

According to the Article 36c section 1 item 3 of the Atomic Law Act nuclear facility design shall include solutions that provide for reliable, stable, easy and safe operation of the nuclear facility, with particular attention to factors related to man-machine interactions between personnel and structures, systems and components.

Also, to ensure that the personnel working at a nuclear facility has all necessary knowledge and practice, the head of organizational entity licenced to operate a nuclear facility is obliged to ensure preliminary and periodic trainings for workers at intervals defined in the licence, but at least every 5 years (Atomic Law Act Art. 11). For nuclear power plants these trainings shall address among others:

- general radiological protection procedures;
- procedures of conducting workplace-specific tasks and activities;
- performance of tasks and activities using simulators of the actual nuclear installations.

The head of organization is also obliged to prepare short-term personnel training plans at least once every 3 years and long-term personnel training plans at a10 year interval. Those plans have to be approved by the President of PAA.

The *Design Regulation* provides more specific requirements. It states that the design shall apply solutions concerning safety level sequences in order to prevent any possible negative consequences caused by human error during nuclear facility operations or during the performance of maintenance activities concerning operations, including nuclear facility repairs and modernization (§. 4.2.4)).

Furthermore (§. 43 of the *Design Regulation*) nuclear facility shall be designed so as to minimise the possibility and limit the consequences of human error, with particular consideration being given to the spatial layout of the nuclear facility and to ergonomics. Nuclear facility design solutions shall ensure the conditions for the appropriate activities of the nuclear facility operator, taking into account the time available for these measures, the anticipated work environment and the psychological strain of nuclear facility operators. Nuclear facility design solutions shall minimise the probability of situations which require intervention measures by the nuclear facility operator over a short period of time; however, if such intervention measures are taken by the operator, the solutions shall ensure that:

1) the operator has at his disposal sufficient time to take the right decisions and measures;
2) the necessary information for the operator to make the right decision is presented in a simple and unequivocal manner;
3) following the accident, in the main control room or the back-up control room and in the route leading to the back-up control room, there is an acceptable occupational environment in terms of radiological protection and work health and safety.

§44 of the *Design Regulation* considers human factors in main control room design. When designing the main control room and the back-up control room of the nuclear facility:

1) human factors shall be analysed and taken into account appropriately, in particular aspects of man-machine interaction so as to ensure an appropriate and transparent division of control functions and steering between nuclear facility operators and nuclear facility automated systems; furthermore, the nuclear facility design shall define the minimum number of operating personnel required for the simultaneous performance of measures necessary for the nuclear facility to attain a safe shut-down state;

2) application shall be made of solutions guaranteeing that nuclear facility operators are provided with complex but easy-to-understand information which is relevant in terms of the punctual making of the right decisions and the performance of activities.

Consideration of human factor is also taken into account in design of the protection systems. The protection system shall be designed so as to permit it to prevent nuclear facility operator activities which could foil the effectiveness of the protection system in operational states and accident conditions, but would not render impossible correct activities of the nuclear facility operator in accident conditions (§87.2.3 *Design Regulation*).

The *Safety analysis Regulation* also gives requirements to include human factors in safety analyses of a nuclear facility. Human factors should be taken into account when identifying the internal PIEs and during performance of probabilistic safety analysis to identify all failure and error sequences which contribute to the risk.

§ 7. 1. Of *Safety analysis Regulation* states that in identifying the internal PIEs, events caused by human error, which could lead to common cause failure should be taken into account, in particular such as: incorrect or incomplete maintenance and repair activities, incorrect control and protection system settings and workers' error. § 38 of this regulation states that when performing a probabilistic safety analysis of a nuclear facility consideration shall be given to possible workers errors, not only diagnostic, but also when performing control functions.

Inclusion of human factors is also reflected in the structure and content of the safety analysis report, with chapter 5.6 devoted to "Consideration of human factors in the nuclear facility design" and taking human factors into account in chapter 7 "Nuclear facility safety analyses", especially in chapter 7.3 where assessment of workers actions during the anticipated operational occurrences and under accident conditions is presented.

Regulation of the Council of Ministers of 27th December 2011 on periodical safety assessment of a nuclear facility gives consideration to "impact of nuclear facility's employees and their behavior and issues related to the performance of safety priority principle on the state of a nuclear facility" in the scope of the periodical safety assessment report.

Arrangements for providing feedback from license holder of experience in relation to human factors, as well as methods and programmes for analyzing and correcting the human errors during operation and maintenance of the facility will be covered by the licence conditions of activities, integrated management system and more broadly by nuclear facility's procedures.

Article 13. Quality assurance

Each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation.

The Atomic Law Act requires (Art.7.2) that every holder of licence issued by the President of PAA is obliged to establish and implement quality assurance programme. Submission of this programme within the documentation provided with the application for the licence is prerequisite to obtain the licence. The programme is subject to review by regulatory body. Practical implementation of the programme is subject to control by regulatory body inspectors.

According to the Atomic Law (Art. 36k.) quality assurance programme is a part of an integrated management system of nuclear facility. In order to ensure implementation and documentation of the system as a whole, the integrated management system should include actions that are taken directly by the licence holder as well as other actions crucial for nuclear safety and radiological protection that are taken by suppliers, contractors and subcontractors. Integrated management system is defined via documentation that includes:

1) quality policy;
2) quality assurance programme;
3) description of the management system;
4) description of the organizational structure;
5) description of responsibilities, duties, authorizations of and interdependencies between personnel involved in management, implementation and assessment operations;
6) description of interdependencies between organization unit and external entities;
7) description of organizational entity processes along with explanations concerning preparation, revision, implementation, documentation, assessment and improvement of the nuclear facility daily operations;
8) safety classification of nuclear facility systems, structures and components
9) preliminary safety report or final safety report.

Integrated management system documents have to be submitted to the President of PAA for approval along with application for a licence.

Producers and suppliers of nuclear facility systems, structures and components as well as contractors for construction works at the nuclear facility are obliged to have appropriate quality systems implemented for the services they provide.

The QA programme should describe the ways of assuring that all quality-related activities will be performed in the properly controlled conditions, i.e. by properly qualified personnel using appropriate tools, equipment, methods and technological processes and under suitable environmental conditions, so that the required quality is attained and may be verified by inspection or test. Review and assessment of this programme shall be carried out by the regulatory body at all stages of the licensing process, i.e. prior to and during the construction, during commissioning and operation. If necessary, suitable conditions and requirements will be included in the licence.

The requirements for the inclusion of quality assurance programme at every step of licensing process is also provided by the *Regulation of the Council of Ministers of 30th June 2015 on the documents required to apply for the issuance of licence to conduct exposure-related activity involving ionising radiation*. The regulation describes more specific requirements for every step of licensing process.

At the stage of commissioning it is required that quality management system contain in particular:

1) Description of the management structure, demonstrating the elements of the integrated management system for effective management supervision in order to ensure nuclear safety and radiation protection at the commissioning phase of a nuclear facility, in particular in respect of tasks and correlations between organizational units responsible for the design, equipment delivery, performing construction and assembly works, as well as the conducting commissioning;
2) Description of the requirements for providing a sufficient number of qualified employees for commissioning;

3) Description of the strategy for developing, maintaining and establishing the safety culture;
4) Description of the quality assurance programme for the commissioning, comprising at least:
a) Description of the process of developing and approving of procedures for: conducting commissioning tests and studies, controlling the tests and studies, as well as assessing and approving of their results,
b) Description of the procedure in the case where results of tests or studies do not fully meet the design needs,
c) Proposed audits and reviews in order to ensure that the safety policy in the organizational unit is effectively implemented, and that the organizational unit draws conclusions from its own experience and the experience of other organizational units in order to improve nuclear safety and radiation protection;
5) Safe management of radioactive waste and spent nuclear fuel programme

At the stage of operation, it is required that quality management system contain in particular:
1) Description of the management structure, presenting and justifying that an effective management supervision level has been attained in order to provide nuclear safety and radiation protection at the stage of the operation of a nuclear facility, covering in particular the descriptions of tasks and correlations between the organizational unit of the applicant as well as the organizational entities of the suppliers of items and services for the purpose of the operation which are important for providing nuclear safety and radiation protection,
2) Description of the requirements regarding a sufficient number of staff suitably qualified for the operation, as well as the requirements regarding the supply of items and services of the quality suitable for the operation.
3) Description of the strategy for developing, maintaining and establishing the safety culture.
4) Description of an operation quality assurance programme, encompassing the activities of all suppliers and contractors of services and items for the purposes of the operation.

The regulatory body, through the requirements concerning the preparation and implementation of the QA programme, obliges the applicant/licensee, as well as his vendors, to plan, perform, verify and document all their activities in an organized and systematic way. An effective QA programme established and implemented by the licensee, allows the regulatory body to obtain satisfactory confidence in the quality of nuclear facility's equipment and in the quality of all performed activities.

According to Article 37 of Atomic Law regulatory body PAA and Office of Technical Inspection are authorized to inspect the suppliers of nuclear facility systems, structures and components as well as contractors hired for works important for ensuring nuclear safety and radiological protection during every stage of facility lifetime. Those inspections can cover SSC both on the stage of manufacture and after completion as well as inspection in nuclear facility to check the works important for nuclear safety and radiation protection. The arrangements for these provisions should be included in contracts with suppliers and contractors.

The discussion presented above includes the response to major common issue from 7th Review Meeting on supply chain.

Article 14. Assessment and verification of safety

Each Contracting Party shall take the appropriate steps to ensure that:

i. comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;

ii. verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.

14.1. Assessment of safety

Article 36d of the Atomic Law provides that before applying for a nuclear facility construction licence to the Agency's President, the investor shall carry out nuclear safety analyses, taking into account the technical and environmental factors, and shall have them verified by independent entities which are by no way involved in the design process of the future nuclear facility. Safety analyses include probabilistic and deterministic safety analysis. Deterministic analyses for design basis conditions shall be based on the conservative approach and analysis of accidents which are more severe than design basis accidents may be analyzed based on best estimate methodology. Based on the safety analysis results, the investor shall draw up a preliminary safety report to be forwarded to the Agency's President along with the application for the construction licence.

Detailed requirements on the scope of the preliminary safety report are provided in *Regulation of the Council of Ministers of 31st August 2012 on the scope and method for the performance of safety analyses prior to the submission of an application requesting the issue of a licence for the construction of a nuclear facility and the scope of the preliminary safety report for a nuclear facility.* This regulation was based on several IAEA safety standards, including NS-G-1.2 (now superseded by GSR Part 4) SSG-2, SSG-3, SSG-4, GS-G-4.1 and relevant WENRA, "EUR" documents as well as guides and regulations from several other countries.

Regulation of the Council of Ministers of 10th September 2015 on the documents required with the application for the licence for activities involving the exposure to ionizing radiation or with the notification of such activities provides for the detailed scope of safety reports submitted with applications for licence on the stage of commissioning, operation and decommissioning.

One of the suggestions from 2013 IRRS mission was to:

- *"Develop procedures covering the review and assessment of new facilities, design modification and SAR amendments for research reactors".*

PAA developed "Procedure for issuing consent for modernization and modification" that covers the entire process of issuing permits for the modernization and modification of systems, structures and components of a nuclear facility which are important for nuclear safety and radiation protection. It describes also the process for review and assessment of documentation enclosed with the application for the consent for modernization and modification.

Currently PAA is working on the specific set of internal guides on assessing the safety analysis report based on existing regulations and Atomic Law.

According to Article 37e of the Atomic Law head of the organizational entity shall perform periodical safety review. The exact time interval will be established in the licence but should not exceed 10 years. Detailed periodical safety review plan needs to be approved by the PAA's President. Based on the periodical safety review, the head of organizational entity shall draw up a periodical safety review report to be submitted to the Agency's President for approval until by the deadline stated in the licence for the nuclear facility operation. *Regulation of the Council of Ministers of 27th December 2011 on periodical safety review of a nuclear facility* provides for a detailed scope of this review and a scope of periodical assessment report. The assessment should include inter alia review of design solutions, status of SSCs, review of safety classification of SSCs, issues related to the natural wear and tear of SSCs, deterministic analyses, probabilistic analyses and review of ageing of SSCs. If - based on the conclusions from the periodical assessment report - it is considered necessary from the viewpoint of nuclear safety, radiological protection, physical protection and nuclear material safeguards, the Agency's President is authorized to amend the conditions of activities covered by the licence.

Currently operator of research reactor MARIA delivered PSAR report to PAA, after completion of the assessment. License for operation was issued in March 2015, and one of the conditions was to perform PSAR in the period of 4 years following issuance of licence. PAA has 6 months to review and assess the PSAR report.

One of the results of periodic safety review is preparation of programme of necessary renovations and corrective measures intended to enhance the level of nuclear safety in the course of further operations of a nuclear facility. Several other provisions for continuous improvement resulting from safety reviews are covered by *Regulation of the Council of Ministers of 11th February 2013 on requirements for the commissioning and operation of nuclear facilities*. Article 8 point 7 of this regulation states that: "In order to ensure a proper level of nuclear safety and radiological protection at the stage of commissioning and at the stage of operation of a nuclear facility, organizational entity which possesses license for commissioning or operation of the nuclear facility [licensee] conducts systematic analyses with regard to operating experience, development of international safety requirements, technological developments and new knowledge, and conclusions from these analyses shall be used to improve the nuclear safety of the nuclear facility". Article 44 of this regulation covers using operational experience from the operated plant to systematically asses safety of the facility. It states that "Experience from the operation of the nuclear facility shall be subject to systematic assessment. It shall refer in particular to extraordinary events in the nuclear facility in order to identify their causes. Where justified, suitable corrective measures shall be taken immediately on the basis of conclusions drawn from the above-mentioned assessment. In order to draw conclusions regarding the operation of the nuclear facility, information shall be obtained and assessed with regard to operating experience of other domestic and foreign nuclear facilities, especially those of similar type. Data on operating experience shall be collected, documented and kept in the manner enabling their easy retrieval and obtaining and performing the evaluation by authorized employees of the nuclear facility."

Taking all of this into account it can be said that polish provisions of law meet the second principle of the Vienna Declaration.

14.2. Verification of safety

Safety of nuclear installation during its operation is under constant verification performed by the licenced operator and by the regulatory body - PAA. Main responsibilities of the licensee for performing verification of safety are stated in the *Regulation of the Council of Ministers of 11th February 2013 on requirements regarding commissioning and operation of nuclear installations.*

The Regulation states that operation of nuclear installation has to be conducted accordingly to the operational limits and conditions which are determined by the President of PAA. These conditions cover among others requirements for inspection and oversight of systems, construction elements and equipment which are important regarding nuclear safety and radiological protection. Moreover, the head of organizational entity licenced to operate a nuclear facility is obliged to prepare a programme of maintenance, repairs, oversight and inspection of these important systems and elements. This programme has to consider ageing processes.

One of the common issues from 7th Review Meeting of CNS Contracting Parties was "managing the safety of ageing nuclear facilities and plant life extension – ageing management programme".

The National Centre for Nuclear Research which is the operator of MARIA research reactor has submitted to the PAA the Ageing Management Programme for acceptance. This document is based on the requirements of the IAEA's Specific Safety Guide No. SSG-10 Ageing Management for Research Reactors. The Programme covers general objectives, responsibilities and describes conditions and ageing mechanisms of safety related structures, systems, and components. It also contains a set of detailed guidelines for ageing management dedicated to individual systems which includes among others: preventive actions against ageing, monitored parameters, methods of detection of ageing effects and acceptance criteria.

Recognising the importance of peer review mechanisms in delivering continuous improvement to nuclear safety, the amended Nuclear Safety Directive (Council Directive 2014/87/EURATOM) introduced a European system of topical peer reviews (TPR). First TPR took place between 2017 and 2018 covering the following topics: electrical cables, concealed pipework, reactor pressure vessels, calandria/pressure tubes (CANDU) and concrete containment structures. MARIA research reactor took part in the TPR process.

Regarding regulatory verification of safety, the nuclear regulatory bodies (the PAA President and nuclear regulatory inspectors) in accordance with Article 64 Section 4 of the Atomic Law Act, must first of all:

1) issue the licences (the PAA President) and other decisions in the matters involving nuclear safety and radiological protection, according to the principles and procedures established by the Act,
2) conduct inspections in nuclear facilities and in organizational entities which hold nuclear materials, ionizing radiation sources, radioactive waste and spent nuclear fuel.

Particular powers of a nuclear regulatory body were specified in Article 66 Section 1 of the Atomic Law Act. In accordance with this Article, in the context of regulatory control, nuclear regulatory bodies are authorized to:

1) around-the-clock access to the sites, facilities, premises and transport vehicles of the inspected organizational entities, being suitably equipped to do so;
2) scrutinize the documentation, logbooks and other data carriers concerning nuclear safety and radiological protection in the inspected organizational entity;
3) request copies of the documents and data carriers referred to in Item 2 to be produced or provided;
4) verify whether the activities of the inspected organizational entity are conducted in compliance with nuclear safety and radiological protection regulations and with the requirements and conditions established in the licences;
5) conduct independent technical and dosimetric measurements, whenever needed;
6) request written or oral information in matters under scrutiny, and to interview the head and personnel of the inspected organizational entity, as well as external workers and apprentices;
7) collect samples for laboratory tests;
8) inspect the site, facilities, premises and installations of the inspected organizational entity and its transport vehicles;
9) record the processes and results of inspection as referred to in Item 8 using audio-visual recording systems;
10) secure and request securing (confirming security) documents and other proofs;
11) during inspections of nuclear power plants – to request the assistance of expert laboratories and organizations authorized by the Agency's President and during inspections of other organizational entities – to request the assistance of experts, specialists and laboratories.

The head of inspected entity is obliged to enable nuclear regulatory bodies the performance of inspection ensuring suitable conditions for the inspection. In accordance with Article 37 of the Atomic Law Act inspection concerns producers and suppliers of nuclear facility systems, construction elements and installations, as well as contractors for systems, components and works important for the nuclear safety, radiological protection and safe operation of installations referred to in the regulations issued under Article 5, Section 4 of the Technical Inspection Act of 21st December 2000, carried out or provided during construction, fitting, commissioning, operation and decommissioning of a nuclear facility. The inspection referred to above consist in checking selected nuclear facility systems, construction elements and installations which are ready or being made, as well as works which are being performed at the nuclear facility.

The head of organizational entity conducting activities involving exposure and consisting in the operation of nuclear facility is obliged to regularly forward the nuclear facility operating parameters which are important for the nuclear safety and radiological protection to the Agency's President.

The nuclear regulatory body possesses appropriate legal measures which enable it to respond to situation when the head of an organizational entity does not comply with the binding provisions of law concerning the performance of activities involving exposure. The nuclear regulatory body may first of all use legal measures specified in Chapter 9 of the Atomic Law

Act i.e. injunctions and interdictions, including order to to stop the operation of a nuclear facility (Article 68 of the Atomic Law Act), decisions to eliminate non-conformances (Article 68b of the Atomic Law Act), post-inspection decisions (Article 69 of the Atomic Law Act), recommendations (Article 68a of the Atomic Law Act). The above measures are used if any non-conformances and irregularities are found during inspection and are intended to:

1) eliminate direct threat to nuclear safety and radiological protection (injunctions and interdictions);
2) eliminate non-conformances if it has been found that factual and legal status is not in compliance with conditions specified in the licence or in provisions regulating activities covered by the licence (decisions to eliminate non-conformances);
3) eliminate other errors or failures than those specified in Item 2 (post-inspection decisions);
4) improve the status of nuclear safety or radiological protection in the inspected entity (recommendations).

The nuclear regulator may also charge the authorized party with a fine in cases specified in Article 123 of the Atomic Law Act. Fines are imposed in the form of administrative decision.

Polish regulations allow for regulatory oversight of the safety of nuclear installations and to impose improvements in safety on operating organization so comply with Vienna Declaration principle 2.

Article 15. Radiation protection

Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

The radiological protection issue at the national level is addressed in the chapter 3 of *Atomic Law Act* and several relevant secondary regulations in which internationally endorsed criteria and standards had been incorporated. The Act takes into account the *Basic Safety Standards for radiation protection* (BSS- *International Basic Safety Standards for Protection against Ionizing Radiation and for the safety of Radiation Sources, IAEA Safety series No.115* based on ICRP 60/72). It is aimed at ensuring the compliance with the provisions of the *EURATOM Treaty* and appropriate EU directives. Besides of the *Directive 96/29/EURATOM on basic safety standards in health services, for the protection of workers and of the members of the public against the ionizing radiation risks*, the Atomic Law provisions introduce the requirements contained in other EU directives, relevant for the protection of workers and general public. They provide for the fundamental set of nuclear safety and radiological protection requirements. Detailed requirements, concerning specific facilities and activities conducted by individual licensee are specified in the licensing conditions. These conditions take into account the results of assessments and analyses performed to establish the operational conditions and limits assumed in safety reports for these facilities and activities.

Dose limits are established strictly according to the EU Directive 96/29 EURATOM in the governmental regulation on ionising radiation dose limits, first issued on 28th May 2002, replaced by its updated version on 18th January 2005. The effective dose limit for workers is 20 mSv per year (or equivalent dose for the lens of eye – 150 mSv per year, for the skin 500

mSv per year and for the hands, forearms, feet and ankles – 500 mSv per year), it is allowed however to exceed it up to the 50mSv in calendar year provided that in any five-year period of his occupational exposure the worker shall not exceed effective dose of 100 mSv (average value of 20 mSv yearly). The same limits are for apprentices and students over 18 years old. For this category for age between 16 and 18 years old yearly limit is 6 mSv/y, for younger than 16 years – 1 mSv/y – the same as for general public. If the worker is pregnant woman, the limitation of her doses has to be such as her child to be born does not exceed the dose of 1 mSv. In special circumstances, strictly defined by law, the limits above may be exceeded with exclusion of apprentices, students and pregnant women. For population equivalent dose limits are 15mSv per year for the lens of eye and 50 mSv per year for skin; the limit of 1 mSv per year may be exceeded provided that in five-year period the effective dose shall not exceed 5 mSv. Workers exposures are subject to optimization. For this purpose, the radiation protection targets may be established by the management of facility. They are not subject to review or endorsement by the regulatory authority. On the contrary, the discharges of effluents to the environment are under control by the regulatory body and numerical values of relevant limits are usually included into the terms of licence. For the purpose of protection of population groups living in vicinity of nuclear facility the zone of limited use is established within such distance from the facility, that the effective dose at its perimeter does not exceed the value of 0.3 mSv. Under the Atomic Law, the responsibility for compliance with the nuclear safety and radiological protection requirements rests upon the Head of organizational entity conducting activities / practices involving exposure (Art.7). This exposure must not exceed the dose limits described above, established in the regulation issued under the Art. 25.1 of the Atomic Law. At the same time the principle of exposure optimization must be observed (Art.9). This means that the activity should be conducted in such way that – after reasonable consideration of economic and social factors – the number of exposed workers and members of general public and their doses are as low as reasonably achievable. According to this principle, the Head of the organizational entities is responsible for assure and perform an assessment of the employees' exposure. If it seems to be necessary from the exposure optimization analysis – the Head of organizational entity shall establish the authorized limits for the workers' exposure (dose constraints) to ensure that their ionising radiation doses will be not greater than these limits, which in turn are lower than dose limits. If the authorized limits are established in the licence, the licensing authority has to be notified of the possibility of their overrun by the organizational unit manager. The assessment of the employees' exposure is based on individual dose measurements or radiation measurements in the workplace environment. The workers whose exposure – according to the manager's assessment – can exceed 6 mSv in one year in the terms of effective dose or three tenths of dose limit values for skin, limbs and eye lens in terms of equivalent dose, shall be subject to the exposure assessment based on systematic individual dose measurements (category A workers). For these workers the organizational unit director is obliged to maintain a register of their individual doses based on systematic measurements and doses' assessment conducted by accredited entities. The data concerning these exposures must be relayed systematically (in compliance with the requirements established in the *Regulation of the Council of Ministers of 23rd March 2007 on the requirements for the individual doses registration*) to the authorized medical practitioner, who maintains medical records of these workers, and also to the Central Dose Register of the PAA President. To match the methods of exposure assessment to the expected exposure level for workers, two categories of workers are established: category A (for workers who may be exposed to an effective dose exceeding 6 mSv/y or to an equivalent dose exceeding three-tenths of the dose limits for eye lens, skin and limbs) and category B (for workers who may be

exposed to an effective dose exceeding 1 mSv/y or to an equivalent dose exceeding one-tenth of the dose limits for eye lens, skin and limbs). The data related to the doses obtained by workers classified (by their supervisor) as “category A workers” is collected since year 2003 in the Central Dose Register of the President of the National Atomic Energy Agency. These data are based on the measurements of whole-body effective dose or equivalent dose to a specified exposed body part (e.g. the hands). Exceptionally, in the cases of exposures to radioactive contamination from the so-called unsealed sources, the assessment of committed dose from internal contamination is performed. Radiation dose measurements are performed by specialized laboratories. The Central Dose Register is kept in the form of an electronic database comprising electronic registration cards, separate for every “category A worker”. Data are stored until the worker reaches the age of 75 years, but not shorter than for 30 years from the end of the calendar year in which the last entry concerning the given worker has been made. The total number of workers classified as “category-A workers” and recorded in the Central Dose Register exceeded 5000. The data show that approximately 97% of category-A workers did not exceed the lower limit for this category of exposure (6 mSv/y) and above 99% did not exceed the 20 mSv/a limit. Each case of exposure exceeding the annual dose limit of 20 mSv is subjected to a detailed investigation by regulatory inspectors.

Head of organizational entity, prior to employing a worker in radiation exposure conditions, shall apply to the PAA President for the information from the Central Dose Register on the doses received by this worker in the calendar year in which the application is submitted, and also in the period of the four preceding calendar years. All employers of the category A workers are obliged to submit the dose data of their employees yearly before 15th April next year, and each time after the dose limits were exceeded or the employee finished its employment.

Article 16. Emergency preparedness

1. Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency.
For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.
2. Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.
3. ***Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.***

Regulation of the Council of Ministers of 20th February 2007 on the emergency plans for radiation emergency defines the responsibilities, scope, requirements and general rules of cooperation in a case of radiation emergency. According to this regulation, the plans on different levels (facility level, province level, national level) and appropriate emergency preparedness arrangements have to be in place and maintained by the organizations and bodies responsible for directing actions aimed at eliminating the threat and its consequences, and in particular - for implementation of intervention measures in case of radiation emergency with consequences beyond the site where it has occurred. The same bodies are responsible for systematic testing of these plans and arrangements within the prescribed time-intervals as

established by the Atomic Law for national level (Art.96) and by the *Regulation of the Council of Ministers on the emergency plans for radiation emergency*. There are emergency plans for spent fuel and radioactive waste management facilities localized at Świerk site and for the National Radioactive Waste Repository in Różan.

The external transportation of radioactive waste is essential for these plans. The plans include internal and external communication and cooperation arrangements (President of the National Atomic Energy Agency, Province Governor office and services, State Regional Sanitary Inspector, police, fire-department). The Atomic Law Act requires that during on-site radiation emergency, the actions aimed at the elimination of the threat and its consequences shall be directed by the facility manager (licensee). During radiation emergency on regional scale actions including intervention measures shall be directed by the governor of a province (Voivode) in co-operation with the proper Regional Sanitary Inspector. On national level this is responsibility of the Minister of Interior, with the PAA President assistance. The regulation describes the scope, content and roles of the parties involved in the public communication process during an emergency.

This minister is obliged by Law (Art.96.2 of Atomic Law) to perform exercise to test the national level radiation emergency preparedness plan at least once every 3 years. According to present requirements (Art.96.1 of Atomic Law, *Regulation of the Council of Ministers on the emergency plans for radiation emergency*) the frequency of testing of the relevant plans at regional (provincial) and facility level must be established within each particular plan by the province governor or the facility manager respectively. In practice such exercises are performed once every -two years for the facility and once every three years for the province. As there is no NPPs in Poland and existing other nuclear facilities are sited far from the national borders, it is rather unlikely that Poland could create immediate radiation threat to a neighboring country. Also, the NPPs in neighboring countries are not located in the close vicinity to Poland's borders. However appropriate arrangements have been made to be able to respond adequately to even very unlikely radiation emergency situation.

According to the Atomic Law the PAA President is responsible for performing the tasks concerning the assessments of national radiation situation in normal conditions and in radiation emergency situations, and the transmission of relevant information to appropriate authorities and to the general public. For the purpose of information gathering and of assessment and forecasting of radiation situation development, the President of PAA has established **the Radiation Emergency Centre** "CEZAR" being one of the departments **in the PAA structure,** which operates **National Contact Point** (for domestic matters and for EC, IAEA, CBSS, and bilateral agreements) and has direct access to the data from the Country-wide system for early detection of radioactive contamination (early warning radiation monitoring system), the meteorological data as well as appropriate computerized tools (decision support systems e.g. RODOS, ARGOS), relevant data bases, and the staff adequately trained to operate these tools, to perform analysis and prognosis and to formulate recommendations for decision makers.

CEZAR operates also the **International and Domestic National Warning Point** (NWP) working on 24h a day/7 days a week basis. It serves as a channel of exchanging information on radiation emergencies with IAEA, EC, CBSS, and neighboring countries according to international conventions and bilateral agreements. Poland has signed bilateral agreements on early notification of a nuclear accident and on cooperation in nuclear safety

and radiological protection with Denmark (1987), Norway (1989), Austria (1989), Ukraine (1993), Belarus (1994), Russian Federation (1995), Lithuania (1995), Slovak Republic (1996), Czech Republic (2005) and Germany (2009).

Poland participates in international projects in the emergency preparedness area, therefore Radiation Emergency Centre CEZAR of PAA regularly participates in many international exercises and tests organized by IAEA (CONVEX level 1, 2 and 3), EU (ECURIE level 1 and 3), NEA-OECD (INEX-5 in 2011), Council of Baltic Sea States (CBSS) EGNRS (Expert Group for Nuclear and Radiation Safety), and within bilateral agreements with neighboring countries. Each year CEZAR participates in several domestic exercises on the national or regional level. Special attention is put on aspects of international and bilateral cooperation in case of emergency situation with transboundary impact in order to identify gaps and areas for further improvement.

Moreover, in order to support achievement of further harmonization of response Poland participates in international initiatives focused on this issue.

The legislative process of the amendment of the Atomic Law is under way. The amendment implements the EU-Council Directive 2013/59/Euratom into national law, one of the topics is also ensuring harmonized emergency plans and response measures on facility, regional and national levels. Currently the harmonization approaches for cross-border emergency planning is not defined by polish legislation.

Article 17. Siting

Each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented:

- ***i. for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;***
- ***ii. for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;***
- ***iii. for re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;***
- ***iv. for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the likely safety impact on their own territory of the nuclear installation.***

17.1. Evaluation of site related factors

Atomic Law (Article 35b) provides that nuclear facilities shall be located within an area which ensures that nuclear safety, radiological protection and physical protection requirements are fulfilled during commissioning, operation and decommissioning of the facility, and that emergency measures can be effectively implemented in response to any radiation emergency.

According to the Atomic Law the licence holder (investor) being liable for nuclear safety, should independently evaluate the terrain for the prospect site of a nuclear facility using methods of evaluation which yield quantifiable results and appropriately reflect the actual conditions of such terrain. Such an evaluation is the prerequisite for selecting the site for a nuclear facility, and concerns:

1) seismic, tectonics, geological, geo-engineering, hydrogeological, hydrological and meteorological conditions;

2) man-made external incidents;
3) external incidents attributed to the forces of nature;
4) population density and land development;
5) conditions for the employment of emergency measures in response to radiological emergency;

The investor needs to prepare the results of the evaluation of a terrain for the prospect site of a nuclear facility, together with results of tests and measurements that are the basis for such evaluation, in the form of a site evaluation report. The site evaluation report will be subject to assessment by the PAA President, in the course of the process for issuing a licence for construction for a nuclear facility. No separate siting licence will be introduced. Before applying for a nuclear facility construction licence, the investor can however apply to the Agency's President for a preliminary assessment of the site of a future nuclear facility.

More detailed provision for siting are provided by *Regulation of the Council of Ministers of 10th of August 2012 on detailed scope of assessment with regard to land intended for the location of a nuclear facility, cases excluding land to be considered eligible for the location of a nuclear facility and on requirements concerning siting report for a nuclear facility* ("*Siting Regulation*").

List of site related factors is covered by § 2 of *Siting Regulation*. Excerpt from § 2 of *Siting Regulation* is provided below.
"§ 2. A detailed scope of assessment with regard to land intended for a location of a nuclear facility shall include:

1) information from the field of seismology and tectonics, including inter alia seismic shocks, faults;
2) information from the field of geological and engineering conditions including inter alia geological and engineering conditions and their changes, intensity of erosion and accumulation processes, stability of existing scarps and slopes;
3) information from the field of hydro-geological conditions including underground waters, filtration features of ground, physical and chemical features of underground waters, prognosis concerning changes of dynamics of underground waters;
4) information from the field of hydrology and meteorology including inter alia flooding threats and history, impact of different period of precipitation, extreme atmospheric phenomena, values (including extremes) of atmospheric and hydro-meteorological variables, impact of long periods of drought on the system of underground and surface waters
5) information from the field of external events being the result of human activity including i.a. transport infrastructure, distance from a nuclear facility to active and planned military facilities, potential threat to a nuclear facility posed by industrial plants and installations, acts of terrorism or sabotage, telecommunication devices
6) information from the field of external events being the result of the forces of nature including i.a. risk of seasonal loss or deterioration of capacity of nuclear facility's cooling systems, natural fire threat, risk of detrimental impact of living organisms on a nuclear facility, in particular on its cooling systems,
7) analyses concerning pace, amount and paths of dispersing of radioactive substances outside the nuclear facility and the possibility to carry out intervention measures in case of radiation emergency under normal operating conditions, predicted operating events and emergency conditions
8) information from the field of population density and land management

9) survey of ground geological structure
10) distribution of radioactive isotopes' concentration in ground, surface waters, underground waters and in the atmosphere and analysis of distribution of ionizing radiation dose rate valid as of the day when the land assessment is carried out."

As presented above *Site Regulation* includes set of natural and human induced hazards which licensee is obliged to investigate. However, regulation contains a non-exhaustive list of natural hazards. Phenomena which are not covered by the Regulation, that can have negative impact to the NPP must be investigated as well.

Concerning siting topics PAA (with help from contracted experts and organizations) has prepared 3 regulatory guides in 2013-2014:

1. Technical recommendations of the President of the National Atomic Energy Agency concerning the assessment of tectonic stability of substrata and seismic activity of faults with reference to locations of nuclear facilities,
2. Technical recommendations of the President of the National Atomic Energy Agency concerning the assessment of geological, engineering and hydrogeological conditions for locations of nuclear facilities,
3. Technical recommendations of the President of the National Atomic Energy Agency concerning the assessment seismic activity of substrata with reference to locations of nuclear facilities.

There are works ongoing on development of another regulatory guides for siting process.

Some other provisions for site related factors affecting the safety of nuclear installation are provided by the *Regulation of the Council of Ministers of 31st August 2012 on nuclear safety and radiological protection requirements which must be fulfilled by a nuclear facility design* ("*Design Regulation*").

§ 19.3 of *Design Regulation* provides that in a design of multi-unit nuclear power plant, consideration shall be given to the possibility of simultaneous impact of given events and external hazards on more than one power unit. § 45 of *Design Regulation* states that in multi-unit nuclear power plants the systems and components of construction and equipment important for ensuring nuclear safety and radiological protection cannot be shared by two or more reactors, unless it is demonstrated that for all reactors, in operational states, including maintenance activities in the scope of operation, repairs, modernisation and during the considered accidents, the requirements on nuclear safety and radiological protection shall be met, and in the event of a severe accident of one reactor, the orderly shut-down, cooling and discharge of post-shut-down heat will be ensured for the remaining reactors. § 49 of the *Design Regulation* sates that design of the nuclear power plant shall take into account its mutual interaction with the power grid, including independence and the number of power lines connected to the nuclear power plant, possible fluctuation and anticipated interference in voltage, mains frequency and system failure, from the viewpoint of ensuring the necessary reliability of power supply to the nuclear power plant systems important for nuclear safety and radiological protection.

§ 47 of the *Design Regulation* provides that the spatial layout of the nuclear facility and the design solutions of nuclear facility buildings shall permit the effective control of access and the movement of people, equipment and materials onto the premises of the nuclear facility, including workers and emergency service vehicles, with particular consideration being given

to protection against the unauthorized access of persons and the unauthorized introduction of objects. Nuclear facility shall be equipped with alarm systems and means of communication which also permit, under emergency conditions, the communication of warnings and instructions to people on the premises of the nuclear facility and informing persons and entities beyond the nuclear facility in keeping with the plant emergency procedure plans.

Design provisions used for:

- fire, explosion etc. – provisions are stated in the chapter 8 of the section IV of the *Design Regulation* titled **Requirements on the fire protection and the prevention of explosions**. Systems and elements of construction and equipment of the nuclear facility important for ensuring nuclear safety and radiological protection shall be designed and distributed so as to minimise the probability of fire and explosion caused by external or internal events. Redundancy, diversity and physical separation of those systems are required. Fire barriers, fire detection systems, fire alarms and the extinguishing of fires at the nuclear facility shall be designed on the basis of the analyses on fire threat of the nuclear facility indicating required fire resistance, need for application and output.
- Aircraft crash – provisions are stated in the § 33 of the *Design Regulation*. Design solutions ensuring NPPs safety in case of a large civilian aircraft crashing into it should be provided. Design should ensure that with limited operator's actions: the reactor core continues being cooled or the primary reactor containment remains intact and the cooling of spent nuclear fuel or the integrity of the spent nuclear fuel pool is maintained. Moreover § 67 of this regulation provides that two reactor containments should be constructed. Presence of the secondary containment increases nuclear safety and resistance to aircraft crash.
- External flooding – provisions are stated in the §23 of the *Design Regulation*. In the event of locating the nuclear facility in the areas where the probability of flooding is once every 1000 years or more than once every 1000 years, the nuclear facility shall be designed in a manner to prevent the negative consequences brought about by floods or flooding. When designing anti-flooding protection for a nuclear facility, consideration shall be given to the maximum water surface ordinate with the probability to occur once every 1000 years.
- Severe weather conditions, earthquakes, heavy rains:
  Following provisions can be found in the Polish regulations:
  Siting Regulation:
  § 5. The land shall not be considered to fulfil location requirements with regard to a nuclear facility location in case of the following factors
  2) in the location ground of a nuclear facility in the distance which is less than 20 km from the borders of planned placement of a nuclear facility there is an active fault or fault in relation to which the probability of activation is more than once in 10,000 years and such activation could cause a threat to nuclear safety of a nuclear facility (it follows the European Commission recommendation from post-Fukushima stress tests):
  3) in the location region there has been an earthquake of 8 grade in EMS-98 scale within the last 10,000 years or there is the probability of earthquake with the same scale which is more than once in 10,000 years
  4) there is the possibility of earthquake with the occurrence probability being more than once in 10,000 years and with the scale below 8 EMS-98, which will prevent the safe operation of a nuclear facility;

Design Regulation:

§21. 1. Nuclear facility shall be designed so as to ensure its nuclear safety in case of the occurrence of seismic events and their consequences.

3. When designing a nuclear facility, consideration shall be given to design seismic events with the shock repetition once every 10 000 years, which generates the highest horizontal ground acceleration spectra. The design seismic event shall define: the shock type and mechanism, its location, magnitude, duration, spectral parameters, vertical and horizontal ground acceleration spectra and the seismic moment tensor.

4. When a nuclear facility is in danger of an induced earthquake taking place, natural and induced earthquakes scenarios shall be taken into account for the purpose of identification of design seismic event.

5. Nuclear facility design solutions shall ensure that in case of a design seismic event taking place, referred to in Section 3, systems and components of construction and equipment of the nuclear facility which are important for performing fundamental safety functions shall resist stress arising from such event, so that the nuclear facility could attain the state of safe switch-off.

6. The requirement defined in Section 5 shall be performed in particular by seismic classification of systems and components of construction and equipment of the nuclear facility depending on their required resistance to seismic stress, taking into account implemented safety functions, and by defining the appropriate technical requirements depending on seismicity class.

§22. 1. The nuclear facility design shall take into account the capability of its systems and components of construction and equipment important for performing fundamental safety functions, to resist the consequences of seismic events which are more severe than design seismic event, so as to demonstrate that they will not be suddenly damaged, even in the case of design stress being slightly exceeded.

2. In designing the facility for seismic events, an assumption will be made for the loss of electrical power supply to the nuclear facility from external power grids as a result of seismic shocks; including pre-emptive shocks and aftershock.

- Related sequential natural external events – provision is stated in the §18 of the *Design Regulation.* In case of the coincidence of given random events, which could lead to anticipated operational occurrences or accident conditions, such events shall be included in the nuclear facility design. Events which may be due to other secondary events, such as floods following earthquakes, shall be treated as elements of the original postulated initiating event.
- External events and events resulting from human activities are taken into consideration in determining the Postulated Imitating Events adopted for the performance of the safety analyses.

As Poland does not have any Nuclear Facilities according to definition in Article 2 of the Convention, therefore no control or review have been carried.

Siting Regulation was based on the number of relevant IAEA safety standards including NS-R-3, series of NS-G's from 3.1 to 3.6 (now surpassed by newer documents). Taking this into account as well as above presented excerpt from regulations it can be sated that Polish provisions of Law are following Vienna Declaration.

17.2. Impact of the installation on individuals, society and environment

When applying for the licence for construction of Nuclear Power Plant licensee will have to provide inter alia:

a. Decision on Environmental Conditions issued by General Directorate of Environmental Protection after PAA's President opinion
b. Preliminary Safety Report including chapter 13 - Impact of the nuclear facility on the environment including radiological and non-radiological impact of the facility.
c. Siting assessment report

The siting assessment report need to contain analysis of all site related factors which should include models of dispersing radioactive isotopes to underground waters, surface waters and atmosphere for assumed design releases, taking account of food chain and evaluation of effective and equivalent doses received by population as a result of the exposure to ionizing radiation with the indication of parameters and data used, calculation methodology and methods applied for the model verification.

Article 36f of Atomic Law establishes creation of the restricted-use area the nuclear facility. This area should be bounded such as the:

1) the annual effective dose from all routes of exposure shall not exceed 0.3 mSv under normal operating conditions of the nuclear facility and during anticipated operational occurrences;

2) the annual effective dose from all routes of exposure shall not exceed 10 mSv in emergencies during which the reactor core does not melt.

Moreover § 9 of *Design Regulation* provides that nuclear facility design shall ensure the limitation of releases of radioactive substances beyond the reactor containment in case of the occurrence of accident conditions so that in the event of:

1) design basis accidents, there is no need to take any intervention measures beyond the limits of the restricted-use area;
2) design extension conditions, there is no need to take:
   a) early intervention measures beyond the limits of the restricted-use area of the nuclear facility during the releases of radioactive substances from the nuclear facility,
   b) medium-term intervention measures at any time whatsoever beyond the limits of the emergency planning zone,
   c) long-term intervention measures beyond the limits of the restricted-use area of the nuclear facility

In the nuclear facility design consideration shall be given to the interaction between the nuclear facility and the environment (§ 17 of the *Design Regulation*). The characteristics of the planned site and the region of the nuclear facility location should determine the impact of the nuclear facility on the environment. The interactions should in particular take into consideration:

1) defining the transfer of radioactive substances to persons belonging to the general population and the environment, including the spreading of radioactive substances in the air, surface water and groundwater;

2) in terms of possible impact on intervention measures and risk assessment for given persons belonging to the general population and the population as a whole in case of accident, such as:

a) population distribution around the nuclear facility,
b) the use of land and water,
c) communication routes.

To ensure the nuclear safety and radiological protection the nuclear facility design shall provide for components of equipment used for the purpose of monitoring ionising radiation in the operational states and during and after the considered accidents (§ 123 of the *Design Regulation*).

On May 25, 2016 General Directorate for Environmental Protection (GDOŚ) issued a decision on the scope of the report of environmental impact assessment for identified by PGE EJ 1 variants locations of the first Polish nuclear power plant, i.e. "Lubiatowo - Kopalino" (municipality Choczewo) and "Żarnowiec" (municipality Krokowa and Gniewino).

17.3. Re-evaluation of site related factors

Not applicable as Poland does not have any Nuclear Facilities according to definition provided in Article 2 of the convention.

17.4. Consultation with other Contracting Parties likely to be affected by the installation

One of the suggestions from 2013 IRRS mission stated that *"PAA should consider extending bilateral exchange agreements to share experiences with other countries embarking on, or expanding, its NPP programme"*

To ensure nuclear and radiological safety, the Republic of Poland signed a number of international bilateral agreements. Agreements concerning early notification of nuclear accident and exchange of information and experience were executed with the neighbouring countries under international Convention on Early Notification of Nuclear Accident, i.e. with Russian Federation (it refers to the zone of 300 km from the Polish border, this area encompasses the Kaliningrad Oblast), Lithuania, Belarus, Ukraine, Slovakia, Czech Republic, Austria, Denmark, Norway and Germany.

Due to the fact that the number of nuclear power plants operate in close vicinity of the territory of Poland, the cooperation with nuclear regulators of the neighbouring countries, conducted in accordance with the mentioned intergovernmental agreements, is an essential element of Polish radiological safety. While assessing possible radiation events, partners of the said agreements use consolidated criteria provided for by so called the International Nuclear Event Scale - INES, which was developed by the IAEA. During last 3 years Poland took part in consultations with Ukraine, Czech Republic, Slovakia and Belarus regarding their plans to build new NPPs or radioactive storages. Moreover, it is required that before applying for a licence to build a nuclear facility, the applying entity is required to obtain opinion of the European Commission issued pursuant to Article 37 Euratom Treaty. Therefore, countries of European Union are allowed to participate in the discussion concerning the safety of the planned nuclear power plants.

Article 18. Design and construction

Each Contracting Party shall take the appropriate steps to ensure that:

- ***i. the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;***
- ***ii. the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;***
- ***iii. the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.***

General provisions for the nuclear facility design, which include prevention of accidents, are provided by Article 36c of the Atomic Law. More detailed requirements are contained in the *Regulation of the Council of Ministers of 31st August 2012 on nuclear safety and radiological protection requirements which must be fulfilled by a nuclear facility design ("Design Regulation")*. This regulation is based on IAEA Safety Standards (in particular SSR 2/1), WENRA recommendations, European Utility Requirements for LWR NPPs and relevant regulatory provisions and requirements binding in particular UE countries, and as such it complies with the principles of the Vienna Declaration on Nuclear Safety. Furthermore, siting requirements are contained in *Regulation of the Council of Ministers of 10th August 2012 on detailed scope of assessment with regard to land intended for the location of a nuclear facility, requirements concerning siting report for a nuclear facility.*

18.1. Prevention of early or large radioactive releases (implementation of 1st and 3rd principle of Vienna Declaration on Nuclear Safety in regulations)

§ 2 section 2 of the *Design Regulation* provides that nuclear facility shall be designed in a manner which ensures limiting the radiation consequences of any possible accident without significant degradation of the reactor core, taken into account in the nuclear facility design, so as to prevent the evacuation of the population and long-term limitations in the use of land and waters around the nuclear facility.

Furthermore § 9 section 2 of *Design Regulation* says that nuclear facility design shall ensure the limitation of releases of radioactive substances beyond the reactor containment in case of the occurrence of accident conditions so that in the event of extended design conditions, there is no need to take neither early intervention measures beyond the limits of the restricted-use area of the nuclear facility during the releases of radioactive substances from the nuclear facility, nor long-term intervention measures beyond the limits of the restricted-use area.

To add on this § 10 section 3 of *Design Regulation* says that nuclear facility design shall ensure the attainment of probability of accident sequences to occur considerably less frequently than once every 1 000 000 years of reactor operation, potentially leading to the premature failure of the reactor containment or to very large releases of radioactive substances to the surroundings.

18.2. Implementation of defence in depth

General provisions for the defence in depth concept are provided by the Atomic Law. Article 36c section 2 says that nuclear facility design shall take into account the sequence of safety levels to prevent deviations from normal operating conditions, predictable operating emergencies and design basis accidents, as well as severe emergencies unaccounted for in

the nuclear facility design, and if any of the foregoing deviations, incidents or emergencies cannot be prevented – to control them and to mitigate radiological impact of the emergency. This requirement is described broader in the *Design Regulation*. § 3 of this regulation develops five safety levels, as well as functions and actions that should be taken at each level. Sequence of protective barriers ensuring the maintenance of radioactive substances at given points of the nuclear facility and preventing their uncontrolled release to the environment, such as: nuclear fuel material (fuel matrix), fuel cladding, pressure boundary of the reactor cooling circuit and reactor containment need to be implemented in the nuclear facility design. In all circumstances, fundamental safety functions of the plant should be performed.

Defence in depth is also included in other requirements for facility design. General requirements provide that the design shall ensure:

1) high level of quality of the nuclear facility in order to minimize the occurrence of failures and deviations from normal operation and to prevent accidents;

2) technical solutions for controlling nuclear facility behaviour during and after the occurrence of a postulated initiating event, with the use of the built-in safety properties of the nuclear facility and appropriate components of the nuclear facility equipment

3) nuclear facility control by applying automatic actuation of safety systems in a manner limiting operator's activities in the earlier phase of the postulated initiating event, as well as the control of the nuclear facility by the operator;

4) as far as it is practically possible, equipment and procedures permitting the controlling of the course of accident and limiting its consequences;

5) multiple technical solutions in order to ensure the performance of each of the fundamental safety functions, attaining in this manner protective barrier effectiveness and limiting the consequences of postulated initiating events.

The nuclear facility design shall apply solutions concerning safety level sequences in order to prevent:

1) the strain of the integrity of protective barriers;

2) the failure of one or more protective barriers;

3) the failure of the protective barrier resulting from the failure of another protective barrier or system, component of construction or equipment of a nuclear facility;

4) any possible negative consequences caused by human error during nuclear facility operations or during the performance of maintenance activities concerning operations, including nuclear facility repairs and modernization.

18.3. Incorporation of proven technologies

Under the provision of the Article 35b of the Atomic Law it is required that in the design and construction process of a nuclear facility, no solutions or technologies shall be used which have not been demonstrated to be appropriate in practice in other nuclear facilities, or by means of tests, studies and analyses.

Integrated management system needs to be presented by the licensee when applying for the licence to conduct activities involving exposure and consisting in construction, commissioning, operation or decommissioning of nuclear facilities. Producers and suppliers of

nuclear facility systems, construction elements and/or installations, as well as contractors for construction works at the nuclear facility shall have appropriate quality systems implemented for the services they provide.

During construction and manufacture of the facility systems, installations and components nuclear regulatory inspectors and inspectors from Office of Technical Inspection will conduct inspections to ensure that high technological standards are met at every step of the construction. Experience of the Office of Technical Inspection inspectors will be a big asset in the inspection process.

Equipment qualification is also required. The safety system necessary for the nuclear facility to attain a safe shut-down and remain in this state shall be designed so as to permit it to perform its functions when fulfilling the single failure criterion and even when any other component of this system or of the auxiliary system required for it to function is excluded from operation.

Requirements regarding reliability and periodic testing of the control and measuring devices and systems are provided by the *Design Regulation.*

18.4. Design for reliable, stable and manageable operation

§ 43 of the *Design Regulation* provides that nuclear facility shall be designed so as to minimize the possibility and limit the consequences of human error, with particular consideration being given to the spatial layout of the nuclear facility and to ergonomics. It should be ensured that operator has conditions provided to undertake needed actions. Nuclear facility design solutions shall minimise the probability of situations which require intervention measures by the nuclear facility operator over a short period of time; however, if such intervention measures are taken by the operator, the solutions shall ensure that:

1) the operator has at his disposal sufficient time to take the right decisions and measures;

2) the necessary information for the operator to make the right decision is presented in a simple and unequivocal manner;

3) following the accident, in the main control room or the back-up control room and in the route leading to the back-up control room, there is an acceptable occupational environment in terms of radiological protection and work health and safety.

§ 44 of the *Design Regulation* gives special attention to the design of the main control room and back-up control room in accordance to human factors and man-machine interaction. Back-up control room is required in the design of the NPP and should be physically separated from main control room, as to ensure the safety of the plant in case if all the necessary actions for ensuring safety cannot be undertaken from the main control room. Control room shall be designed to provide operators with comprehensive picture of the state and functioning of the nuclear facility and complex but easy to understand information.

Probabilistic safety analysis will be conducted and included in the Safety Analysis Report and will take into account inter alia possible workers errors.

18.5. Provisions concerning Fukushima Daiichi accident lessons learned

Many solutions which are now found as lessons learned from Fukushima Daiichi accident were already implemented in Atomic Law and the working version of *Design Regulation* when the accident happened.

Based on the lessons listed in The Fukushima Daiichi Accident Report by the IAEA Director General, these are the most important provisions regarding design and construction:

1) As mentioned above back-up control room and the route leading to it shall have acceptable occupational environment after an accident occurs.

2) § 99 of the *Design Regulation* gives special attention to sources of emergency power supply for the nuclear facility. These sources shall be selected in a manner to ensure reliable operation after the anticipated operational occurrences of the systems and components of equipment important for ensuring nuclear safety and radiation protection.

Furthermore In the event of a loss of alternating current supplied externally, the internal sources of power supply to the nuclear facility with alternating current, with the exception of those sources of supply, referred to in Section 4, shall ensure the power supply of systems and components of equipment important for ensuring nuclear safety and radiation protection, for at least 7 cycles of 24-hours in operational states and during and after the considered accidents.

Besides internal sources of power supply the nuclear facility design shall also provide for an alternative source of supplying the facility with alternating current to be used in case of unavailability of internal sources of power, in particular transportable or portable power generators or combined systems for supplying emergency power to a nuclear facility.

3) According to § 78 of *Design Regulation* control and measuring devices used in nuclear facility, shall be qualified in keeping with environmental conditions which could occur in given nuclear facility states, ensuring that these devices are appropriate for nuclear facility parameter measurements in accident conditions.

4) § 58 to § 66 of the *Design Regulation* are dedicated to reactor cooling circuit. Among others it provides that the design of a nuclear power plant shall provide for the application of the emergency reactor core cooling systems in order to restore and maintain nuclear fuel cooling during in accident states, even in the event of the loss of the integrity of the pressure boundary of the reactor cooling circuit.

5) Among other more specific requirements regarding containment *Design Regulation* provides that the design solutions of reactor containment and its related safety systems shall in particular ensure the fulfilment of accident scenarios including nuclear meltdown, selected on the basis of engineering judgment and probabilistic safety analyses. Nuclear power plant and research reactor shall be designed so as to prevent the occurrence of severe accidents, which could lead to a premature failure of the primary reactor containment, or it shall be demonstrated that the probability of occurrence of such accidents is so small that it is not necessary to include it in the design. The design of a nuclear power plant and research reactor shall provide for solutions ensuring limitation, by means of the reactor containment system, of the consequences of severe accidents involving reactor core degradation.

6) §76 of the *Design Regulation* states that reactor containment system design shall provide for, as required, systems used for limiting, reducing and controlling the quantities of products

of fission, hydrogen, oxygen and other substances, which may be released into the reactor containment. Those systems should be designed with the appropriate degree of multiplicity (redundancy) and with appropriate mutual connections, with the purpose of ensuring that each safety group may fulfill the required safety function, with electricity supply from internal facility sources or from the external power grid, assuming the occurrence of a single failure. In order to reduce the concentration of flammable gases in the reactor containment, application shall be made of systems or components of equipment which do not require electricity.

Article 19. Operation

Each Contracting Party shall take the appropriate steps to ensure that:

- ***i. the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;***
- ***ii. operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;***
- ***iii. operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;***
- ***iv. procedures are established for responding to anticipated operational occurrences and to accidents;***
- ***v. necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;***
- ***vi. incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body;***
- ***vii. programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;***
- ***viii. the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.***

As Poland does not have any Nuclear Installations by the definition of Nuclear Safety Convention presented below information is based mostly on excerpts from Atomic Law and relevant regulations. *Regulation of the Council of Ministers of 11th February 2013 on requirements regarding commissioning and operation of nuclear installations ("Regulation on Commissioning and Operation")* is based on IAEA Safety Documents (SSR – 2/2, NS-G-2.9, NS-G-2.2, GS-R-3) as well as relevant WENRA documents and regulations and guides from other countries. Preparation of relevant Polish regulations therefore meet the third principle of the Vienna Declaration.

19.1. Initial authorization

Article 4 of the Atomic Law states that separate licences for commissioning and operation are required. A list and scope of documents that are required at this stage of licensing process are provided by *Regulation of the council of ministers of 10th September 2015 on the documents required with the application for the licence for activities involving the exposure to ionizing radiation or with the notification of such activities*. Most important documents required at commissioning stage (there are 38 documents specified in Regulation):

- commissioning Safety report including safety analysis, based on the Preliminary Safety Report with updates, clarifications and supplements arising from

construction phase, including information about system, structures and components as built and every other change as important to nuclear safety and radiological protection
- commissioning programme and procedures
- operational limits and conditions
- nuclear fuel reloading program, supported by appropriate neutronic and thermal-hydraulic calculations for first fuel cycle
- operational procedures
- list of planned pre-operational tests
- training programme for NPP staff
- updated nuclear facility decommissioning programme
- description of the structure and activities of separated division or team responsible for maintaining knowledge about plant's project and design throughout plant's lifetime

Most important additional documents required at operation stage:
- operation Safety Report
- commissioning report, with pre-operational test results
- statement of adequacy of human resources to perform activities important for nuclear safety and radiological protection
- operation programme, including electricity production programme and plan of repairs for at least 10 years

Article 37a. 1. of the Atomic law states that "nuclear facility shall be commissioned and operated in a manner that will ensure nuclear safety and radiological protection of personnel and general public, in accordance with the licence issued by the Agency's President and the implemented integrated management system." Point 2 of Article 37a requires the licensee to submit commissioning programme to PAA's President for approval. The programme shall list all pre-commissioning tests of nuclear facility systems, construction elements and installations to be completed, and in particular:

1) pre-commissioning tests, including tests required under the technical inspection regulations (specific scope of tests is provided in the *Regulation on commissioning and operation*);
2) fuel load and sub-criticality tests;
3) preliminary criticality tests and low power output tests;
4) power output tests (at power levels specified in the *Regulation on commissioning and operation)*

Results of nuclear facility commissioning tests at every stage need to be submitted the Agency's President. The Agency's President may suspend nuclear facility commissioning if the results of commissioning tests indicate any risks for nuclear safety or non-compliances with the nuclear safety requirements. Further requirements are provided by *Regulation on commissioning and operation*.

During construction, commissioning and operation phase regulatory inspectors are authorized to inspect producers and suppliers of nuclear facility systems, structures and components as well as contractors for systems, components and works important for the nuclear safety, radiological protection and safe operation of installation (Article 37.1. of Atomic Law).

19.2. Operational limits and conditions

Every licence specifies the conditions of activities covered by the licence, including operating limits and conditions (Article 39g). Requirements for operating limits and conditions for commissioning and operation of nuclear facilities are provided by *Regulation on Commissioning and Operation.*

The licensee presents proposed operational limits and conditions with the application for commissioning. The President of PAA has the right to modify them, taking into account operational experience or modifications of systems, structures or components, results of new safety analyses as well as scientific and technological developments. Operational limits and conditions are subject to reviews during commissioning and operation of the nuclear facility.
Operational limits and conditions shall include at least (§ 3. 1 *Regulation on Commissioning and Operation)*

1) safety limits – defined as “values of these physical and technological parameters which must not be exceeded and which directly impact the condition of protective barriers”;
2) limiting settings for safety systems, where safety system settings are defined as “parameter values at which protective devices are automatically actuated in the event of anticipated operational occurrences or accident conditions to prevent safety limits from being exceeded”;
3) limits and conditions for normal operation;
4) requirements concerning inspection and surveillance over the systems, structures and components of the nuclear facility important for ensuring nuclear safety and radiological protection;
5) minimum required staffing of operational personnel, including the control room operators.

Safety limits shall be established based on conservative approach taking into account uncertainties of safety analyses. In the case of exceeding safety limits during commissioning or operation of the nuclear power plant or research reactor, the reactor shall be immediately shut down.

Limits and conditions for normal operation shall determine conditions for the safe operation of the nuclear facility in all the modes of its normal operation. They shall include in particular:

1) ranges and rates of permissible changes of physical and process parameters of the nuclear facility;
2) requirements for functional availability and effectiveness of the systems and components of the nuclear facility important for ensuring nuclear safety and radiological protection so that
they could fulfil safety functions in particular conditions;
3) measures which should be taken in the case when the requirements as referred to in Item 2 are not met and the identification of time period in which these measures should be taken.

§ 30.2 of *Regulation on Commissioning and Operation* provides that at the end of commissioning of the nuclear power unit or research reactor an assessment of the results

obtained shall be conducted in order to confirm whether operational limits and conditions are proper and practically applicable and to specify possible limitations for operation which must be implemented as demonstrated by the results of commissioning tests and measurements.

Description of operational limits and conditions shall be made available to the operators of nuclear facility's control room in a separate document (technical specification for commissioning and operation respectively). Furthermore *Regulation of the Council of Ministers of 10th August 2012 on activities important for nuclear safety and radiological protection in an organizational unit conducting activity which consists in commissioning, operations or decommissioning of a nuclear power plant* states that theoretical training for position of operator should include inter alia "Limits and operating conditions and nuclear regulatory authority's requirements".

19.3. Procedures for operation, maintenance, inspection and testing

Requirements for appropriate procedures are provided by *Regulation on Commissioning and Operation* and *Regulation of the council of ministers of 10th September 2015 on the documents required with the application for the licence for activities involving the exposure to ionizing radiation or with the notification of such activities.*

§ 33 *Regulation on Commissioning and Operation* provides basic requirements on operational procedures. Operation of the nuclear facility shall be conducted in accordance with operating procedures developed, verified, approved, modified and revoked according to the principles set out in the integrated management system. Operating procedures of the nuclear facility shall be developed on the basis of the design documentation, in particular the safety analysis report, also on the basis of operational limits and conditions and the results of nuclear facility commissioning. Operating procedures of the nuclear facility shall be developed for particular states of the nuclear facility. Operating procedures of the nuclear facility shall be made available to employees of the nuclear facility on the permanent basis, and to the nuclear regulatory bodies – on demand. The Agency's President may order introducing changes in the operating procedures if the reasons for nuclear safety or radiological protection require so.

Regulation also obliges the operator to establish program of maintenance, testing, surveillance and inspection of the systems, structures and components of the nuclear facility important for ensuring nuclear safety and radiological protection with relevant procedures. This programme will need to include systematic assessments in order to confirm that the systems, structures and components are capable of performing their functions in the operational states and in accident conditions and management of aging processes. It is subject to periodic reviews on the basis of operating experience. Specific scope of the programme and implementing procedures will be prepared by the operator during commissioning phase. Design, assessment, inspection and implementation of any modernizations and modifications introduced in the nuclear facility during its operation shall be made in accordance with the procedure constituting an element of the integrated management system.

Regulation on the documents required with the application for the licence provides that in addition to commissioning and operational procedures, there should be procedure established for preparation, acceptance and implementation of procedures as well procedure for implementing modifications in other procedures.

19.4. Procedures for responding to operational occurrences and accidents

Operating procedures of the nuclear facility shall be developed for particular states of the nuclear facility. That means that both at commissioning and operation phase operator need to have procedures for normal operation, procedures for accidents and emergency procedures including severe accident management guidelines. More specific guides on establishment of specific procedures may be further developed by PAA.

19.5. Engineering and technical support

As explained in response to compliance with article 11.2 of Convention in order to ensure a proper level of nuclear safety and radiological protection at the stage of commissioning and at the stage of operation of a nuclear facility, in the organizational entity which possesses license for commissioning or operation of the nuclear facility the sufficient workforce possessing qualifications and professional experience adequate to tasks performed shall be guaranteed.

During the construction of Olkiluoto 3 in Finland significant share of work was done by Polish companies e.g. Polbau, Elektrobudowa, Energomontaż-Północ, KMW Engineering. Thanks to this experience big part of building can be done with the help of Polish engineers and companies. However, there are very few experts in the field of design of nuclear power reactors and as well there is lack of experienced operational staff. The main scientific support for the Polish Nuclear Power Programme is National Centre for Nuclear Research in Świerk (NCBJ). NCBJ is operator of polish research reactor MARIA.

Due to these reasons PGE EJ 1, which is a special purpose company responsible for preparing the investment process and construction of the first nuclear power plant in Poland, in May 2013 signed an agreement with Polish universities to promote education and research in the field of nuclear power. Both PGE EJ1 and PAA recognize their need to have a strong backup in consultants, contractors and technical support organizations and are looking for the ways of cooperation both in Poland and abroad.

19.6. Reporting of incidents significant to safety

The Atomic Law Act states that “the head of organizational entity conducting activities involving exposure and consisting in commissioning, operation or decommissioning of nuclear facilities shall immediately notify the PAA President, the regional governor, district or municipal authorities competent for the area where the facility is located, as well as municipal authorities of the adjacent areas on all emergencies related to actual or potential nuclear hazards”. He also shall publish or update information concerning hazardous nuclear emergencies within the last 12 months on the facility’s official website and shall forward it to the Agency’s President (Article 35a).

In the event of radiation emergency, the head of the organizational entity shall secure the emergency site and shall notify immediately the Agency’s President and additionally, in justified cases, shall notify also other organizations and services, in accordance with the on-site emergency plan.

The licence will specify the conditions concerning anticipated operational occurrences, as well as accidents and emergency conditions which are required to be reported to nuclear regulatory body.

19.7. Operational experience feedback

According to Article 37c of Atomic Law head of the organizational entity operating NPP will keep records on the day-to-day operation of the nuclear facility; introduce technical and organizational solutions to be able to collect and analyse on an ongoing basis the nuclear facility operating parameters which are important for the nuclear safety and radiological protection, in consideration of the operating experience so far. Operator is also obliged to regularly forward the nuclear facility operating parameters which are important for the nuclear safety and radiological protection to the PAA's President**.**

Regulation of the Council of Ministers of 10th September 2015 on the documents required with the application for the licence for activities involving the exposure to ionizing radiation or with the notification of such activities obliges the licensee to include in Safety Analysis Report information about the programme of operational experience feedback based on operating experience of the plant and other nuclear facilities, especially those of similar type.

The specifics of this programme are provided by *Regulation of the Council of Ministers of 11th February 2013 on requirements regarding commissioning and operation of nuclear installations*, which also provides several further requirements. In order to ensure a proper level of nuclear safety and radiological protection at the stage of commissioning and at the stage of operation of a nuclear facility systematic analyses shall be conducted with regard to operating experience, development of international safety requirements, technological developments and new knowledge, and conclusions from these analyses shall be used to improve the safety state of the nuclear facility (§ 8.7). During commissioning and operation of the nuclear facility it shall be verified that the integrated management system has been implemented correctly in the scope of radiological protection and it shall be assessed whether this system meets the set objectives, and, if necessary, suitable corrective and updating measures shall be taken to ensure its implementation in the light of operating experience (§ 9.3). Program of maintenance, testing, surveillance and inspection of the systems, structures and components of the nuclear facility is subject to periodic reviews on the basis of operating experience (§37.3). During maintenance, modernization or modification outages of the nuclear facility the performance of comprehensive assessments should be made in order to draw conclusions and lessons learned to be used for future maintenance, modernizations and modifications (§45.2).

Experience from the operation of the nuclear facility shall be subject to systematic assessment. It shall refer in particular to extraordinary events in the nuclear facility in order to identify their causes. Information resulting from the examination of events important from the viewpoint of nuclear safety or radiological protection, and also conclusions drawn from this examination shall be submitted to the employees of the nuclear facility. In order to draw conclusions regarding the operation of the nuclear facility, information shall be obtained and assessed with regard to operating experience of other domestic and foreign nuclear facilities, especially those of similar type. In order to detect states, situations or deficiencies which could potentially lead to deviations from the normal operation, assigned employees of the nuclear facility shall conduct appropriate analyses of operating experience so that it shall be possible to take necessary countermeasures to prevent such events. Internal procedures which are applicable in the nuclear facility shall oblige the nuclear facility's employees to notify the head of the organizational entity [licensee] about any events related to nuclear safety or radiological

protection and shall also encourage employees to inform about the events which potentially could lead to adverse effects from the viewpoint of nuclear safety or radiological protection. Data on operating experience shall be collected, documented and kept in the manner enabling their easy retrieval and obtaining and performing the evaluation by authorized employees of the nuclear facility (§44).

During 2013 IRRS mission one of the suggestions was so that:

- *The regulatory body PAA should establish an internal process for using the feedback from operating experience, incidents and accidents in Poland as well as in other countries.*

Since the end of 2013 PAA has gained access to 3 databases consisting records and information about operational experience in various countries. Those are CONEX, CLEARINGHOUSE and IRS databases. At the current status of databases mostly IRS base is used as CONEX database will no longer be updated by member states. Based on the information provided in those databases a dedicated team in PAA is preparing "quarterly reports on operational experience in NPPs" that is intended mainly for the employees of PAA's Nuclear Safety and International Programs Department and Inspection and Oversight Department as the opportunity to learn about problems, occurrences, events at NPPs in different phases of the lifetime and regulatory approach in other countries. Every operational experience that was chosen to be described in the quarterly report is explained and followed by the conclusions ranked in different categories: relating to law changes, regulatory actions, inspections, safety analysis and calculations, regulatory procedures and general observations. IRRS follow-up mission in 2017 closed the suggestion based on reported progress. From 2017 the process has been furtherly improved.

As Poland is still at the stage before tendering process for technology supplier, the most important events that are analyzed are those arising during the stage of construction. PAA has found the usage of all databases as a great tool to prepare for upcoming challenges during Polish Nuclear Power Programme as it allows to learn of problems that may arise, what to consider during inspections and assessments, how vendors, contractors and regulatory bodies respond to problems or events. It also gives the opportunity to attend the annual meetings of database users, which helps to improve international cooperation in the matter of sharing operational experience. In future PAA will urge operator to participate in international cooperation on sharing operational experience and invite universities, technical support organizations etc. to use the databases.

19.8 Management of spent fuel and radioactive waste on the site

Article 50 of Atomic Law states that Radioactive waste and spent nuclear fuel shall be stored in conditions allowing their segregation and, in a manner, ensuring protection of humans and environment. Spent nuclear fuel, subsequent to the cooling period in the reactor pool, shall be stored in a wet storage facility (in aqueous environment) or in a dry storage facility (in inert gas atmosphere), under conditions ensuring that on the spent nuclear fuel element surface the temperature permissible for a given type of nuclear fuel shall not be exceeded, and preventing the occurrence of self-sustaining nuclear fission reaction (preservation of sub-criticality). Furthermore the *Regulation Commissioning and Operation* states that the collection, segregation, processing, movement and storage, on the facility site, and preparation for transport outside the nuclear facility site of radioactive waste and spent nuclear fuel during

commissioning or operation of the nuclear facility shall be in accordance with the radioactive waste and spent nuclear fuel safe management programme.

Specific requirements for the on-site handling of spent fuel and radioactive waste are listed in the *Regulation of the Council of Ministers of 14th December 2015 on radioactive waste and spent nuclear fuel.*

3. Concluding summary on the fulfilment of the obligations

Process of implementing Polish Nuclear Power Programme is progressing slowly, there were several amendments to the schedule, and as of 2019 the Ministry of Energy is working on the update of Nuclear Power Programme document. For more information on the subject of Polish Nuclear Power Programme please refer to Annex no.2.

Atomic Law Act is currently under amendment process to introduce two Euratom Council Directives:

- 2013/59/Euratom of 5th December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionizing radiation
- 2014/87/Euratom of 8th July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations

Please refer to article 7.6 for specific information on current status of Atomic Law amendment.

One of the major common issues identified during 7th Review Meeting was participation in "International Peer Reviews". Poland is actively participating in the Peer Review process, hosting IRRS, INIR and IPPAS mission in recent years.

PAA hosted IRRS mission in 2013 and since then has been implementing actions with regard to IRRS action plan, enhancing inter alia its management system, human resources development plans, communication strategy, preparing regulatory guides and fully reviewing research reactor's operator application for licence renewal. IRRS follow-up mission took place in 2017. As the result from the mission all suggestions and recommendation were closed based on the progress made by Poland in implementing the action plan. 3 additional suggestion have been issued an PAA is working on implementing them. Another IRRS mission is expected to take place in 2023. Please refer to introduction for more information on IRRS mission, findings and PAA's action plan.

INIR mission took place in 2013 and INIR follow-up mission has been conducted in 2016 and concluded that Poland has implemented all 5 recommendations and 6 suggestions. In addition, the experts found that Poland is already implementing many of the actions that are expected for the next phase of developing its nuclear power programme.

During the 7th review meeting Poland received two challenges in connection with legislative framework and safety culture in PAA. First challenge: "Poland to continue developing its framework to ensure safe implementation of its first nuclear power plant project meeting the harmonized safety expectations (e.g. WENRA safety objectives for new reactors)". Poland's legal framework is continuously improved, as mentioned before at the moment Atomic Law Act is in the amendment process to introduce two EU directives. PAA is also planning the assessment of some of the executive regulations in 2019 to assess whether they need a review. Please refer to article 7.1 for more information.

Second challenge refers to "PAA to continue strengthening its safety culture requiring challenging attitude". As described in article 10.1 PAA has made significant effort to strengthen its safety culture. In 2017, PAA approved *Action Plan on enhancing safety culture in PAA for the year 2017-2019.* This document is a long-term strategy for safety culture development and consist list of action which are taken by PAA. Please refer to article 10.1 for more information.

Vienna Declaration on Nuclear Safety principles will be one of the fundamentals in implementing Polish Nuclear Power Programme. In reporting on relevant articles (14, 17, 18, 19) Poland have presented that supporting Regulations to the Act of Atomic Law are developed based on IAEA Safety Standards, WENRA recommendations and regulations from experienced countries with Nuclear Programmes, therefore this is a good legal basis for introducing nuclear power in accordance with 1st and 2nd principle of Vienna Declaration. Poland will continue this practice in future amendments and in the process of issuing new regulations.

Nine major common issues were identified at 7th Review Meeting. The President of the 7th Meeting recommended that Contracting Parties take these issues into account when preparing their National Reports to the 8th Review Meeting. Poland has provided the description of actions for each issue as specified in the list of issues provided in introduction.

Based on the presented evaluation, it can be concluded that **Polish regulations and practices continue to be in compliance with the obligations of the Convention** to the extent applicable to Poland, and further progress is underway in the view of Polish nuclear power programme.

Compliance with Convention on Nuclear Safety (and other instruments of international nuclear safety regime) was one of the key criteria when Poland was conducting works on the development national legal and regulatory framework as preparation to introduce nuclear power programme. Consequently, in the future during continuation of these efforts, especially in the field of human resources development, CNS guidelines as well as IRRS mission results and principles of Vienna Declaration on Nuclear Safety will be always taken into account.

Annex no. 1 – Nuclear Installations

Installations (other than defined in the article 2(i) of the Convention on Nuclear Safety)

Research reactors

The only Polish **operational reactor „MARIA"** is a high flux **channel-pool type** one, of nominal thermal power **30 MW** (**first criticality date 18.12.1974**), at present operating at about 20 MW thermal power and used mostly for isotopes production, silicon doping and physical experiments. It was operating at the time of entering into force of the Convention, after an extensive process of upgrading. In the years 1999-2002 a process of conversion from 80% to 36% enriched fuel of reactor core was completed. Another conversion, this time from HEU to LEU, took place in the years 2012-2015. At this moment there are only LEU fuel assemblies in the core. The conversion of the reactor core necessitated modernization of the fuel channels' cooling systems which took place in 2013. Main point of this modernization was change of the pumps for the new ones.

The facility, **operated by the National Centre for Nuclear Research NCBJ** (former Institute of Atomic Energy IEA and Institute for Nuclear Studies IPJ merged in 2011), on 31st March 2015 was granted with a new licence for operation valid until 2025. The reactor is subject to process of its constant upgrading and accommodation to actual tasks. All principles enumerated in Article 19, concerning its operation are observed. The exchange of experience (art.19 (vii)) is naturally limited as the design of the reactor is very specific.

The spent fuel from this reactor is stored in a technological pool connected to the reactor pool inside the reactor building (AR, wet type of storage).

The first research **reactor "EWA"** (pool type) 10 MW_{th} (first criticality date **14.06.1958**), used for isotopes production and physical experiments in horizontal channels, was shut down and unloaded of fuel in 1995. Its **decommissioning** process authorized under general permission issued to its **operator (IEA)** is continued. The spent fuel unloading, decontamination and the majority of dismantling works were performed by IEA before the year 2002, when the facility was handed over together with spent fuel facilities to the newly created State-owned public utility enterprise Radioactive Waste Management Plant (ZUOP). Since the beginning of the 2002 ZUOP has been continuing EWA decommissioning works and operating 2 separate facilities that used to contain all EWA reactor spent fuel (AFR, wet type of storage), before their repatriation to Russian Federation within GTRI (see more information below) initiative. **Currently no spent fuel is stored at Świerk site, beside the one placed in MARIA reactor technical pool.**

The former **critical assembly "ANNA"** (first criticality date **12.01.1963**), **zero-power reactor "AGATA"** (pool type, first criticality date **05.05.1973**) and **small power (100 kW_{th}) reactor "MARYLA"** (pool type, first criticality date **29.12.1963**) long ago had been **permanently shut-down**, unloaded of fuel and **dismantled**.

Both reactors as well as the spent fuel storages are sited at nuclear research centre in Świerk, where also waste treatment and storage facilities for ILW and LLW are located. High activity spent sealed sources are also temporarily stored at Świerk.

Spent fuel facilities and GTRI

Before the year 2009 spent fuel elements from the MARIA reactor were stored in the MARIA reactor operated by IEA (**AR, wet**) and spent fuel storage facility operated by ZUOP. Spent fuel from EWA reactor (HEU and LEU fuel) was stored in two spent fuel storages operated by ZUOP. Within the framework of GTRI Poland implemented RRRFR Programme (Russian Research Reactor Fuel Return Programme). In the years 2009-2016 eight spent fuel shipments were performed and all HEU spent fuel from both EWA and MARIA reactors was shipped back to Russian Federation. At this moment there is no HEU spent fuel stored in Poland.

Radioactive waste facilities

Radioactive waste of low and intermediate activity produced in Poland is collected, processed, solidified and prepared for disposal by the State-owned public utility ZUOP.

ZUOP operates the following installations and facilities at Świerk site:

- LILW storage tanks for liquid waste,
- treatment station for LILW liquid and solid waste: evaporator and reverse osmosis unit, chemical treatment station (liquid waste), cementation unit, hydraulic press (12 ton),
- temporary storage facility.

At Różan site, ZUOP operates a surface type repository, which was originally a military fort, converted to a repository in 1961. This repository serves for the disposal of low- and intermediate level waste containing short-lived beta and gamma isotopes, SSRS, as well as a temporary storage for long-lived waste. In the first decade of the repository operation, the concrete facilities No. 2, 3 and partially No.1 were filled with not segregated, only partially conditioned waste. Since 1968, short-lived low- and medium level waste is being disposed of in a part of the dry moat area (facility no. 8) and alpha-bearing waste is being placed in temporary storage in facility no. 1 with the intention of retrieval. In the frame of the PHARE Project performed in the years 2003 and 2004, the safety reports related to respectively the operation, closure and post-closure phase of the Różan facility were also prepared. This project also considered the decommissioning options regarding facilities nos. 2 and 3 at the site, including waste retrieval, repackaging and re-disposal.

Różan repository is currently the only radioactive disposal site available in Poland. According to present expectations, this repository is foreseen to be completely filled by 2025. It is likely that another site for a national repository for future waste arising will have to be found. The National Plan for the Management of Spent Fuel and Radioactive Waste was adopted in 2015 and it fulfilled the obligation imposed by the Council Directive 2011/70/EURATOM. The National Plan was prepared by the Ministry of Economy (now the Ministry of Energy) and approved by the Council of Ministers. It establishes actions in the scope of responsible and safe management of radioactive waste and spent fuel and ensures effective and safe management of radioactive waste and spent nuclear fuel in Poland. The document covers such issues as:

-siting and construction of the new national radioactive waste repository for low and intermediate level waste (to be put in operation after closure of Różan repository ~ 2025),

-continuation of research and development on deep geological repository undertaken in the late 90s of last century,

-continuation of works connected with closure of Różan repository,

-aspects related with radioactive waste coming from nuclear power plants

The National Plan should be updated by the Ministry of Energy by the end of 2019 and possible postponement of the Różan repository can be expected.

Concerning the siting activities for the near-surface repository for low- and intermediate-level waste the Ministry of Energy in cooperation with National Environmental Found has prepared a special project covering such issues as gathering, analysis, verification and evaluation of available archival materials collected as a result of a three-year Strategic Governmental Programme undertaken in 1999, as well as conducting additional research being necessary to enable the selection of optimal location of LLW/ILW-SL radioactive waste repository. With respect to the closure of Różan repository new safety report related to closure and post-closure phase will be prepared

Uranium mining

Most mining activities took place in the south-west of the country. Mining of ore ended in 1968, and processing was terminated in 1973. There are some 100 dumps, mostly abandoned, of waste rock and ore totalling approximately 1.4 x 10^6 m^3 as well as one tailing pond, which remediation project (partly funded by the EC) was finished in 2004.

Annex no. 2 – Implementation of Nuclear Power Programme

Prepared by the Ministry of Energy

INFORMATION

on the implementation of the nuclear power in Poland

1. Current status of the Polish Nuclear Power Programme

The Polish Nuclear Power Programme (PNPP) adopted in 2014, currently is a subject to review and update. One of the aims of the update is to align the PNPP with a draft of the Polish Energy Policy until 2040 (PEP2040), released by the Ministry of Energy on 23rd November 2018. The draft of PEP2040 to be approved by the government, foresees 6 to 9 GWe of nuclear power until 2043, with the commissioning of the first unit in 2033.

1.1 Site selection

Investor and future operator– PGE EJ1 LLC are completing the site investigation and environmental surveys in the 2 potential locations „Lubiatowo – Kopalino" and „Żarnowiec". It is planned to complete environmental surveys by the end of this year. PGE EJ1 LLC is developing the Site Evaluation Report and the Impact Assessment Report.

2. Informative and social activities connected with the introduction of nuclear energy in Poland

As the public support is one of the major challenges for implementation of any new nuclear power plant throughout the world, efforts to build the public awareness have been taken by various stakeholders of the Polish nuclear power program (PNPP). There are two main organizations responsible for public communication of the PNPP. The Ministry of Energy and PGE EJ 1 are simultaneously campaigning on the subject, which consists of numerous activities both on the national and local level.
Communication activities include:

- media relations (Press Releases at Ministry's website on nuclear energy, interviews, articles, infographics, conferences and briefings, study tours for journalists to NPPs abroad)
- social media activities
- events (e.g. taking part in science festivals, picnics and events in schools, at universities; organizing conferences for business and academia)
- information and promotional materials on nuclear energy prepared for the public (brochures, leaflets, books, educational games)
- animations (e.g. 6 episodes for children about nuclear science and NPP „Small boy named Neutronek in NPP" and „The story of nuclear energy" about the development of nuclear industry and its positive impact on the society and economy, for audience 16+).

According to the public opinion poll conducted by the Ministry of Energy in 2017, 59% of Poles support the construction of nuclear power plant in the country with 35% against and 6% undecided. 42% of respondents would agree to have a NPP built near their homes. Construction of a nuclear power plant is an important issue for 71% of Poles, because in their opinion it will increase Poland's energy security (67%) and help to fight climate change (65%).

Local support in 3 communes - potential sites of the planned first NPP - remains strong and stable. According to the survey conducted by the investor PGE EJ1 in 2 potential sites (Lubiatowo-Kopalino located in Choczewo commune and Żarnowiec site located in 2 communes: Gniewino and Krokowa) 69% of inhabitants support NPP construction - 2% increase comparing to the year before.

In this context, important role is played by Local Information Centres which have been established by PGE EJ1 in April 2013 in the three municipalities Choczewo, Krokowa and Gniewino. At the Information Centers the residents and visitors can find information related to the project and nuclear power on a daily basis.

The research and scientific institutes (e.g. National Center for Nuclear Research (NCNR), Nuclear Chemistry and Technology Institute) are also very active in informing on the wide scope of the nuclear energy applications including electricity generation.

The Ministry of Energy, PGE EJ 1 and NCNR also take efforts on building basis for the education on nuclear energy. Direct cooperation with schools and teachers facilitates disseminating knowledge and will benefit in the future, since the PNPP is a long-term effort.

3. Human resources development

The main goal of the PNPP in the area of human resources is development of the staff that guarantees effective and safe construction and operation of the NPPs and in later perspective – their decommissioning.

Pursuant to the art. 108a paragraph 4 point of the Atomic Law (Journal of Laws of 2014, item. 1512, as amended) the Minister of Energy "undertakes *the activities to ensure the competent human resources for the nuclear power"*. Moreover, the PNPP includes Activity no. 5 *"Education and training of human resources for institutions and companies related to nuclear power"*. As well as, in Chapter 2.10 of the PNPP there is *"Timetable and activities"* (for stage I, i.e. January 1st, 2014 – December 31st, 2016) with point: *"Development Plan for the development of human resources for nuclear power"*.

All institutions directly involved in the process of preparation and implementation of the PNPP are obliged to develop human resources for nuclear power. Those institutions are: the Ministry of Energy, the Ministry of Science and Higher Education, the Ministry of National Education, the Ministry of Labour and Social Policy, National Atomic Energy Agency, Radioactive Waste Management Plant, Office for Technical Inspection, investor and future operator– PGE EJ1 LLC and other inspection or control authorities.

The main activities carried by the Ministry of Energy in the field of human resource development include:

1. Preparation of following documents, reports and materials:
   a) The Framework Plan for human resources development for the needs of the nuclear power in Poland, 28th June 2016;
   b) Report Identification of resources and staffing needs of institutions directly involved in the planning and implementation of the PNPP, 2013;

c) Report on Education in secondary schools and the implementation of teaching content related to energy, physics and nuclear chemistry, 2013;
d) Report on Resources and staffing needs of high schools in connection with the implementation of the PNPP, 2013;
e) Register Studies in the field of Energy, nuclear physics and chemistry, 2013;
f) Report on Identification of resources and staffing needs of the selected institutes, 2013;
g) Nuclear energy and nuclear medicine in academic education. Part 1. Overview of public school education offers - 2015/2016;
h) Nuclear energy and nuclear medicine in academic education. Part 2. Overview of planned public university education offers. Academic year - 2016/2017 and 2017/2018;
i) Nuclear energy and nuclear medicine in academic education. Part 3. Overview of current and planned forms of support. Academic year - 2015/2016 and 2016/2017 and 2017/2018;
j) Nuclear medicine in academic education. Overview of public medical schools' offers, 2016;
k) Nuclear energy and nuclear medicine in academic education, 2016;
l) Publication for teachers with the scenarios of best lessons. „I know how to teach nuclear energy", 2016.

2. Organization of following seminars, conferences, trainings and meetings:
   a) The Educational Forum of Nuclear Energy, 2014 and 2017;
   b) Competition for teachers, 2016;
   c) 4 training courses for 120 teachers in Pomerania region, 2015;
   d) 4 series of regional seminars for 160 teachers in Poland, 2017 and 2018;
   e) 100 demonstration lessons about nuclear energy in 20 secondary schools in 2017 and 250 lessons in 45 secondary schools in 2018;
   f) Annual co-organization of the International School of Nuclear Energy;
   g) Polish – Japan HRD Workshop for the main stakeholders of the PNPP, November 8th, 2018.

3. Popularization of knowledge about nuclear energy:
   a) Dissemination of knowledge about nuclear energy among students during scientific picnics, science festivals, etc.;
   b) Distribution of educational materials among youth and adults (puzzle, brochures, pellets, publications);
   c) Patronages of the Minister of Energy for the activities undertaken in the field of nuclear energy (conferences for teachers, competitions for students, etc.);
   d) Maintaining a thematic tabs on the website: *Training of staff*.

The most crucial activity listed above is the elaboration of *The Framework Plan for human resources development for the needs of the nuclear power in Poland* that was adopted by the Management of the Ministry of Energy on June 26th, 2016.

The main objective of the Framework Plan is creation of the adequate and competent staff by all PNPP's stakeholders. Itis expected that all stakeholders will develop an effective cooperation model in order to utilize the synergy of mutual activities to prepare the necessary human resources maximally based on the national potential.

The elaboration of the properly detailed plan for human resources development requires information of size of the nuclear project, chosen technology chosen by the investor as well as the model of cooperation with the vendor concerning the HRD know-how transfer. The Framework Plan was prepared due to the lack of the above knowledge and it will be the base for the later preparation of the National *Plan of the Human Resources Development for the Needs of the Nuclear Power*. The Framework Plan covers the period from the adoption to the conclusion of the tender to choose the nuclear technology and strategic partner for the NPP. After the announcement of the results of the tender the Plan for Human Resources Development for the Needs of the Nuclear Power will be elaborated in cooperation with the main stakeholders of the PNPP.

In Poland, there exists an educational and scientific infrastructure which can be used to develop education and training for the needs of nuclear energy. Most of the nuclear sciences specialists are grouped in two large centers:

- Warsaw (Warsaw University of Technology, Warsaw University, National Centre for Nuclear Research, Institute of Nuclear Chemistry and Technology, The Institute of Plasma Physics and Laser Microfusion or Central Laboratory for Radiological Protection);
- Cracow (Jagiellonian Univeristy, AGH University of Science and Technology, Cracow University of Technology or The Henryk Niewodniczanski Institute of Nuclear Physics Polish Academy of Sciences).

Besides, it should be emphasized that several Polish technological schools and universities have opened and lead various programs and majors (undergraduate, graduate and doctoral studies) directly connected with nuclear power. There is also well developed scientific and research base in the nuclear field. Many Polish institutes conduct scientific work in the area of nuclear chemistry and physics. Additionally, a research nuclear reactor "Maria" operated at the National Center for Nuclear Research in Swierk plays an important role in training for Polish scientific background.

Annex no. 3 – Atomic Law

Summary of the Act of Atomic Law

The Atomic Law Act, originally enacted by the Parliament of the Republic of Poland on 29th November 2000, has been amended several times in the years 2001-2015. Last significant amendment namely the act of 4th April 2014 amending the Atomic Law and certain other acts (Journal of Laws, item 587) entered into force on 24th May 2014. A draft of the said act had been prepared by the Ministry of Economy with the assistance of the PAA President. The act was aimed at complementing the national legal framework with the provisions of Council Directive 2011/70/EURATOM of 19th July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (OJ L 199 of 2.8.2011, p. 48).

The Act is divided into 20 Chapters:

Chapter 1 entitled *"General provisions"* defines the subject and presents definitions of terms used in the text of the Law. The list of definitions of terms has been extended by those connected with safety of nuclear facilities, also some old definition has been improved for example terms "nuclear safety", "nuclear installation". Last amendment of the Atomic Law has changed definitions of such notions as radioactive waste, radioactive waste management, spent nuclear fuel management, storage of radioactive waste or spent nuclear fuel, processing of radioactive waste, disposal of radioactive waste and closure of radioactive waste repositories, the foregoing being caused by a necessity to ensure that the said definitions match those provided in Council Directive 2011/70/Euratom. The definition of the decommissioning of a radioactive waste repository or a spent nuclear fuel repository has been removed from the Atomic Law, for it stems from the very definition of radioactive waste that, since radioactive waste is disposed at a radioactive waste repository without an intention of its subsequent extraction, the repository decommissioning process should not be taken into account at all.

Chapter 2 entitled *"Licences addressing nuclear safety and radiological protection issues"* lists the activities which require licences or notifications from the point of view of nuclear or radiological safety, and activities which are prohibited. It also sets up adequate procedures regarding the licensing and defines the authorities granting licences to perform activities. **Chapter 3** entitled *"Nuclear safety, radiological protection and health protection of workers"* places the responsibility for nuclear safety and radiological protection on manager of the organization pursuing the activities involving exposure and defines the scope of this responsibility, in particular in a case of ceasing activity. It formulates the requirement for justification of such activities, as well as a number of other requirements, such as supervision and inspection, the imperative to follow the "optimization principle" with regard to exposures, adequate training of workers, authorization of persons working on certain positions and performing certain activities important from the nuclear safety and radiological protection point of view, radiological safety of individuals in cases of medical exposures, occupational exposures and radiological protection of workers and external workers, and their rights. This chapter also specifies the conditions for carrying out actions aimed at elimination of radiation emergency consequences, maintaining of the central register of doses received by individuals, categorization of radiation workers (categories A and B) and requirements with regard to

dosimetric equipment. Finally, it introduces a system of subsidizing certain activities in the area of nuclear and radiological safety from the State budget;

Chapter 3a entitled *"Medical application of ionizing radiation"* enumerates medical applications of ionizing radiation, and formulates principles of carrying on activities that involve patient's exposure to ionizing radiation, in particular – mandatory justification of exposure and optimization of radiological protection. It places responsibilities for patient's exposures on the authorized medical practitioner, and relevant responsibilities and duties in the area of inspection and clinical audits - on medical institutions. It defines principles and requirements for quality management system in radio-diagnostics, invasive radiology, nuclear medicine and radiotherapy, including the reference radiological procedures for standard medical exposures, the terms of issuance of relevant permits and authorizations and the authorities competent for granting them. Finally, it formulates the scope and terms of creation of the National Radiation Protection Centre in Medicine and the central data base for medical radiation facilities.

Chapter 4 entitled *"Nuclear facilities"* places the responsibility for assuring nuclear safety, radiological protection, physical protection and nuclear material safeguards on manager of the organization which holds the licence for construction, commissioning, operation or decommissioning of a nuclear facility. For the process of construction of a nuclear facility, the scope of these requirements is extended to other participants in the investment process, the obligations of the manager of the organisation or unit notwithstanding. This chapter also addresses the fundamental conditions that must be met by a nuclear facility design, the questions of licensing and regulatory review in the stages of construction, operation and decommissioning of nuclear facilities and establishing of the restricted areas around such facility, the information duties of the manager of a nuclear facility and the PAA President concerning nuclear safety and radiological protection issues, as well as formulates the right for the PAA President to curtail or suspend the operation of nuclear facility when nuclear safety may be endangered. The nuclear facility (at stage of construction, commissioning, operation and decommissioning) is required to adopt the integrated management system that, among the others, must include a quality assurance programme One of the important licence prerequisites for the applicant is to possess appropriate financial means required to ensure:

1) fulfilment of the requirements of nuclear safety, radiological protection, physical protection and nuclear material safeguards during the respective stages of operation of a nuclear installation until decommissioning is completed; specifically, the operator of a nuclear power plant has to establish a special fund to cover the costs of the final management of radioactive waste and of the decommissioning costs;

2) for the licence for construction – completion of the construction of a nuclear installation.

Chapter 4a entitled "Public communication pertinent to nuclear power facilities" contains provisions to establish Local Information Centres, Local Information Committees and Municipal Information Points, which are meant, among others, to provide information on a nuclear power facility and to monitor the activities of the operator.

Chapter 5 entitled "Nuclear materials and technologies" formulates requirements for adequate nuclear materials accountancy and their physical protection as well as for appropriate control of nuclear technologies (as required by appropriate international agreements and conventions). In particular it includes prohibition of use these materials and technologies to

construct nuclear weapon or nuclear explosives; any scientific researches in this area are subject to notification to the PAA President prior their commencement. It defines also other PAA President's duties and responsibilities in this area as well as the obligations of the managers of units performing activities with nuclear materials and of other users of lend or buildings where such an activities could be possible, in connection with inspections performed by PAA, IAEA or EURATOM inspectors;

Chapter 6 entitled "Ionizing radiation sources" formulates requirements for the accountancy, and inspection with regard to radioactive sources and to equipment containing such sources or generating ionizing radiation. It includes also requirement of appropriate protection of radioactive sources against damage, theft or possessing by an unauthorized person.

Chapter 7 entitled "Radioactive waste and spent nuclear fuel" classifies radioactive wastes, states the responsibilities of the manager of the organizational unit which is handling wastes, and addresses the questions of wastes disposal, including provisions on siting of waste repositories, and of the necessary protection of humans and of the environment. The amended Atomic Law introduced provisions that the organisational unit which has generated the radioactive waste or the spent nuclear fuel is held responsible for ensuring that it is possible to manage the radioactive waste and the spent nuclear fuel from the moment of their generation until their disposal at the repository, including for financing of this procedure and coverage of the related disposal costs, altered the principles of classification, storage, disposal and keeping records of radioactive waste and spent nuclear fuel. With regard to the classification of radioactive waste, the notion of activity level or dose rate on the surface of waste material has been replaced by a criterion of radioactive concentration of radioisotopes the former contain. Last amendment introduced also an obligation regarding the development of a national programme for spent nuclear fuel and radioactive waste management in Poland.

Chapter 8 entitled "Transport of nuclear materials, ionizing radiation sources, radioactive wastes and spent nuclear fuel" formulates requirements for safe transporting of such materials and regulates the questions of their import, export and transit through the Polish territory, as well as on reporting of these activities to the PAA President;

Chapter 8a entitled "Import, export and transit through the territory of Republic of Poland of radioactive waste and spent nuclear fuel" establishes formal and organizational conditions connected with procedure of licensing above mentioned activities.

Chapter 9 entitled "Control and inspection from the viewpoint of nuclear safety and radiological protection conditions" allocates the control and inspection responsibilities to appropriate authorities, formulates these responsibilities as well as the rights of the regulatory authorities, introduces enforcement measures, and sets up qualification requirements with regard to nuclear regulatory inspectors;

Chapter 10 entitled "National radiation situation assessment" obliges the PAA President to conduct systematic assessments of the national radiation situation and formulates requirements thereof, including the use for these purposes of a dedicated Radiation Emergency Centre established within the PAA and receiving appropriate data from "stations" and "units" serving for early detection of radioactive contamination (the list of such "stations" and "units" has been established by means of the Governmental regulation) and operates the International Contact Point for early warning and information exchange with IAEA, EU and other Countries in a case of radiation emergency. It also obliges the PAA President to provide

information to the general public, regional governors, Council of Ministers and/or to the chairman of the appropriate crisis management team at the national level.

Chapter 11 entitled “Radiation emergency management” introduces distinction between different types of radiation emergencies and list the actions to be undertaken in case of such emergencies, as well as formulates the responsibilities on all levels. It refers to the national emergency preparedness plan established through a Governmental regulation and sets up rules for the implementation of specific intervention measures (including the issue of costs to be borne in such cases). It also formulates a requirement to conduct periodic exercises to test the national emergency preparedness plan and addresses the questions of protection against the use of food and feeding stuffs which exceed the permitted levels of radioactive substances contents, both produced within the Polish territory or imported;

Chapter 12 entitled “Civil liability for nuclear damage” allocates the responsibility for nuclear damage caused to individuals, property and environment to the operator and limits its liability to 300 million SDR, allows the operator to establish a limited liability fund in case when claims exceed this figure, obliges the operator to be insured (also in case of the transport of nuclear material from a nuclear installation), sets minimal guaranteed amount of insurance and procedures for claiming the compensation, sets time limits for suing for the damage, and locates the competence in the issues of nuclear damage.

Chapter 12a entitled “Activities pertinent to the development of nuclear power” describes the activities of the minister competent for economy matters in the field of the use of atomic energy for social and economic needs of the state, especially aimed at the development of nuclear power programme. In particular, this chapter contains provisions on developing, approving and updating of a long-term programme called “the Polish Nuclear Power Programme”.

Chapter 13 entitled “The President of the National Atomic Energy Agency” states that the President of the PAA is the central organ of the governmental organization and is nominated by the Prime Minister to whom he reports directly, on request by the Minister competent for environmental matters, who supervises PAA administratively. The President executes his tasks (which are listed in Art. 110 of the Atomic Law) through the National Atomic Energy Agency, statute of which is to be issued by the Minister for environmental matters. In addition, this chapter introduces a PAA President’s consulting and opinion-giving body, “Council for Nuclear Safety and Radiological Protection”, which is appointed by the PAA President (although the next amendment of Atomic Law Act will give the authority to appoint members of the Council to the Minister of Environment).

Chapter 14 entitled “State-owned public utility “Radioactive Waste Management Plant” establishes the above named plant as a legal personality while the supervision over the plant is placed under responsibilities of the minister competent for economy matters, which will provide the plant with a statute. This chapter specifies, inter alia, that the utility will receive subsidy from the national budget for radioactive waste and spent fuel management.

Chapter 15 entitled “Penal regulations” introduces financial penalty or other means of punishment for cases of violations of rules established by this Law.

Chapter 16 entitled “Transitional, adaptive and final provisions” formulates detailed conditions for the enactment of this Law.

Annex no. 4 – List of regulations

Executive Regulations to the Act of Atomic Law

1. Regulation of the Council of Ministers of 11th February 2013 on requirements concerning commissioning and operation of nuclear facilities (JL of 2013, item 281)

2. Regulation of the Council of Ministers of 11th February 2013 on nuclear safety and radiological protection requirements for the decommissioning phase of nuclear facilities and on the content of a nuclear facility decommissioning report (JL of 2013, item 270)

3. Regulation of the Minister of Health of 21st December 2012 on granting authorizations for radiological protection inspectors in laboratories using X-ray devices for medical purposes (JL of 2012, item 1534)

4. Regulation of the Council of Ministers of 10th October 2012 on the amounts of contributions to cover the costs of spent nuclear fuel and radioactive waste disposal and the costs of nuclear power plant decommissioning by organizational entity authorized to operate a nuclear power plant (JL of 2012, item 1213)

5. Regulation of the Council of Ministers of *31st* August 2012 on nuclear safety and radiological protection requirements which must be fulfilled by a nuclear facility design (JL of 2012, item 1048)

6. Regulation of the Council of Ministers of *31st* August 2012 on the scope and method for the performance of safety analyses performed before applying for a nuclear facility construction licence and on the scope of the preliminary safety report for a nuclear facility (JL of 2012, item 1043)

7. Regulation of the Council of Ministers of 10th August 2012 on detailed scope of assessment with regard to land intended for the location of a nuclear facility, requirements concerning siting report for a nuclear facility (JL of 2012, item 1025)

8. Regulation of the Council of Ministers of 10th August 2012 on activities important for nuclear safety and radiological protection in an organizational unit conducting activity which consists in commissioning, operations or decommissioning of a nuclear power plant (JL of 2012, item 1024)

9. Regulation of the Council of Ministers of 2nd September 2016 on the position important for ensuring nuclear safety and radiological protection and on radiological protection inspectors (JL of 2016, item 1513)

10. Regulation of the Council of Ministers of 24th August 2012 on nuclear regulatory inspectors (JL of 2012, item 1014 as amended)

11. Regulation of the Minister of Economy of 23rd July 2012 on detailed rules and conditions for the establishment and operation of Local Information Committees and on the cooperation in the field of nuclear power facilities (JL of 2012, item 861)

12. Regulation of the Council of Ministers of 27th December 2011 on periodical safety review of a nuclear facility (JL of 2012, item 556)

13. Regulation of the Council of Ministers of 26th March 2012 on the special purpose subsidy awarded to ensure national nuclear safety and radiological protection while using ionizing radiation (JL of 2012, item 394)

14. Regulation of the Council of Ministers of 27th December 2011 on the standard quarterly report on the amount of decommissioning fund payment (JL of 2012, item 43)

15. Regulation of the Minister of Environment of 18th November 2011 on the Council for Nuclear Safety and Radiological Protection (JL no. 279, item 1643)

16. Regulation of the Minister of Environment of 9th November 2011 on the standard official identity document of nuclear regulatory inspector (JL no. 257, item 1544)

17. Regulation of the Minister of Health of 29th September 2011 on psychiatric and psychological tests of employees performing activities important for nuclear safety and radiological protection (JL no. 220, item 1310)

18. Regulation of the Minister of Finance of 14th September 2011 on value of the minimum guaranteed amount of the third-party liability insurance for the operators of nuclear devices (JL no. 206, item 1217)

19. Regulation of the Minister of Interior and Administration of 13th April 2011 on the list of border crossings through which nuclear materials, radioactive sources, devices containing such sources, radioactive waste and spent nuclear fuel may be imported into and exported from the territory of the Republic of Poland (JL no. 89, item 513)

20. Regulation of the Minister of Health of 18th February 2011 on conditions for the safe use of ionizing radiation for all types of medical exposure (JL no. 51, item 265, as amended)

21. Regulation of the Prime Minister of 8th January 2010 on the procedures for the supervision and inspection by nuclear regulatory authorities in the Internal Security Agency, the Intelligence Agency and the Central Anticorruption Bureau (JL no. 8, Item 55)

22. Regulation of the Council of Ministers of 21st October 2008 on the authorization and approval for import into the territory of the Republic of Poland, export from the territory of the Republic of Poland and transit through this territory radioactive waste and spent nuclear fuel (JL no. 219, item 1402)

23. Regulation of the Council of Ministers of 4th November 2008 on physical protection of nuclear material and nuclear facilities (JL no. 207, item 1295)

24. Regulation of the Minister of Health of 27th March 2008 on minimum requirements for health units providing health care benefits from the X-ray, interventional radiology and radionuclide diagnosis and therapy of non-malignant diseases (JL no. 59, item 365 as amended)

25. Regulation of the Minister of Health of 27th March 2008 on the database of radiological devices (JL no. 59, item 366)

26. Regulation of the Council of Ministers of 4th October 2007 on the allocated and special purpose subsidy, fees and finance management in the state-owned public utility ‘Radioactive Waste Management Plant' (JL no. 185, item 1311, as amended)

27. Regulation of the Council of Ministers of 20th February 2007 on the requirements for controlled and supervised areas (JL no. 131, item 910)

28. Regulation of the Council of Ministers of 20th February 2007 on the terms for import into the territory of the Republic of Poland, export from the territory of the Republic of Poland and transit through this territory of nuclear materials, radioactive sources and equipment containing such sources (JL no. 131, item 911)

29. Regulation of the Council of Ministers of 23rd March 2007 on the requirements for the individual dose registration (JL no. 131, item 913)

30. Regulation of the Minister of Health of 2nd February 2007 on the detailed requirements for the form and content of the reference and working medical radiological procedures (JL no. 24, item 161)

31. Regulation of the Council of Ministers of 2nd January 2007 on the requirements concerning the content of natural radioactive isotopes of potassium K-40, radium Ra-226 and thorium Th-228 in raw materials and materials used in buildings designed to accommodate people and livestock, as well as in industrial waste used in construction industry, and the procedures for controlling the content of these isotopes (JL no. 4, item 29)

32. Regulation of the Minister of Health of 22nd December 2006 on the supervision and control of observance of terms of radiological protection in the organizational units using x-ray devices for medical diagnosis, interventional radiology, surface radiotherapy and radiotherapy of non-malignant diseases (JL 2007 no. 1, item 11)

33. Regulation of the Minister of Health of 21st August 2006 on detailed safety requirements for work involving radiological devices (JL no. 180, item 1325)

34. Regulation of the Council of Ministers of 12th July 2006 on detailed safety requirements for work involving ionising radiation sources (JL no. 140, item 994)

35. Regulation of the Minister of Health of 4th May 2006 on the organization, operation mode and the specific tasks of the National Centre for Radiation Protection in Health Care (JL no. 85, item 592)

36. Regulation of the Minister of Health of 7th April 2006 on minimum requirements for health care facilities applying for authorization to conduct activities involving exposure to ionizing radiation for medical purposes, consisting in the provision of health services in the field of radiation oncology (JL no. 75, item 528 as amended)

37. Regulation of the Council of Ministers of 18th January 2005 on the emergency plans for radiation emergency (OJ No. 20, item 169 as amended),

38. Regulation of the Council of Ministers of 18th January 2005 on ionizing radiation dose limits (JL no. 20, item 168)

39. Regulation of the Council of Ministers of 27th April 2004 on intervention levels for various intervention measures and criteria for cancelling intervention measures (JL no. 98, item 987)

40. Regulation of the Council of Ministers of 27th April 2004 on the determination of entities competent to inspect maximum permitted levels of radioactive contamination of foodstuffs and feeding stuffs following a radiation event (JL no. 98, item 988)

41. Regulation of the Council of Ministers of 27th April 2004 on the protection against ionising radiation of outside workers exposed during their activities in controlled areas (JL no. 102, item 1064)

42. Regulation of the Council of Ministers of 27th April 2004 on prior information to the general public in the event of a radiation emergency (JL no. 102, item 1065)

43. Regulation of the Council of Ministers of 17th December 2002 on the stations for early detection of radioactive contamination and on the units that conduct measurements of radioactive contamination (JL no. 239, item 2030)

44. Regulation of the Council of Ministers of 23rd December 2002 on the requirements for dosimetric equipment (JL no. 239, item 2032)

45. Regulation of the Council of Ministers of 14th December 2015 on radioactive waste and spent nuclear fuel (JL item 2267)

46. Regulation of the Council of Ministers of 30th June 2015 on the documents required with the application for the licence for activities involving the exposure to ionizing radiation or with the notification of such activities (JL item 1355)

47. Regulation of the Council of Ministers of 6th August 2002 on the cases when the exposure to ionizing radiation are exempted from mandatory licensing or notification, and on the cases when such activities can be conducted on the basis of a notification (JL no. 137, item 1153 as amended)

48. Regulation of the Council of Ministers of 14th December 2015 on periodical safety review of a nuclear waste repository (JL from 2016, item 28)