



Warsaw, 25.05.2016.

# GENERAL DIRECTOR FOR ENVIRONMENTAL PROTECTION

DOOŚ-OA.4205.1.2015.23

## DECISION

Pursuant to art. 123 of the *Code of Administrative Procedure Act* (Journal of Laws 2016.23), hereinafter referred to as *CAP*, in connection with art. 66 and 68 (2) (2) (b) and (c) and art. 69 (2) and (3) of the Act of 3 October 2008 *on providing information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessment* (Journal of Laws 2016 .353 as amended), hereinafter referred to as the *EIA Act*, in connection with § 2(1)(4) of the Regulation of the Council of Ministers of 9 November 2010 *on projects likely to significantly affect the environment* (Journal of Laws 2016.71), having analysed the application of PGE EJ1 Sp. z o.o. for the determination of the scope of the environmental impact report and for the issuance of a decision on environmental conditions for the undertaking consisting in *the construction and operation of the first Nuclear Power Plant in Poland, with an electrical capacity of up to 3750 MWe, in the area of the communes of: Choczewo or Gniewino and Krokowa,*

**I determine the scope of the environmental impact report in accordance with art. 66 of the EIA Act, including the following issues:**

- I. justification of the project in the context of the potential possibilities of electricity production in Poland (including from renewable sources), taking into account alternative ways of obtaining it and improving energy efficiency**
- II. description of the planned project**
- II.1 characteristics of the entire project and the conditions of using the area in all phases of the implementation (site preparation, construction, start-up, operation, shut-down, decommissioning):**
- II.1.1 site location** - provide:
  - a) detailed location of each of the planned variants of the project, with the justification of their selection,
  - b) boundaries of individual variants of location, indicating the cadastral parcels, with the graphic representation on the cadastral base map,
  - c) total area of the land occupied by individual location alternatives (along with justification for assumptions made), as well as the area occupied by individual elements of the project (including the area of the Baltic Sea occupied by the cooling water intake and discharge structure, cooling system, construction backup facilities)
  - d) indicative layout plan of the nuclear power plant site for particular location alternatives (in graphic form) - arrangement of basic installations within the power plant and presentation of connections with elements of the accompanying infrastructure (technical and transport) conditioning its operation
  - e) locations and areas of construction backup facilities and transport bases (within and beyond the nuclear power plant area);

### **II.1.2 scope description:**

- a) the project, including all phases of its implementation, with characteristics of the following tasks and elements among others:
- demolition of existing facilities and installations (with particular emphasis on facilities at the Żarnowiec site), including in the area designated for construction backup facilities and transport bases,
  - construction of roads (including target access roads from the existing roads to the location of the power plant), internal roads, car parks, railway line and siding - together with the scope and boundaries of the road and railway infrastructure covered by the application,
  - construction of onshore infrastructure - together with a presentation of the type of planned works and the aforementioned infrastructure (including installation and assembly works of underground networks, construction of technological pipelines and facilities and structures associated with them, as well as cooling water channels)
  - excavation dewatering system and ground water discharge system - with a presentation of a diagram, technical and technological parameters of the above mentioned system and an indication of maximum depths of excavations
  - water intake for the nuclear power plant - including an explanation of the purpose of the water intake
  - waste water treatment plant for the nuclear power plant - including the type of waste water to be treated and the stage at which it will operate (construction or operation of the facility),
  - temporary storage yards for construction materials and technological equipment as well as a yard for storing humus - together with an indication of the scope of activities, location, planned type of substrate for the above yards (e.g. hardened, sealed)
  - distribution stands for liquid and gaseous fuels,
  - construction office, social and storage facilities - together with an indication of the location and size of the area occupied
  - concrete batching plants - with indication of their number and location,
  - power unit (nuclear and conventional parts) and other power plant components which are not part of the unit,
  - spent fuel storage facility - including type and location,
  - cooling water intake and discharge facilities - with indication of their parameters and detailed location,
  - construction of maritime infrastructure - with the characteristics of its elements and the type of planned works (including dredging, deepening, hydrotechnical works and other activities related to the preparation of the seashore area for the construction of anti-flood protection and protection against erosion)
  - start-up works of facilities, systems, equipment and infrastructure;
- b) investment intentions not covered by the application:
- indicate all the above-mentioned projects (including associated investments), together with the chronology and the expected schedule of their execution, with respect to individual phases of the project,
  - present the conditions of power output from the power plant to the National Power System (number of lines and their voltage, alternative locations of corridors, place and method of incorporation of electric power into the above mentioned system),
  - for transport infrastructure - provide assumptions regarding the location and adjustment of transport routes (with maps) and the expected daily traffic distribution of vehicles and means of transport (cars and trucks, buses, trains, ships),
  - characterise the activities planned for the treatment of radioactive waste at the site of the power plant, generated during the operation of the facility and "other activities related to radioactive waste management", identified in the project information sheet as accompanying investments (external infrastructure related to radioactive waste management);

### **II.1.3 phasing and period of the project - indicate:**

- a) whether the investment will be implemented in stages - in such case characterise the scope of activities planned for individual stages,
- b) estimated deadlines for each phase of the execution of the project (including possible phasing) with the schedule of all works presented in the table form;

### **II.2 types of technology, including the description or functioning scheme of**

- a) basic technological processes,

- b) types of nuclear reactors under consideration (and differences between them) and their number and power
- c) cooling systems for each power plant location option (indicating, as appropriate, sources of intake water and receiver of cooling water discharge, or means of post shutdown heat removal), including:
  - open cooling system (OCS) - describe inter alia the way of routing the cooling water channels (e.g. underground, aboveground, open channels, pipelines), the way of possible crossing of existing watercourses,
  - closed cooling system (CCS) - describe inter alia technical parameters and principles of operation of the considered types of cooling towers,
  - reactor cooling system, associated systems and equipment, safety containment and spent fuel pool, in particular to ensure the removal of post switch-off heat to the final heat outlet, in operation and under emergency conditions, if active or passive safety systems are used as appropriate,
  - other emergency systems (including those associated with reactor core meltdown),
  - maximum temperatures of discharged cooling water, depending on the cooling system used (OCS, CCS), broken down by type of operation (nominal, minimum, start-up, shut-down), taking into account the maximum temperature of the receiver,
- d) power plant production data: thermal power generated (at nominal and minimum output, during unit start-up and shut-down, taking into account the drop of post-shut-down power) and discharged in cooling water, electrical power (gross and net), planned annual electricity production, generation efficiency and energy consumption for own needs, principles for power plant operation planning (including stoppages for fuel handling or repairs),
- e) back-up power supply, including presentation of infrastructure corridors for bringing electrical power from high and medium voltage lines,
- f) nuclear fuel cycle and fuel characteristics and annual requirements;

**II.3 anticipated types and quantities of pollutants for all phases of the planned project** resulting from:

(a) its implementation - provide:

- methodological assumptions for establishing the boundary condition envelope (BCE) with justification of the adopted parameters and their characteristic values for the considered types of reactors, including uncertainties resulting from the assumptions adopted,
- types and quantities of pollutants not taken into account for determination of BCE for the considered technologies in particular location options,

b) other activities directly and indirectly related to the implementation of the project and included in its life-cycle analysis;

**II.4. variants of the project or the option not to undertake the project** - present:

- a) description of reasonable variants of the project, in particular including the location and cooling systems, together with variants of accompanying investment solutions (e.g. the number and route of power lines taking power out of the power plant);
- b) description of predicted effects on the environment in the case of not undertaking the project, including the impacts resulting from the necessity to ensure energy demand from conventional or unconventional sources;

**III. determination of the predicted environmental impact of analysed variants (including cross-border impact) at each phase of project's execution, taking into account the phasing of investment, together with the justification for the variant proposed by the applicant;**

**III.1. transformation of the ground surface and changes in the use and development of the land**

- provide:

- a) analysis of changes in land development and use and transformation of the settlement network and infrastructure;
- b) impact of the project on the spatial management in the municipalities in the area surrounding the power plant;
- c) analysis of changes in land use in maritime areas and at the sea coast;
- d) analysis of changes in the land surface configuration and the related balance of ground masses;
- e) impact of the project on soils (including soils of protected classes);

### **III.2 landscape (including cultural landscape) and monuments - present:**

- a) inventory of landscapes (on land and at sea) in the area of impact of the project, their characteristic features (e.g. natural, historical and cultural, landscape degrading features) along with their valorisation;
- b) inventory of historical monuments and archaeological sites in the area of impact of the project;
- c) assessment of the impact on the landscape, taking into account among others the analysis of active exposition from viewpoints, public spaces and viewing routes, as well as valorisation of the visual value of panoramas, assessment of the strength of visual impact;
- d) analysis of the impact of the project on protected areas (e.g. protected landscape areas and landscape parks), including the impact of lighting the project, taking into account the active and passive exposition;
- e) assessment of the impact on historical monuments and assessment of the visual impact on historical values of the cultural landscape;
- f) results of conducted analyses in the graphic form and photographic documentation (including photomontages of viewpoints and sequences);

### **III.3 climate and climate change - present:**

- a) climatic and meteorological conditions within the range of the project impact;
- b) climate change scenarios assumed for the analysis in the perspective of the power plant operation period (approx. 70 years);
- c) analysis and assessment of emissions of substances and energy (including greenhouse gases) related to the project's execution on the climate and climate changes, including:
  - direct emissions;
  - indirect emissions outside the area of implementation of the investment (carbon footprint analysis), resulting from the operation of installations and infrastructure related to the implementation of the project;
- d) comparative analysis of the impact of the planned project on the climate and climate changes with energy generation from other conventional sources (including the emission of greenhouse gases - including the carbon footprint analysis);
- e) analysis of the impact of climate changes resulting from the project on biodiversity of ecosystems in the area of impact of the project;
- f) analysis of the impact of the project on the microclimate;
- g) analysis of the project's resistance to primary and secondary effects of climate change, taking into account among others: heat and drought, extreme precipitation and flooding (including sea floods), hurricanes and tornadoes, sea level fluctuations, storms, shoreline retreat (erosion, abrasion), periods of extreme frost and snow;

### **III.4. air emissions - present:**

- a) the current state of air quality within the range of influence of the planned project;
- b) all types of organised and unorganised air emissions and their sources, divided into emissions from:
  - the execution of the project, including among others the emissions characteristic for the technological process, from electrical power generators and reserve and emergency sources of electrical power supply, from the boiler room, from the reactor ventilation stack, from non-road mobile machinery, from other vehicles connected with the execution of the project;
  - maritime, road and rail traffic connected with the construction of the power plant;
- c) predicted volume of individual air emissions;
- d) analysis of the impact of the project on the state of the atmospheric air quality, taking into account dispersion of substances from the above mentioned sources (with diagrams of isoline concentrations of substances in the air), together with graphic illustration of the above issues and electronic version of input and output data of the modelling.

### **III.5 Emissions of noise, vibration and electromagnetic fields (EMF):**

#### **III.5.1 noise - present:**

- a) current state of acoustic climate within the range of impact of the planned project;
- b) detailed qualification of areas (along with marking their borders in the graphic annexes) within the range of impact of the planned project, which are the areas subject to acoustic protection, performed on the basis of:

- designation of areas specified in local spatial development plans or
- in the absence thereof - the actual development of the area, determined by competent authorities;
- c) all sources of noise, including the acoustic power level, time of their operation and variability of noise intensity generated during the day and night, divided into the emissions from:
  - the execution of the project - including among others the emissions from devices and installations being part of the technological process, from light and heavy vehicles, construction machines and equipment, electricity generators and back-up and emergency power supply sources;
  - maritime, road and rail traffic connected with the construction of the power plant;
- d) analysis of the acoustic impact of the project on the environment, including the types of areas subject to acoustic protection, the range of equal loudness contours (before and after the application of possible minimising measures) in the day and night time, along with the visualisation of the above mentioned issues in the graphic form and electronic version of input and output modelling data;

**III.5.2 vibrations** - present:

- a) all sources of generated vibrations (considering among others construction works, road and railway traffic);
- b) analysis of the impact of vibrations on people, buildings, together with a graphical interpretation of the obtained results;

**III.5.3 EMF** - present the analysis of impact, including the current background and all sources of EMF emission generated by the project;

**III.6 waste and spent fuel**

**III.6.1 waste (excluding radioactive)** - present:

- a) types, codes, sources and maximum predicted quantities of hazardous and non-hazardous waste generated;
- b) the methods of handling the above mentioned wastes, i.e. all the operations connected with their management (recovery, neutralisation, storage and planned storage) and transport;
- c) the environmental impact of the management approaches;

**III.6.2 radioactive waste and spent fuel** - present:

- (a) the categories of radioactive waste and the maximum anticipated quantities of such waste and spent fuel, before and after treatment;
- (b) the planned arrangements for the management of radioactive waste (low-, intermediate- and high-level radioactive waste) and spent fuel (including handling and transport, treatment, storage and envisaged other subsequent treatments), together with the envisaged schedule;
- (c) the environmental impact of the radioactive waste and spent fuel management practices;

**III.7 geological conditions, surface water and groundwater** - present:

- a) description of geological conditions in the area of project execution and impact;
- b) description of aquatic environment in the area of project's execution and impact, taking into account surface waters (including coastal and marine waters) and groundwater, including:
  - quantitative and qualitative characteristics of these waters;
  - hydrological and hydrogeological conditions, taking into account among other things existing aquifers (including usable), depth of the first groundwater level, directions of groundwater migration, possibilities of pollution migration and hydraulic contact between the aforementioned waters, size of the so-called transition zone (contact zone of groundwater flowing from the land with infiltrating sea water) - present this information also in graphic attachments in the form of maps and hydrogeological cross-sections;
  - information on the location of the project in relation to body of surface water and ground water, open sea waters, major groundwater reservoirs and water intakes, together with their protection zones;
  - qualitative characteristics of the seabed sediments (lithology, chemical composition, including heavy metals), in particular: in the place of the planned intake construction and cooling water discharge, and in the place of the planned protection of the wharf against flooding and erosion, as well as with an indication of the method of handling any dredged material;
  - information on shore morphology and dynamics;
- c) description of the planned water and sewage management, including:
  - sources, quantities and planned use of water needed for the project, detailing the processes for which it will be used;

- purposes, types and technologies of planned installations (concerning e.g. water treatment, demineralisation, desalination and chlorination, waste water treatment);
  - sources, types and amounts of emissions of substances or energy to water or soil, taking into account all installations and processes involved in the project;
  - types, quantities, parameters, manners and technologies of management, as well as receivers of the generated sewage, in particular: domestic sewage, industrial sewage, heated cooling waters, waters from land drainage and rainwater and snowmelt;
- d) analysis of the impact of the project on the water environment and on phenomena and morphological processes, including:
- earthworks performed at the stage of construction of the power plant, including the indication of hazards for the soil and aquatic environment (e.g. excavation, foundations of buildings, organisation of the construction site/back-up facilities, construction of tunnels and channels of the cooling system - including the impact on the morphology of the seabed, works related to the construction of elements of the maritime infrastructure and coastal protection against flooding and erosion, activities related to the transport of equipment and materials by sea and reloading in the area of dune habitats and reefs);
  - impact of discharged wastewater (including, among others, waters from construction dewatering, cooling waters polluted with chemical substances used during water treatment, rainwater and snowmelt) on the quality of receiving waters and hydrological and hydrogeological conditions;
  - anticipated changes in water relations (resulting, inter alia, from drainage, tree and shrub removal and land levelling), including the quantity and dynamics of water flow, taking into account the impact of raw water intake on the water balance of drained watercourses or reservoirs, and the anticipated size of the radius of depression cone;
  - impact on the ecological continuity of watercourses and migration of aquatic organisms;
  - impact of the discharge of heated cooling water in summer and winter on the quality of receiving waters and its eutrophication, taking into account the most unfavourable conditions, and on the ice cap and sea currents, together with the graphical presentation of the range of the thermal plume of water discharged from the power plant;
  - impact of the investment on the disturbance of debris transport along the shore as a result of locating in the coastal zone the infrastructure connected with the power plant;
  - impact on the variability of underwater reefs;
  - impact on the dynamics of changes of the seabed, coastline and dunes (e.g. interruption of the continuity of dune structures and disruption of dune-forming processes);
- e) analysis of the impact of the project on the achievement of environmental objectives set for body of surface water, body of ground water, and marine waters within the range of its impact;

### **III.8 social and economic conditions - present:**

- a) current socio-economic conditions in the range of impact of the project, including among others:
- number of inhabitants (permanent and temporary) and their distribution, demographic structure of the population, location of the nearest buildings to the power plant, labour market (employment structure, unemployment level),
  - real estate market, industry, agriculture, tourism, public and private services;
  - uses of water resources (e.g. water supply for population and industry, agriculture, fishing, tourism, recreation, shipping, etc.);
- b) the predicted number of permanent and temporary workers employed during the execution of the project (with an indication of the variability over time);
- c) analysis of the impact of the project in each phase of implementation on the socio-economic conditions, with particular attention to the impact on the quality and living conditions of people;

### **III.9. natural environment**

#### **III.9.1 description and distribution of elements of the natural environment - present (also on maps):**

- a) elements of land, sea and freshwater environment:
- flora (bryophytes, vascular plants);
  - macrofungi and lichens;
  - fauna (invertebrates, ichthyofauna, herpetofauna, avifauna, mammals);
  - planktonic organisms;
  - benthic organisms, including macrophytes;

- natural habitats and other plant communities;
  - with particular regard to the natural habitats and plant and animal species listed in the Council Directive *on the conservation of natural habitats and of wild fauna and flora* (hereinafter: *Habitats Directive*), birds listed in the Directive of the European Parliament and of the Council *on the Conservation of Wild Birds* (hereinafter: *Birds Directive*), plants, animals and fungi protected under national law and rare and endangered (included in "red books" and national and regional "red lists");
- b) forms of nature protection;
- c) ecological corridors of international, national, regional and local importance;
- d) plant, fungi and animal protection zones;
- e) information on species composition, number, positions of animals in particular phenological periods and stages of development, including identification of functional habitats (e.g. places of breeding, spawning, feeding, wintering, shelters, roost sites, migration corridors), as well as information on the manner and intensity of use of space and area by fauna;
- f) identification of patches of natural habitats and plant communities forming them on the basis of phytosociological photographs taking into account characteristic and distinguishing species;
- g) the area and state of preservation of natural habitats (including marine habitats) and other plant communities and the distribution of seabed biotopes;
- h) the conservation status of populations and habitats of plant and animal species (distinguishing between species listed in the *Habitats Directive*, the *Birds Directive* and others),
- i) information on taxonomic composition, abundance and biomass of phyto- and zooplankton and phyto- and zoobenthos (including seasonal variation of phytoplankton and zooplankton);
- j) information on ichthyofauna:
  - species composition, abundance, biomass, distribution and density of ichthyofauna (including ichthyoplankton);
  - age structure, length composition (total length [Lt]),
- k) information on marine avifauna - species composition, distribution and abundance, including density index (number of birds per 1 km<sup>2</sup>) and total abundance of individuals of the given species per 1 hour of the ship's trip;
- l) information on marine mammals, inter alia:
  - porpoise activity (continuous monitoring using hydroacoustic detectors, compared with previous results of similar surveys), including days on which porpoises were recorded;
  - number of observations of live and dead seals, number of individuals seen;
  - key locations and migration routes of the mammals;
  - results of underwater acoustic background monitoring for particular seasons;
- m) information on the coastal zone biocoenosis, including:
  - taxonomic composition and spatial distribution of wash margin;
  - abundance and distribution of *Talitrus saltator*;
- n) information on invasive alien species (abundance and distribution);
- o) assessment of biodiversity in relation to species, habitats and ecosystems;
- p) natural valorisation of the studied area on the basis of inventoried natural resources;

### **III.9.2. requirements concerning environmental studies**

- a) the description of the natural elements of the environment should be made on the basis of current data obtained in the course of field research;
- b) the spatial range of the environmental inventory should cover the area of the impact of the project, taking into account the areas, where an accumulation of impacts with other investments may occur;
- c) the research should be conducted in optimal time periods for particular types of natural habitats and plant and fungi species;
- d) the inventory of fauna should be conducted for a period of not less than 12 months, the duration of research, the frequency of inspections and their deadlines should be adjusted to the biology and ecology of the examined species / group of species, taking into account the varied activity of animals in subsequent phenological periods;
- e) indicate the area of research on marine environment situated beyond the range of impact of the variant proposed by the applicant, constituting a potential reference area for monitoring the impact of the power plant on the marine ecosystem;

### **III.9.3. determine the predicted impact of the power plant on the natural environment, including:**

- a) impact on inventoried elements of the biotic environment, taking into account:
  - changes in hydrogeological and hydromorphological conditions;
  - physical effects of the project, such as cutting down, destruction, transformation, fragmentation or isolation of natural habitats as well as plant and animal habitats;
  - impact on structures and ecological processes, which condition the proper functioning of natural habitats and plant and animal populations;
  - forecasted changes in the population parameters of the inventoried fauna species (e.g. impact on abundance as a result of increased mortality, change in density, structure);
  - creation of a barrier to migration and dispersal of organisms, restriction of the area of their occurrence;
  - impact on breeding sites, feeding grounds, resting places, migration routes (continuity and functioning of international, national, regional and local corridors);
  - impacts on biodiversity;
  - impact on increased anthropopression;
- b) impact on forms of nature conservation located within the range of impact of the project, in particular on Natura 2000 areas and the continuity of ecological corridors connecting them, including the provisions stemming from the plans for protection of those areas;
- c) analysis of the risk related to the appearance and spread of invasive alien species;
- d) assessment of the impact of the project on commercial fish resources (fish species important for fishery);
- e) impact on the receiving body ecosystem caused, among others, by:
  - extraction and stirring up of bottom sediments, increase in the concentration of suspended matter in the water;
  - noise (using modelling of underwater noise propagation) and vibration;
  - emission of substances to receiving waters and change of water quality as a result of discharge of heated cooling waters and chemical treatment of these waters (anti-scaling agents, anti-corrosive agents, biocides, etc.);
  - the occurrence of an emergency (including uncontrolled leakage of radioactive substances);
  - ingress of fish and other organisms into the cooling system;
  - change in species composition, range, abundance and biomass of the receiver's fauna and flora;
  - introduction of structures which may constitute artificial habitats colonised by aquatic organisms.

### **III.10 Ionising radiation and nuclear safety - present:**

- a) description of the radiation status of the environment (background) for the region of the project location, made on the basis of at least 12-month pre-implementation monitoring, including:
  - concentrations of radioactive isotopes in atmospheric aerosols;
  - total alpha and beta activity in the air;
  - spatial equivalent dose rate  $H^*(10)$  in air at 1 m above the ground;
  - concentrations of radioisotopes (including anthropogenic origin) in environmental compartments sampled and representative of the region of location (including bioindicators), in particular: soil, groundwater, inland surface waters and coastal zone of the Baltic Sea;
  - health status of the population with an indication of the spatial variation in the occurrence of diseases which might result from exposure to ionising radiation (in particular cancer);
  - concentrations of radioisotopes in food produced, sampled and representative for the region of location, including in particular: plant products (fruit and vegetables) and cereals, animal products (meat, eggs), milk, drinking water, grass (fresh fodder);
- b) an analysis of the radiological impact of the project during normal operation, taking into account the predicted releases of radioactive isotopes into the atmosphere (in particular: H-3, C-14, halides - I-131 equivalent, noble gases and aerosols), and to water (in particular: H-3), including:
  - assessment of the total annual effective doses from different exposure pathways, for different age groups, resulting from the assumed annual radioisotope releases;
  - assessment of the annual dose to the thyroid gland for different age groups resulting from the assumed annual environmental releases of iodine isotopes;



- analysis of the possibility of accumulation of radioactive substances in environmental components, including flora, fauna and human organisms;
- c) analysis of the radiological impact of the project in emergency situations, taking into account the predicted releases of radioactive isotopes into the atmosphere and water, in particular; H-3, Cs-134, Cs-137, Sr-90, I-131 (particulate, aerosol, gaseous fractions), together with an assessment of the levels of radioactive contamination and doses to individuals from the general population, taking into account the provisions on the values of intervention levels for the different types of intervention activities and the criteria for the cancellation of these activities, including:
  - the human and environmental impact (radiological consequences) in the event of an accidental condition, for the radiological limiting sequence of design basis accidents (DBAs) and for the radiological protection of the population and the severe accident included in the design extension conditions - DEC, as well as that postulated for emergency preparations - determined in accordance with the Polish regulations in force in this respect and taking into account relevant international requirements and recommendations, together with the dispersion of radionuclides in the aquatic environment and the atmosphere, and with the assumed probability of occurrence of particular types of accidents;
  - the predicted area in which emergency action is considered for an accident that falls within the category of extended design conditions;
- d) with reference to points III.10 b and c - the calculation methods and codes used and the input parameters used in calculating the dispersion of the contaminants (amount and composition of the radionuclides released, height and duration of the release, meteorological data), together with the justification for their choice;
- e) the predicted extent of designation of the planned restricted use area, taking into account the acceptable annual effective doses from all exposure pathways (including the design operating states and in the case of an accident without reactor core meltdown);
- f) the results of probabilistic safety assessments (PSAs) for the reactor types considered under the BCE, data on the frequency of severe accidents due to core damage frequency (CDF) and large release frequency (LRF);
- g) description of external natural and anthropogenic events, together with a methodology for determining significant events that may pose a threat to the safety of the nuclear power plant, in particular concerning:
  - seismic phenomena taking into account results of current observations;
  - extreme weather events and their consequences (e.g. freezing, droughts and other obstructions to cooling water intake, floods, storms, gales, snowstorms)
  - terrorist and sabotage attacks;
  - possible explosions at neighbouring industrial or military sites or due to transport;
- h) description of combinations of external events under consideration;
- i) description of internal events that could pose a safety risk to the nuclear power plant;
- j) values of probabilities of occurrence of particular nuclear facility states, specifying the postulated initiating events (PIEs) contributing to them, for the reactor types under consideration in the BCE;
- k) analysis of possible consequences for boundary accident sequences;
- l) information on actions taken to limit and mitigate the consequences of severe accidents;
- m) information on legal requirements for the development of external and internal emergency plans as well as procedures and a system of early notification of neighbouring countries in the event of an accident;
- n) information on legal and procedural conditions regarding effective life-cycle management and ageing of facilities in the context of long-term operation of a nuclear power plant as an important element of nuclear safety;

**IV. description of anticipated cumulative environmental impacts of the project with other existing and planned investments and emission sources, in particular taking into account:**

- a) accompanying investments;
- b) transport and communication in the area of investment;
- c) power infrastructure;
- d) pumped storage power station in Żarnowiec;

- e) extraction of fossil fuels (e.g. crude oil, natural gas, shale gas);
- f) activities in the maritime area;

**V. predicted actions preventing, limiting and compensating the negative environmental impact of the project**, with particular consideration of:

- a) inconvenience for people in the period of construction and exploitation;
- b) impacts on surface and underground waters in the scope of:
  - way of organising the construction site, construction backup facilities, transport bases, material and raw material bases, distribution stands for liquid and gaseous fuels, and waste management (especially radioactive and hazardous);
  - the quantity, types, technical parameters and location of planned sewage treatment devices;
  - measures to limit depression cone in connection with planned drainage;
- c) impacts on air quality, including the equipment used and its parameters;
- d) the possibility of taking measures to limit the amount of thermal energy emitted to the atmosphere or to the receiving body of cooling water (e.g. involving combined heat and power production - cogeneration);
- e) impacts on the acoustic climate and vibrations (including measures to minimise the excessive noise level, with the specification of parameters of the proposed protection and its location);
- f) impacts on climate change and the resulting impact on infrastructure (adaptation to climate change);
- g) impacts arising from the management of radioactive waste and spent fuel;
- h) measures to reduce the generation of waste, particularly radioactive waste;
- i) minimisation and environmental offsetting activities and measures;
- j) measures to prevent the release of core damage frequency into the environment;
- k) measures to prevent the release of radioactive substances into the environment as a result of pressure reduction in the primary circuit and in the safety housing in foreseen operating conditions and under emergency conditions;
- l) measures taken to limit and mitigate the consequences of severe accidents;
- m) protection and control against leakage of radioactive substances from the OCS/OCS and process ventilation to the environment in normal and emergency states;

**VI. description of impact forecasting methods applied by the applicant** - provide the assumptions and methodology of analyses presented in the report, in particular concerning: climate and its changes, emissions of substances and energy to the environment, natural environment, together with literature sources.

## JUSTIFICATION

The proceedings on the issuance of a decision on environmental conditions for the subject project were initiated at the request of PGE EJ1 Sp. z o.o. dated 05.08.2015, supplemented by letters dated 01.09.2015, 21.09.2015 and 11.01.2016. This application at the same time concerned the determination of the scope of the environmental impact report (hereinafter the report).

According to § 2 (1) (4) of the Regulation of the Council of Ministers *on undertakings likely to have a significant impact on the environment*, the planned investment is classified as an undertaking likely to always have a significant impact on the environment: *"nuclear power plants and other nuclear reactors (...)"*, therefore its implementation requires a decision on environmental conditions (art. 71 par. 2 item 1 of the EIA Act). Since the project may have a transboundary impact on the environment, pursuant to art. 69 par. 1 and 2 of the EIA Act the determination of the scope of the report is obligatory and requires the submission by the investor (together with the application) of the project information sheet [*"Pierwsza Polska Elektrownia Jądrowa; Karta Informacyjna Przedsięwzięcia (PGE\_SCN\_DES\_0001\_PL\_2.0) PGE EJ 1 sp. z o.o. z siedzibą w Warszawie (00-542) ul. Mokotowska 49, Polska; wrzesień 2015"*], hereinafter PIS. Pursuant to Article 75

(1a) of the EIA Act, the authority competent to issue a decision for an investment in the scope of construction of a nuclear power plant, issued pursuant to the Act of 29 June 2011 *on preparation and implementation of investments in nuclear power plants and accompanying investments* (Journal of Laws 2011.135.789), is the General Director of Environmental Protection (hereinafter GDOŚ). This decision is a decision issued by this authority pursuant to art. 69 par. 3 of the EIA Act, in the course of proceedings for issuing a decision on environmental conditions. Additionally, GDOŚ, guided by the location, nature and scale of the impacts, in this decision indicated pursuant to art. 68 par. 1 sec. 2 of this Act specific issues which need to be taken into account in the report.

In the course of the proceedings, GDOŚ requested by letter dated 12.10.2015. (DOOŚ-OA.4205.1.2015.11) to the Pomeranian Voivodeship Sanitary Inspector (hereinafter PPWIS) and the Director of the Maritime Office in Gdynia for an opinion on the scope of the report, pursuant to article 70(1)(2) and (1a) of the EIA Act. In response, the above mentioned authorities sent: the decision of the Director of the Maritime Office in Gdynia dated 03.11.2015. (INZ1.1-AM-8103-96-1/15) and letter from PPWIS dated 12.11.2015. (ONS.9022.6.1.2015.AS). In the decision issued, the Director of the Maritime Office in Gdynia specified what information should be included in the report (in addition to the requirements resulting from article 66 of the EIA Act):

- data on the species composition, abundance and distribution of ichthyofauna in the planned location of the intake structure and water discharge and in the range of its impact; determination of the impact of the investment on ichthyofauna;
- determination of the species composition, quantity and distribution of water birds in the planned location of the intake structure and the water discharge structure and in the range of their impact; determination of the impact of the investment on water birds (including - on the species and their habitats being the object of protection in the Natura 2000 area "Przybrzeżne Wody Bałtyku" PLB 990002);
- quantitative and qualitative analysis and distribution of planktonic and benthic organisms in the location of the intake structure and the water discharge and in the range of their impact; determination of the impact of the investment on plankton and benthos;
- detailed analysis of the impact of the cooling water discharge on the biotic components of the marine environment, with particular attention to the difference in temperature of waters and the chemical treatment of cooling water (anti-scaling agents, biocides, anti-corrosive agents, etc.), together with the indication of minimising measures in this respect;
- radiological impacts during normal and emergency operation on the marine environment (including Natura 2000 sites);
- impact of pipe-laying on seabed morphology;
- state of purity of sediments in the place of the planned intake construction and water discharge; method of dealing with possible dredged material;
- determination of the intensity of noise generated by the water intake and discharge facilities; impact of noise on ichthyofauna, avifauna and marine mammals;
- determination of environmental effects connected with deforestation of the area for the power plant, connections, cooling systems, etc.;
- impact of the investment on the disturbance of debris transport along the shore as a result of location of the infrastructure connected with the power plant in the coastal zone;

- impact of the investment on the functioning of ecological corridors, including regional corridors;
- identification of environmental effects related to disturbance/breakdown of the continuity of the linear system of habitats and reef system;
- determination of environmental effects connected with considered logistics assuming transport of equipment and materials by sea and reloading in the zone of dune habitats and reefs (for all assumed location options);
- impact of the power plant location on fishing economy in the region;
- impact of the project on the environmental objectives specified in the "Vistula River Basin Management Plan";
- determination of the range of impact of the project and the area of research compatible with it.

GDOŚ accepted the above mentioned suggestions of the authority, which was reflected in the sentence and justification of this decision. PPWIS in its opinion indicated the necessity to prepare the report in the full scope determined in accordance with article 66 of the EIA Act.

In accordance with art. 66 par. 3 of the EIA Act, the report, in the case of establishing the possibility of a transboundary environmental impact assessment, should take into account the impact of the planned project outside the territory of the Republic of Poland in the sections specified in art. 66 par. 1 sec. 1-16. Moreover, in accordance with art. 66 par. 1 sec. 6 of the EIA Act, the report should contain the determination of the predicted environmental impact of analysed variants, including the possible transboundary environmental impact.

The possibility of cross-border environmental impact of the project was indicated in the PIS. In view of the above, and in accordance with Art. 108 par. 1 sec. 1 and par. 3 and 4 of the EIA Act, GDOŚ issued the decision no: DOOŚ-tos.440.8.2015.JA.dts.1 dated 22 September 2015 on the necessity to conduct proceedings on transboundary environmental impact assessment of the subject project and imposed on the applicant the obligation to prepare in English, German and Lithuanian: PIS, the application for the issuance of a decision on environmental conditions and determination of the scope of the environmental impact report and those parts of the environmental impact report which will enable the countries on the territory of which the planned project may have an impact to assess a possible significant transboundary environmental impact. The information presented in the PIS shows that it cannot be excluded that harmful effects of a transboundary nature may occur as a result of the consequences of a major accident. Information on the initiation of proceedings to issue a decision on environmental conditions for the nuclear power plant was sent electronically to all countries within 1000 km of potential nuclear power plant sites, i.e. Norway, Moldova, Romania, Serbia, Croatia, Slovenia, Hungary, Italy, Switzerland, France, Luxembourg, Belgium, the Netherlands. In turn, official notification of a possible significant transboundary environmental impact of the project under Article 3 of the *Convention on Environmental Impact Assessment in a Transboundary Context*, done at Espoo on 25 February 1991. (OJ of 3 December 1991), hereinafter the *Espoo Convention*, was sent on 2 December 2015 by the GDOŚ to the countries directly neighbouring Poland (to Germany, Czech Republic, Slovakia, Ukraine, Belarus, Lithuania, Russia) and, due to the location of the project in the Baltic Sea coastal strip, to the countries of the Baltic Sea basin (to Latvia, Estonia, Finland, Sweden, Denmark). Additionally, based on the results of the transboundary proceedings for the Polish Nuclear Power Programme conducted in

2011 - 2014, GDOŚ found it necessary to officially notify Austria about the possibility to participate in the said proceedings as an Affected Party.

In response to the Espoo notification, all the notified countries joined the transboundary procedure. In addition, the Netherlands and Hungary applied for official notification (and upon receiving it, joined the procedure as an Affected Party). Thus, 15 countries participate in the transboundary procedure for this investment as Affected Parties. The majority of the Affected Parties participating in the procedure sent their official positions with comments to the scope of the EIA report within the set deadline. The main topics of interest for the Affected Parties were, among others: the possibility of significant transboundary impacts due to the accident, the way of radioactive waste and spent nuclear fuel management, the considered reactor technologies, the impact of the project implementation and operation phase on the Baltic Sea, the impact on the climate and adaptation to climate change. Information on how the comments of the Affected Parties have been taken into account has been included in this order in specific parts concerning particular environmental components or types of impacts.

When determining the circle of parties to the proceedings, GDOŚ took into account the information contained in the PIS, assuming that the parties are the persons owning real properties within the range of impact of the project, considered at this stage as a "zone of local impact", comprising the area of:

- 5 km from the borders of the planned site of the nuclear facility and from the points of discharge and intake of cooling water in the sea areas, and
- 1 km from the borders of corridors designated for cooling water infrastructure.

The 5 km buffer identified in the PIS as the project impact area was based on preliminary analysis of potential impacts (such as air emissions, ionising radiation, noise, water impacts among others). The range of the temporarily restricted intervention zone in case of severe accident with core meltdown was considered as the decisive factor resulting from the design objectives adopted for limiting the radiological impact of the nuclear power plant on the environment (3 km - intervention zone for Generation III and III+ nuclear power plants complying with the document EUR *European Utility Requirements for LWR Nuclear Power Plants. Revision D. October 2012*). However, when determining the area of 5 km from the borders of the planned site of the nuclear facility (and from the cooling water discharge and intake points in maritime areas), the precautionary principle was applied, direct reference was made to the "location area" of the investment, defined in § 1 point 2 of the Regulation of the Council of Ministers of 10 August 2012 *on detailed scope of assessment of the area intended for the location of a nuclear facility, cases excluding the possibility to consider the area as meeting the requirements for the location of a nuclear facility and on requirements for the location report for a nuclear facility* (Journal of Laws 2012.1025). In the light of the above provision, this area is understood as "the area up to 5 km from the boundaries of the planned site of a nuclear facility, and in justified cases related to the construction of a subsoil of significant importance for its stability during the placement of the facility and after its placement - the area extended to the extent allowing to obtain comprehensive data and assessments regarding the stability of the subsoil".

Taking into account the cautious approach of PGE EJ1 Sp. z o.o. to the determination of the project impact area, GDOŚ found it reasonable at this stage to assume that this range will not go beyond the aforementioned zone of local impacts (also in relation to the 1 km zone around the corridors

designated for the cooling water infrastructure). On this basis, the authority in question has assumed that the applicant and persons who are owners or perpetual usufructuaries of the real properties on which the investment in question will be executed, as well as those to which the range of its impact extends, have the status of parties to the proceedings (art. 28 of the Code of Administrative Procedure - a party is anyone whose legal interest or obligation is affected by the proceedings or who demands an action of the authority on account of his legal interest or obligation). It should be noted that after the submission of the report containing detailed predictive analyses of the environmental impact, this range (and thus the circle of parties to the proceedings) will be clarified.

Due to the number of parties to the proceedings exceeding 20, the parties are notified of the decisions and other actions of the body in question through a notice or in another customary way of public announcement (pursuant to Art. 49 of the Code of Administrative Procedure, in connection with Art. 74 par. 3 of the EIA Act). Considering the assumed at this stage territorial range of the impact of the project, GDOŚ published its notifications (apart from the notice board and the BIP of the office) on the notice boards (or by notifying the parties in another customary way accepted in the localities) through the following offices: Wejherowo commune office, Władysławowo commune office, Krokowo commune office, Puck commune office, Gniewino commune office, Choczewo commune office, Wicko commune office, Leba City Hall, Pomeranian Voivodeship Marshal's Office, Pomeranian Voivodeship Office, Maritime Office in Gdynia. It should be noted that by publishing the notices by the Marshal's Office of Pomeranian Voivodeship, the Pomeranian Voivodeship Office and the Maritime Office in Gdynia (state organisational units, acting within the scope of their tasks on behalf and for the benefit of the State Treasury), potential parties to the proceedings were informed, who have a legal interest in the maritime areas (e.g. entities applying for administrative decisions, which were granted the right to conduct investment activities in the maritime areas in the area of potential impacts - e.g. to use the sea resources or to construct constructions in the maritime areas) located in the above mentioned zone of local impact.

In the above manner, the parties to the proceedings were informed about the initiation of the proceedings and the availability of evidence (notice dated 14.09.2015 - DOOŚ-oa.4205.1.2015.2) and about the change of the name of the project by eliminating the words from the previous name: "in the Pomeranian Voivodeship", obtaining by GDOŚ opinions of the Director of the Maritime Office and PPWIS concerning the scope of the report and excluding at the request of PGE EJ1 Sp. z o.o. from the scope of the project the location variant "Choczewo" (notification of 20.01.2016 - DOOŚ-oa.4205.1.2015.16).

Due to the obligation to conduct an environmental impact assessment for the project in question, in accordance with Article 33 (1) and Article 79 (1) of the EIA Act, by notice dated 14.09.2015. (DOOŚ-oa.4205.1.2015.4) the public was informed about:

- the initiation of proceedings;
- authorities competent to issue the decision (GDOŚ), opinion on the draft decision (President of the State Atomic Energy Agency) and opinions and agreements (regarding the scope of the report and conditions for the implementation of the project - PPWIS, Director of the Maritime Office in Gdynia);
- the principles of disclosure and the type of documentation made available to the public and the possibility to submit comments and proposals and to participate in a possible administrative hearing open

to the public, which will be provided as part of the environmental impact assessment of the project (after the submission of the report by the investor);

- later public announcement of the date, place and manner of submitting comments and applications, as well as the date and place of the administrative hearing.

The above means that GDOŚ fulfilled the requirements of art. 33 par. 1 of the EIA Act, by providing the above mentioned information to the public without undue delay after the initiation of the proceedings (which results in the possibility of familiarizing with the necessary documentation of the case during the entire procedure), at the same time informing that the possibility to submit comments and applications (within the statutory deadline) or to participate in the administrative hearing will be provided only after the submission of the report. The notice addressed to the public dated 14.09.2015. (DOOŚ-oa.4205.1.2015.4) was made public in the above mentioned offices, by GDOŚ, in two nationwide press titles ("Gazeta Wyborcza" and "Rzeczpospolita") and by all regional directorates for environmental protection.

GDOŚ did not take into account comments submitted during the transboundary proceedings, concerning the legitimacy of conducting public participation already at the stage of report scoping. In accordance with Article 6(2) of Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 *on the assessment of the effects of certain public and private projects on the environment* (OJ EU.L.2012.26.1), at the preliminary stage of the procedure, the authority carrying out the environmental impact assessment is required, inter alia, to determine the time and place at which and means by which the relevant information will be made available to the public and the details of the arrangements for public participation. It should be noted that Article 6(5) of this directive determines that the manner of providing the opportunity to the public to comment is left to the discretion of the Member States of the European Union. Analogous provisions were contained in art. 33 par. 1 of the EIA Act, transposing provisions of the directive, and it results from it that before issuing the decision, the body is obliged to make public (without undue delay) information inter alia on the possibility, manner and place of submitting comments and applications, indicating at the same time the 21-day deadline for their submission. Considering the fact that pursuant to art. 79 par. 1 of the EIA Act the public participation is to be provided "before the issuance of the decision on environmental conditions", it is reasonable to conduct it when the applicant submits the report - the basic document for the assessment. Contrary to reservations of the exposed countries, ensuring public participation in the Polish legal order at the stage of environmental impact assessment (after the report has been submitted) meets the requirements of article 4(1) of the Convention drawn up in Aarhus on 25 June 1998 *on access to information, public participation in decision-making and access to justice in environmental matters* (Journal of Laws 2003.78.706), which specify that such participation takes place early enough for all options to be still possible, and for public participation to be effective. Effective participation can only be ensured if the public has access to full information about the project (including its, impacts, possible variants), the natural environment and the impact of the project on the environment, which occurs only after the submission of the report. According to the PIS, the report for the project in question will include, among others, the results of annual environmental monitoring and analysis and modelling of pollution emissions. Only after the submission of the report by PGE EJ1 Sp. z o.o. will it be possible to ensure effective public participation, while keeping all options open (at the stage of issuing the decision, GDOŚ, in justified cases, has the possibility to indicate another

variant of project implementation or to refuse to determine the environmental conditions). Making it possible for the public to get acquainted without any restrictions with the documentation of the case at the headquarters of GDOŚ from 14.09.2015 (date of the announcement) and to submit comments to the proceedings only at the report stage, fulfils the above-mentioned provisions on the principles of public participation. In addition, it should be noted that the exposed countries participating in the transboundary proceedings had the opportunity to conduct public participation at the report scoping stage, in accordance with their own legislation. It is also worth mentioning that, as it results from the PIS, informing the society (especially the local one) about the project and its advancement is successively performed by PGE EJ1 Sp. z o.o. as part of informal actions, going beyond the above prescribed GDOŚ activities.

Data on the application were placed in the publicly available register of data on documents maintained by the GDOŚ, in accordance with article 21 section 1 point 9 of the EIA Act.

The following ecological organizations acceded to the proceedings as parties, pursuant to art. 44 par. 1 of the EIA Act (on the date of submission of their applications to the body):

- Greenpeace Poland Foundation with registered office in Warsaw (on 09.09.2015),
- Ecological Association "Ojczyzna" based in Świdnica (on 30.09.2015),
- Ecological and Tourist Association "Lubiatowska Wydma" based in Kopalino (on 14.10.2015),
- Ecological and Cultural Association "Wspólna Ziemia" based in Chojnice (on 14.01.2016).

Positive verification by GDOŚ of the statutory objectives of the above-mentioned ecological organisations and the fact that they had been carrying out statutory activities in the field of environmental protection or nature protection for at least 12 months prior to the date of initiation of the proceedings resulted in their admission to the proceedings on the rights of a party. At the same time, the organisations were informed that in accordance with article 49 of the Code of Administrative Procedure, they will be notified of each action and ruling within the proceedings through a public announcement made available, among others, on the BIP website of the authority.

The PIS indicates that the project will be implemented, depending on the selected location variant, in the area of the communes of Choczewo ("Lubiatowo-Kopalino" variant) or Gniewino and Krokowa ("Żarnowiec" variant). By letter dated 11.01.2016. PGE EJ1 Sp. z o.o. modified its application, excluding the "Choczewo" location variant from it. The local authority does not accede to the demand of the Greenpeace Poland Foundation (letter of 05.02.2016) concerning the extension of the argumentation in the scope of removing the above mentioned variant from further analyses, considering that this issue is the exclusive responsibility of the investor - the disposer of the administrative proceedings, and its justification was presented by PGE EJ 1 Sp. z o.o. In the opinion of GDOŚ the abandonment of one and leaving two location options fulfils the requirement to present a location alternative (rational alternative option), pursuant to the EIA Act.

It results from the PIS that the implementation of the project will consist, among others, of the following tasks and elements:

1. preparation of the site for the construction of the power plant:
  - a) demolition of existing buildings, technological installations and infrastructure;



- b) removal of trees and shrubs located on the properties covered by the decision on the location of investment in the scope of construction of nuclear power facility, along with grubbing up and removal of humus;
  - c) earthworks, land levelling, including archaeological work and sapper reconnaissance and the removal of possible unexploded ordnance, unexploded bombs and other artefacts;
  - d) preparation of access roads, fencing and securing of the construction site including marking and monitoring system;
  - e) construction of connections to water supply, sewage and telecommunication networks (optionally gas and district heating) and main 110/15kV power supply point, including site lighting and media distribution points (internal infrastructure);
  - f) construction of a water intake and sewage treatment plant for the power plant;
  - g) installation of an excavation dewatering system together with a ground water discharge system;
  - h) preparation of the office and social and warehouse facilities for the construction site;
  - i) preparation of temporary storage yards and warehouses for construction materials and a yard for storing humus;
  - j) preparation of distribution stands for liquid and gaseous fuels;
  - k) preparation of the area for the construction of the elements of the maritime infrastructure (within the area of the power plant location, e.g. for the cooling water channels);
  - l) preparation of the sea quay area for the construction of flood prevention measures and erosion protection;
2. construction of the power plant:
- a) nuclear part of the power unit (reactor building with safety enclosure, reactor auxiliary equipment building, nuclear fuel building, radioactive waste management building, safety systems buildings and other auxiliary facilities of the nuclear part),
  - b) conventional part of the power unit - engine room (engine room building containing the steam turbine set with auxiliary systems and equipment, condensate and feed water system, power output system with unit transformer, related measurement and control systems, electrical supply systems, ventilation and heating systems, and other auxiliary facilities, systems and equipment)
  - c) other power plant components (facilities, systems and equipment not belonging to the nuclear or conventional part of the power unit - cooling water systems, turbine condensers, moving water systems, fire water systems, raw water systems, water treatment plants and other water and wastewater management facilities, electrical back-up power systems, interim spent fuel storage, site physical protection system, workshops and storage facilities, training centre, public information centre, welfare facilities, environmental monitoring centre and other ancillary facilities),
  - d) cooling water intake and discharge facilities;
3. Operation of the plant, to generate electricity (at a level of between about 9 and about 28 TWh per year, depending on the technology chosen).

The stage of decommissioning the nuclear power plant does not fall within the scope of the application, since according to § 2 section 1 point 4 of the Regulation *on projects likely to have a significant impact on the environment*, it is a separate project that may always have a significant impact on the environment, for the implementation of which it is required to obtain a decision on environmental conditions before issuing

a decision on a permit to dismantle nuclear facilities (art. 72 section 1 point 2 of the EIA Act). However, the above does not exempt PGE EJ1 Sp. z o.o. from the necessity to include in the report the impacts also of the decommissioning stage of the power plant (art. 66 par. 6 of the EIA Act), which will take place after the completion of its exploitation (after about 70 years from start-up).

The PIS also indicates investment intentions not covered by the application, implemented in connection with the construction of the power plant, such as:

- construction and development of transmission networks (power lines - supply and output of energy);
- maritime infrastructure required for delivery to the site of a significant amount of bulk materials, large-size and high tonnage pieces of equipment, which due to land transport limitations cannot be transported by road or rail;
- road and rail transport infrastructure (the basic type of transport of all kinds of construction materials, equipment and workers connected with the execution of the project);
- air transport infrastructure (helicopter landing field or modernisation of one of the existing landing fields in the voivodship, e.g. for the needs of medical rescue operations);
- water supply and sewage disposal infrastructure (construction or modernisation of existing underground water intakes and water supply networks or modernisation of municipal sewage treatment infrastructure);
- social and welfare facilities and infrastructure for permanent and temporary staff, training centres and office facilities,
- wired and wireless communication system;
- organisation of a system of security and physical protection, fire-fighting and medical care, public transport, early detection of radioactive contamination, supply of fuel and technical gases;
- external infrastructure related to radioactive waste management, etc.

Some of them will obtain the status of accompanying investments, according to art. 2 item 1 of the Act *on Preparation and Execution of Investments in the Field of Nuclear Power Facilities and Accompanying Investments*, defined as investments in construction or extension of transmission networks necessary to derive power from a nuclear power plant or other investments necessary to build or ensure proper operation of a nuclear power facility. For such projects it will be necessary to obtain a decision on environmental conditions, in accordance with Art. 72 par. 1 item 18a of the EIA Act. Other investment projects implemented in connection with construction of the power plant will be subject to verification regarding the need to obtain the decision on environmental conditions, pursuant to the provisions of the regulation *on projects that may significantly affect the environment*. Regardless of the above, it should be noted that all investment projects not covered by the application, which are carried out in connection with the construction of the power plant, should be taken into account in the report for the nuclear power plant in the context of cumulative impact analysis. It also appears from the PIS that for investments constituting accompanying infrastructure, which at the same time are projects likely to have a significant impact on the environment in light of the ordinance on projects likely to have a significant impact on the environment, obtaining separate decisions on environmental conditions will take place after the final selection of the power plant location option and technology, as these two factors will allow to determine the necessity of construction and the appropriate parameters of these projects.

The PIS shows that at the stage of the report, the detail of the information on the reactor to be used in the power plant will be limited to the specification of the technologies considered and their

parameters. The 3 main types of nuclear reactor technology under consideration (comprising more than a dozen reactor models offered by different vendors) are: Pressurized Water Reactor - PWR, Boiling Water Reactor - BWR, Pressurized Heavy Water Reactor - PHWR. The specific technology will be chosen at a later stage after the selection of, among others, a nuclear power plant technology supplier and a nuclear fuel supplier. Since it is not possible to specify the technology at this stage, the reactor types presented in the report are not project alternatives, but the impacts resulting from the nuclear part of the power plant will be analysed in the report on the basis of the BCE - the so-called boundary conditions envelope. This envelope takes into account the maximum parameters of the investment resulting from the considered technologies, as well as the parameters of the most far-reaching technological and technical scenarios which may cause the greatest impact of the investment on particular elements of the environment (which will be analysed as part of the environmental impact assessment). According to the PIS, examples of aspects taken into account when determining the BCE can be: demand for cooling water, levels of emissions of substances or energy to the environment (including radioactive substances and noise), area of project execution, number of employees needed to execute the project. PGE EJ1 Sp. z o.o. assumes that on the basis of the analysis of environmental impacts resulting from the BCE and the data set of the environmental inventory, forecasted environmental effects of the variants presented in the report will be obtained. These may influence the parameters and choice of reactor technology (emission levels) or e.g. the positioning of individual elements of the project, in order to optimise the predicted environmental impacts.

The PIS presents possible water based power plant cooling systems, which are alternative technological options of the project: open (OCS) and closed (CCS). The choice of a given cooling system depends largely on the choice of location and will be the subject of an option analysis in the report. In the case of the Lubiatowo-Kopalino location alternative (located in the immediate vicinity of the Baltic Sea, which is the source of cooling water for the power plant), the open cooling system is the solution preferred by the investor at this stage. For the Żarnowiec alternative (distance to the sea approx. 10 km) the closed cooling system (with cooling towers) is indicated as the preferred solution.

The project will generate radioactive waste (low-, intermediate- and high-level waste) and spent nuclear fuel. According to the information contained in the PIS, during the operation of the power plant, the waste and spent fuel will be temporarily stored and successively processed on the premises of the power plant. During and after the operation of the plant, low- and intermediate-level waste will be sent to the National Radioactive Waste Repository, while high-level waste and spent nuclear fuel, according to the PIS, will eventually be sent to a deep repository. The investor stated that the implementation of the above mentioned repositories does not fall within the scope of the application and they are separate projects, for which construction plans and guidelines have been defined in the National Plan of Management of Radioactive Waste and Spent Nuclear Fuel (NPMRWSNF). This document defines actions for responsible and safe handling of the above-mentioned materials, including for the site of the first Polish nuclear power plant and was subject to a strategic environmental impact assessment.

In the further part, GDOŚ justifies the requirements for the report imposed in the sentence of this order.

The requirement formulated in pt. I of the provision, the requirement to justify the project in the context of the potential possibilities to produce electricity in Poland (including from renewable sources) taking into account alternative ways of obtaining it and improving energy efficiency results from the legitimacy of presenting general assumptions regarding the purpose of the project. This issue was raised in transboundary submissions and the requirement to demonstrate the purpose of the proposed activity derives from Article 4(1) and Annex II of the *Espoo Convention*. While imposing the above obligation, GDOŚ at the same time considered as unjustified the proposal submitted in the transboundary proceedings to provide in the report an analysis of other options of the Polish energy policy, assuming energy production without the need to implement the project (based on the application of clean energy technologies and energy efficiency). The scope of the proceedings for the determination of environmental conditions for the project in question covers the implementation of a specific investment and does not concern issues at the level of state policy. Justification of the project should also refer to the content of strategic documents that condition the development of nuclear power in Poland, which were indicated in the NIP. GDOŚ also did not take into account the suggestions made during the transboundary proceedings, concerning giving the way of using the produced energy (covering own consumption in Poland or export) and the indirect impact of the project on the energy market of the Baltic Sea region and Latvia, considering that it goes beyond the scope of the environmental impact assessment of the project.

In point II of the decision, GDOŚ obliged the applicant to present basic information about the planned project, including its characteristics and conditions of use of the area, taking into account each of the phases of implementation: preparation of the construction site, construction, start-up, operation, shutdown and decommissioning. The above means that the concept of "implementation" of the project should not be identified in this order only with the stage of its construction.

In particular it is justified to give the exact location of the investment along with the detailed location of each of the planned variants of the project and the justification for their selection, geographical data enabling its unambiguous identification, borders of location variants, registered plots, the area of the land occupied by individual variants and elements of the infrastructure (along with the justification) and an indicative plan of the development of the power plant area in individual location variants and connections of the power plant with elements of the accompanying infrastructure (technical and transport) conditioning its operation. Due to the large scale of the construction stage of the project, it is necessary to provide the location and surface area of the construction backup facilities and transport bases, as well as to distinguish which of them will be located within the boundaries of the power plant site and which outside of it. The above information is necessary in order to precisely indicate the location of particular variants and their mutual comparison. Moreover, it is necessary to specify in detail the scope of the planned investment, including the indication of the elements included in it (identified in the PIS), as well as the investment plans not covered by the application (including the accompanying investments). It also needs to be clarified which of the activities related to radioactive waste and spent fuel management will be performed on (and which off) the nuclear power plant site. For this reason, GDOŚ obliged in item II.1.2 of the order to specify the activities planned as part of (unspecified) radioactive waste treatment at the power plant site, as well as those characterised so far as "other activities related to

radioactive waste management". In turn, item III.6.2 requires the presentation of all planned management of the above waste and spent fuel, including on site.

The authority found it important to provide in the report the chronology and schedule of the implementation of the projects not covered by the application (also in the context of examining cumulative impacts), including data on: the planned power lines leading out of the power plant, location and adaptation of transport routes (with mapping) and vehicle traffic, as well as activities described in the PIS as "other activities related to radioactive waste management", including radioactive waste treatment at the power plant site (identified in the PIS as associated investments).

Taking into account the execution of the project in a long time horizon and provisions of the PIS on the possibility of its phased execution, GDOŚ, in point II.1.3 of its decision, obliged to present in the report information in this scope, including the description of the scope of planned activities and dates of each phase of the project. Despite including in the application all possible stages together and providing in the PIS parameters of the project covering the scenario of complete execution of all possible stages, the above information is necessary to take into account their sequence and schedule (time scale) when analysing the environmental impact of the project.

In order to perform a comprehensive analysis of environmental impacts of the project, it is necessary to provide information on the types of technologies applied and the scheme of functioning of the power plant components, allowing to identify all impacts (including the places of emission of substances and energy into the environment). For this reason, GDOŚ in section II.2 obliged to present, apart from basic technological processes, also detailed information on e.g. considered types of nuclear reactors, cooling systems for each power plant location option, production parameters of the power plant and back-up power supply systems. The reactor cooling systems are the installations generating the main environmental impacts of the planned project, therefore it is necessary to present in the report details on the application of the two basic systems: OCS (including the way of running cooling water channels, ways of possible crossing of watercourses) and CCS (including technical parameters and principles of operation of considered types of cooling towers). In addition, GDOŚ obliged to provide information on nuclear fuel, including its consumption and the entire fuel cycle, covering all activities related to its production, transport, handling, loading into the reactor, storage and use (within and outside the power plant site). Full presentation of the above mentioned cycle constitutes a comprehensive information on, among others, hazards resulting from the application of this material.

GDOŚ recognizes as unfounded the suggestion made in the transboundary proceedings, concerning the necessity to select the type of reactor at the stage of report preparation, in order to obtain more detailed data, as well as to inform the public about priorities taken into consideration during its selection. Procedural and investment conditions of the planned project imply the necessity to select a technology supplier in such a way, that a competitive and impartial access to the tender procedure was maintained for all potential suppliers. This justifies that there is no requirement to specify at the report stage the selected reactor type and to assess the environmental impact of the reactor part of the power plant on the basis of the BCE. The results of environmental studies and the conditions of the decision defining the environmental conditions of the project will be one of the factors determining the choice of reactor technology. In addition, it should be noted that the environmental impact of a specific selected reactor technology will be subject to environmental impact assessment as part of the procedure for

issuing a decision on the construction permit or also as part of the procedure for issuing a permit for preparatory works (article 82 (1)(4a) and (4b) of the EIA Act).

The local authority did not take into account the suggestion made in the transboundary proceedings concerning proving in the report the application of the best available technique (BAT) to minimise the risk of release of radioactive substances from the reactor not only during standard operation, but also in emergency situations (with respect to the selection of the type of reactor, taking into account the risk of releasing substances into the environment and, consequently, the exposure of residents and neighbouring countries). The requirement to apply BAT results from article 204 (1) of the Act of 27 April 2001. *Environmental Protection Law* (Journal of Laws 2013.1232 as amended), hereinafter the *EPL Law*, according to which installations requiring an integrated permit must comply with the environmental protection requirements arising from the best available techniques. It should be noted that among the installations included in the planned project, obtaining such a permit and meeting BAT may require:

- installations in waste management, in accordance with pt. 5 of the Annex to the Regulation of the Minister of Environment of 27 August 2014 on the types of installations likely to cause significant pollution of individual natural elements or the environment as a whole (Journal of Laws 2014.1169),
- installations for combustion of fuels and nominal power of not less than 50 MW (the project includes 8 emergency power generators of 7.5 MWe each, 4 generators of 2.5 MWe each - in case of lack of power from the external network, portable generators used at the stage of construction), according to paragraph 1 item 1 of the annex to the above mentioned regulation.

The provision of art. 66 item 5 of the EIA Act indicates that if the planned project involves the use of installation covered by the obligation to obtain the integrated permit, the report on the environmental impact of the project should contain the comparison of the proposed technique with the best available techniques (BAT). In turn, the analysis in the scope of the developed BAT reference documents (BREF) indicates that in the case of installations included in the planned power plant, it was only developed for industrial cooling systems [*BAT reference document for the best available techniques in industrial cooling systems. December 2001. Ministry of the Environment. Warsaw, January 2004. – „Reference Document on the Application of Best Available Techniques to Industrial Cooling Systems”*]. There are no grounds for imposing the above obligation due to the fact that there are no BAT and BREF requirements for nuclear reactors (concerning minimising the risk of radionuclide releases), while for all installations requiring an integrated permit, BAT will have to be taken into account by law. Moreover, the use of advanced levels of nuclear reactor technology (Generation III or III+) in the planned power plant - as declared in the PIS - will contribute to increased safety and reduced emissions to the environment.

In point II.3 of the decision GDOŚ obliged to present predicted amounts of pollutants emitted at all stages of the project. It should be noted that the content of the PIS does not clearly explain whether all emissions other than those generated by the nuclear part of the project will be included in the BCE, so the envelope may not include the remaining emissions (from non-nuclear and independent elements of the project). In order to ensure that the BCE will in fact take into account the most adverse impacts of the different reactor technologies, GDOŚ considered it necessary to provide in the report the methodological assumptions for the determination of the BCE, with justification of the adopted parameters and their magnitudes characteristic for the considered reactor types and taking into account

the uncertainties resulting from the adopted assumptions. As some of the impacts of the planned project (generated by other facilities than the reactor, independent from the selected nuclear technology) may not be included in the BCE, the body obliged to present also such emissions and impacts (including considered technologies in particular location options). The specificity and scale of the project justifies the requirement to present in the report estimated emissions resulting from activities directly or indirectly connected with the execution and operation of the project, included in its life cycle, such as: the consumption of raw materials and energy for the production of materials necessary for the execution of the project (with specifying their sources) and the supply of the project with raw materials, materials and energy necessary for its construction and operation (with specifying the transport routes). The above provision also takes into account the postulates made during the cross-border proceedings concerning including in the report all stages of the life cycle of the power plant.

The point II.4 of the decision obligated to include in the report, apart from the location variant, also other variants (technical, technological), including alternative solutions in the scope of applied cooling systems (optimal in given location conditions) and variants of accompanying investment solutions (especially in relation to power lines taking power out of the power plant). The above requirement satisfies the expectations reported in the cross-border proceedings, inter alia in terms of providing alternative variants concerning waste management, handling of used fuel and applied technologies (e.g. cooling systems). GDOŚ also considers reasonable the suggestions made by the exposed countries regarding the justification for selecting as one of the location options the Lubiatowo-Kopalino variant, which, unlike the Żarnowiec variant, is not at the top of the ranking contained in the *PPEJ* of the 28 potential best evaluated locations for the planned nuclear power plant.

At the same time, the body in question notes that in the submitted report the applicant will present a specific preferred location for the power plant (indication of the variant proposed by the applicant), which was one of the suggestions made in the cross-border procedure.

The above-mentioned item of the decision also includes the provision on the obligation to provide in the report the predicted effects for the environment in the case of not undertaking the project (requirement of art. 66 par. 1 sec. 4 of the EIA Act), including those resulting from the necessity to provide domestic energy demand by generating it in conventional power plants (from fossil fuels) or from other unconventional, alternative sources - taking into account, among others, the comparison of air emissions (including the balance of greenhouse gases), water demand and the amount of generated waste. The comparison of the option of implementing the project with the option of not implementing it should take into account not only alternative ways of producing energy, but also the possibilities to increase savings in energy consumption (including through increased energy efficiency) or alternative strategies and ways of energy supply (e.g. import). This issue was of great interest to the countries in the cross-border procedure. On the other hand, GDOŚ considered as unjustified (in the framework of comparing the project implementation option with the option of not undertaking it), obliging the investor to provide alternative locations for the nuclear power plant in the country, as the location "screening" has already been performed once at the stage of strategic environmental impact assessment (*PPEJ*). The selection of the proposed variants (including localization) is up to the applicant, requires detailed

justification in the report and will be subject to verification by GDOŚ (including on the basis of art. 81 of the EIA Act).

The point III of the decision specifies the requirements regarding data in the report on particular, especially specific impacts of the project on various components of the environment (of particular variants, in each phase of the project, including phasing of the investment).

In accordance with Art. 66 par. 3 of the EIA Act, the information given in the report should also take into account the impacts of the planned project outside the territory of the Republic of Poland. GDOŚ recognized as reasonable the comments of the countries participating in the cross-border procedure concerning the necessity to include in the documentation the environmental impact of ionizing radiation resulting from the exploitation of the power plant, radioactive waste and spent nuclear fuel management (taking into account nuclear safety) and issues related to climate change.

Due to anticipated significant transformations of the ground surface and changes in the use and management of the area (land use and management in the area of the execution of the investment, spatial management in communes, management of maritime areas and at the seashore, transformations of the settlement network and infrastructure, shaping of the surface of the area), point III.1 of the decision included the requirement to include the above mentioned issues in the report, along with the indication of, among others, the balance of earth masses produced during the execution of the investment and the impact of the project on soils, including protected classes.

The scale of the project, the degree of occupancy of the area, the large cubic capacity and height of the objects as well as the natural character of the environment in the place of both location options result in the necessity to present in the report the impacts of the investment on the landscape, including the aspects indicated in point III.2 of the decision. The analysis of this impact should in particular take into account the different landscape features at Żarnowiec and Lubiatowo-Kopalino, as well as the specifics of the different location and technology options of the project - e.g. different reactor cooling systems, where in case of the CCS system it is necessary to build cooling towers of considerable height, being a dominant feature in the landscape. On the other hand, for each of the variants, the impact on the landscape resulting from the construction of typical large-size structures, such as the reactor, should be expected. GDOŚ also obliged the investor to present an analysis regarding the impacts of the investment on the cultural landscape and historical monuments.

In the case of investments in the energy industry (among the sectors of the economy with the most harmful impact on the environment and human health), it is particularly important to include in the report the impact of the project on climate and climate change, which was expressed in point III.3 of the decision. As far as the low emission characteristics of energy generation in nuclear power plants is a fact, as compared to its generation in conventional power plants currently in use (based mainly on resources of non-renewable fossil fuels), when presenting in the report the analysis of the impact on climate one should also take into account indirect emissions outside the area of the project execution, resulting from the functioning of installations and infrastructure related to the project execution (e.g. transport, accompanying infrastructure, waste management). Therefore, the climate impact of the project must be presented also in the context of a comparative analysis of energy generation from other conventional sources (including the emission of greenhouse gases - including the carbon footprint analysis). The



climate impact analysis should also take into account the microclimate impacts, which have already been diagnosed in the PIS, e.g. as a result of water vapour emissions from the cooling towers. When presenting the analysis of the impact of the project on climate changes, it is necessary to provide the adopted climate change scenarios for the period of the power plant operation (about 70 years), as basic data for this long-term analysis. GDOŚ also found it reasonable to provide in the report how the execution of the project may indirectly contribute to the impact of climate change on biodiversity of ecosystems in the area of investment impact. Due to the safety of the nuclear facility, the decision obliged to present an analysis of the project's resistance to primary and secondary effects of climate change. Particularly important in this context are issues related to providing the power plant with access to water in sufficient quantity for the needs of cooling the nuclear facility - especially in periods of heat and drought (increased demand for energy and water for cooling, increase in water temperature of the receiver) and extreme frost and snow (ice cover, floe, etc.). It is also necessary to analyse the impact of the above mentioned extreme phenomena (including such phenomena as icing of electrical cables) on the provision of energy access to the project and on the possibilities of output of the generated electricity. GDOŚ also obliged to analyze in the report the risks associated with other extreme phenomena intensifying with climate change: precipitation, floods (including odmorskiego), storms, river surges, sea level fluctuations, loss of ground stability, sea coast erosion, hurricanes, tornadoes, etc. The possibility of secondary consequences of the above-mentioned extreme events should also be considered, such as seismic shocks and activation of faults, instability of slopes or escarpments, risk of occurrence of processes in the soil which are unfavourable for the foundation of a nuclear facility (in particular liquefaction, swelling and collapse, changes in ground conditions under static and dynamic loads), excessive growth of aquatic organisms, or fires. At the same time, the obligations imposed in the order meet the expectations formulated in the cross-border proceedings concerning the presentation of a worst-case scenario of threats resulting from climate change (e.g. rising level of the Baltic Sea and resulting flooding, etc., which the power plant site may experience) along with the models and risks used, as well as an analysis of the project's resistance (safeguards) to primary and secondary effects of climate change.

The point III.4 of the decision contains the requirements regarding the presentation of an analysis of the impact of the project on air quality, taking into account all sources of organised and unorganised emissions characteristic for the technological process as well as generated by other equipment, installations and vehicles used in the execution of the project. Due to the necessity of large-scale development of the transport infrastructure necessary for the execution of the investment, it was also obligatory to present in the report all types of air emissions connected with transport and communication.

The point III.5 of the provision specifies the requirements for presenting the analysis of impacts of noise, vibration and electromagnetic radiation (EMR) on the environment, generated by the project. When classifying the areas, which constitute the areas subject to acoustic protection, one should first of all take into account their designation specified in local spatial development plans, and if there are no such plans - the actual development. If there are no local spatial development plans for the areas within the range of the project impact, it is required to submit reliable data on the actual development of the area (certified by authorities in possession of such data), which will allow GDOŚ to assess the acoustic impacts on people. Analyses, referred to in point III.5 should include all sources of noise (including the level of acoustic power), vibrations and EMR, the time of their operation and variability of noise intensity

generated during the day and night, characteristic of the technological process and other devices, installations and vehicles used at the power plant site. Due to the need for a large-scale expansion of the transport infrastructure necessary for the implementation of the project, it was also required to include in the vibroacoustic analysis all types of noise emissions related to transport and communication resulting from the implementation of the power plant.

The point III.6 of the decision GDOŚ obliged to present information on production and management of waste (including radioactive waste), as well as spent nuclear fuel. The necessity of the above data results from the characteristics of the project, which at all stages of its implementation will generate significant amounts of waste or spent fuel, as well as the necessity to ensure their safe management. For this reason, it is important to provide in the report the predicted environmental impact resulting from the management of waste and spent fuel. The local authority included in the decision radioactive waste and spent fuel separately, in order, among other things, to emphasize the special importance of threats and impacts resulting from the management of these materials, as well as obliged to present in detail the manners of managing radioactive waste of different activity levels (low-, medium- and high-activity) and nuclear fuel, taking into account all the activities to which they will be subjected (including handling and transport, storage and other foreseen ways of further management) and their foreseen schedule. Many of the comments (report proposals) made in the transboundary proceedings addressed these issues and were taken into account in section III.6.2. of the decision. In summary, these comments concerned:

- the method of conditioning, treatment and neutralization of radioactive waste, and examination of the environmental impact of radioactive waste treatment at the nuclear power plant site;
- the quantity, classification and management of radioactive waste and spent fuel (a realistic, comprehensive analysis with a timetable of where and how it will be stored), including operational waste and waste arising from decommissioning of the nuclear power plant;
- off-site management of radioactive waste and spent fuel (although as separate projects they will be subject to separate environmental impact assessments);
- a detailed analysis of the potential environmental impact in relation to the management of spent fuel and radioactive waste arising from the operation of the plant;
- the impact during the transport of radioactive waste;
- the planned interim and final repository for low and intermediate level waste (with timetable for implementation);
- the interim spent fuel storage facility and deep repository for spent fuel and the alternative solution considered for it.

Referring to the suggestion of the exposed countries to present in the report a feasible way of managing high-level waste and spent fuel (specific technical feasibility, geological conditions, location of the storage facility), GDOŚ in principle shares the view that the considered feasible option of their final management should be given at the stage of the environmental impact assessment of the power plant. However, taking into account the lack of detailed information at this stage as regards the target method of management of the above mentioned materials, distant time horizon for the possible construction of the deep repository (and covering the construction of such facilities with a separate procedure of environmental impact assessment), this body deems it sufficient at this stage to present general

information on this issue in the report. At the same time, GDOŚ did not take into account motions to present in the report data on planned volume, applied technologies or projects of radioactive waste storage facilities (low- and intermediate-level radioactive and high-level radioactive) and spent fuel storage facilities, due to lack of detailed data on such facilities at this stage.

As regards the demand to present in the report the quantity of spent fuel and related impacts for considered reactor types, GDOŚ states the following. The BCE concept applied by PGE EJ1 Sp. z o.o. assumes taking into account the most unfavourable parameters of considered reactor types when analysing the worst potential impacts of the power plant. The necessity to present methodological assumptions for the determination of BCE was indicated in item II.3.a of the decision. Accordingly, in the event that the issues of spent fuel quantity and related issues (e.g. spent fuel storage pool capacity and lifetime) constitute the above-mentioned parameters, the investor will be required to take them into account when determining the BCE.

Referring to the comment of the Affected Party regarding the need to treat the programme for development of nuclear energy in Poland and disposal of radioactive waste and spent fuel as a whole, GDOŚ notes that the aforementioned documents were prepared and adopted at the strategic level as part of the national legal order (PPEJ - 2014, NPMRWSNF - 2015). On the other hand, at the current stage of investment preparation, GDOŚ takes into account the view that the report should describe potential methods of radioactive waste and spent fuel management, being an immanent consequence of nuclear power plant construction. This is reflected in the investor's obligation in item III.6.2 of the order to provide information on planned methods of radioactive waste (low-, intermediate- and high-level waste) and spent fuel management, including anticipated alternative methods of their ultimate treatment or disposal, together with the anticipated schedule, as well as to provide information on the nuclear fuel cycle, including its management outside the power plant site (point II.2.f of the order).

GDOŚ finds it inappropriate to take into account some of the suggestions regarding radioactive waste and spent nuclear fuel, submitted in the transboundary procedure, and provides its arguments in this respect below:

- the application of the classification of radioactive waste according to IAEA publication (Classification of Radioactive Waste, IAEA Safety Standards series No GSG-1, 2009) or (in its absence) the application of a national classification system - no legal or factual basis to oblige the developer to apply the above mentioned International Atomic Energy Agency (IAEA) classification. Poland applies its own classification in this respect, in accordance with the Regulation of the Council of Ministers of 14 December 2015 *on radioactive waste and spent nuclear fuel* (Journal of Laws 2015.2267), while the reference of national regulations to the IAEA classification remains the responsibility of PGE EJ1 Sp. z o.o;
- whether Poland plans to dispose of nuclear waste itself, and whether it is considering participating in the construction of a so-called regional repository - strategic issues, set at the level of national policy, and therefore beyond the scope of this procedure;
- providing information about the potential transport (including its route) of radioactive waste and nuclear fuel outside Poland (e.g. through the territory of the Federal Republic of Germany) resulting from the execution of the project, taking into account the safety of transport, e.g. by sea - at the stage of the report, in the absence of the selected technology, such data will not be known; transport of dangerous goods and cargo is strictly regulated by law: road transport (ADR - European Agreement concerning the

international carriage of dangerous goods by Road, concluded in Geneva on 30. 09.1957 (*Accord européen en relatif au transport international des marchandises dangereuses*)); transport by rail (RID - Regulations concerning the international carriage of dangerous goods by rail (*Reglement concernant le transport international ferroviaire des marchandises dangereuses*)); transport by sea (IMDG - *International Maritime Dangerous Goods Code*); transport by air (*LATA-DGR - LATA Dangerous Goods Regulations*). Requirements for transport of nuclear materials, ionising radiation sources, radioactive waste and spent nuclear fuel are also formulated in Chapter 8 of the Act of 29 November 2000 *Atomic Law* (Journal of Laws 2014.1512 j.t.).

The component of the environment subject to particularly significant impacts of the planned project will be surface and underground waters. Point III.7 of the decision specifies requirements for including the above mentioned issues in the report, taking into account also geological conditions strictly connected with hydrology and hydrogeology of the area. As a result of the location of both location options, apart from inland surface waters and groundwaters, the analyses will have to take into account the impact of the investment on coastal and marine waters of the Baltic Sea. The starting point for the analyses should be a reliable description of geological conditions and the aquatic environment, as a critical component of the environment in terms of exposure to impacts of the planned power plant, the scope of which was included in item III.7.a and b of the decision. This description will require providing e.g. the data specific for the marine environment, such as e.g. the size of the so-called transition zone (zone of contact of groundwater flowing from the land with infiltrating seawater), qualitative characteristics of the seabed sediments (lithology, chemical composition, including heavy metals) - especially in the place of the planned intake construction and discharge of cooling waters and in the place of planned protection of the wharf against flooding and erosion, or the morphology and dynamics of the shore. The analysis of the impact of the project on the abovementioned environmental components also requires a comprehensive presentation of the water and sewage management (point III.7.c), in order to identify: the required quantities and all sources of water intake, technological processes requiring its consumption and installations for water treatment and sewage treatment, emissions of substances or energy to waters or to the ground (all sources, volumes, etc.), as well as characteristics of sewage discharged to receivers, water from dewatering, rainwater and snowmelt and heated cooling waters. The provisions of the PIS are general in this respect and it does not follow from them exactly what installations are to be used in the execution of the project, which affects the detail of the requirements presented in the order. When formulating the requirement to present the analysis of the impact of the project on surface and groundwater (point III.7.d), GDOŚ specified the most probable sources, which in particular should be included in the report. The implementation of the project is connected with the necessity to perform a number of earthworks and construction works, requiring excavation and dewatering, which may affect water relations of the area and contribute to creation of a depression cone of significant radius. The significance of the anticipated lowering of groundwater levels on the environment is evidenced by the fact, among other things, that this was the reason for eliminating the Choczewo location alternative from further analysis (because of the possibility of a significantly negative impact on the Białogóra PLH220003 Natura 2000 Special Protection Area as a result of the formation of a depression cone and a change in local hydrological conditions). The analysis of the changes in water relations should also take into account the effects of land levelling, removal of trees and bushes from the area of the investment project and the impact of raw water intake on the water balance of the drained watercourses or reservoirs if raw water is

taken from rivers, lakes or aquifers. In the case of water intake from surface watercourses or anticipated interventions related to their crossing, the impact on their ecological continuity and the possibility of migration of aquatic organisms should be analysed. The authority drew the attention to the necessity of presenting in the report the analysis of impacts resulting from the construction of tunnels or canals of the power plant cooling system (resulting, among other things, from the performance of deep excavations on land and on the seabed and the possible crossing of watercourses), as well as from the construction of elements of the maritime infrastructure and protection of the quay against flooding and erosion and activities related to transport of equipment and materials by sea. The interference in the marine environment, resulting from location of the infrastructure connected with the power plant in the coastal zone, should be analysed in the context of, among other things, the possibility of impact on the disturbance of debris transport along the coast and underwater reefs and on the dynamics of changes of the seabed, dynamics of changes of the coastline and dunes (interruption of the continuity of dune structures and disturbance of dune-forming processes). The scope of construction works justifies also that the report should present the impact of discharged wastewater (including water from construction dewatering and rainwater and snowmelt) on the quality of the receiver (suspended solids) and hydrological and hydrogeological conditions. A significant impact of the nuclear power plant is the emission of energy (heat) to the environment, the excess of which is collected by the cooling system from the condenser, which is part of the nuclear part of the power plant. Therefore, GDOŚ obliged to present an analysis of the impact of discharged heated cooling waters (including analysis of heat plume spreading and taking into account summer and winter seasons and the most unfavourable conditions - e.g. high receiver temperatures) on the receiver's water quality, its eutrophication (e.g. oxygen conditions, chemistry, salinity, water temperature taking into account thermal stratification, nutrient levels), ice cover, sea currents, etc. The analysis of the impact of discharged water or wastewater on the aquatic environment should also take into account emissions of chemicals used, inter alia, in water treatment processes. When analysing the impact on surface waters and groundwater it is also necessary to take into account the impact of the project on the achievement of environmental objectives set for bodies of surface waters, bodies of groundwaters and marine waters in the range of its impact, as well as on the major groundwater reservoir and water intakes, including their protection zones. The above requirement for bodies of surface waters and bodies of groundwaters results directly from the provisions of Section III, Chapter 1 of the Act of 18 July 2001. *Water Law* (Journal of Laws 2015.469 j.t.), and due to the location of both considered location options, all bodies of surface waters and bodies of groundwaters are located in the Lower Vistula Water Region (according to the division used for water resources management purposes) and are included in the Resolution of the Council of Ministers of 22 February 2011. *Vistula River Basin Management Plan* (M.P.2011.49.549). Additionally, it is worth noting that if a watercourse is located in a protected area, the environmental target becomes the achievement of standards and objectives resulting from special regulations, on the basis of which the area was established, unless they contain different provisions in this respect (according to article 38f of the *Water Law* Act). In the situation when for a given water body more environmental objectives have been set, the objective formulating more stringent requirements should be taken into account (art. 38g of the *Water Law* Act). The assessment of the current ecological status/potential of waters should be performed on the basis of own field surveys, using the methods of measurements and research used in the monitoring works carried

out within the framework of the State Environmental Monitoring. It is also advisable to take into account the results collected for the purposes of the above mentioned monitoring, presented in the reports of the Voivodeship Inspectorates for Environmental Protection. In addition, it is necessary to present in the report the methodology of analyses of the impact of the project on bodies of surface and ground waters. It should also be noted that due to the anticipated range of impact of the project, the examination of the risk of failure to achieve environmental objectives for surface waters in relation to the project is not limited to those bodies of surface waters (watercourses, reservoirs, internal, transitional or coastal marine waters), but should also include open marine waters, if at the stage of the report a set of environmental objectives for marine waters will be adopted, in accordance with article 61n of the *Water Law Act*. Furthermore, analyses of the impact of the investments on the marine ecosystem should be conducted taking into account the provisions of Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 *establishing a framework for community action in the field of marine environmental policy* (OJ EU.L.2008.164.19), as well as the "HELCOM Baltic Sea Action Plan". The point III.7.d of the decision takes into account the suggestion made in the transboundary proceedings to present in the report the possibility of pollution of the Baltic Sea waters by conventional substances when cooling water is released into the primary circulation, by obliging the investor to examine, among other things, the impact of discharged cooling water on the quality of receiving waters.

The implementation of the project will significantly affect the local and regional socio-economic conditions, hence requirements in this respect were formulated in point III.8. of the decision.

It is clear from the content of the PIS and from experience with nuclear power plants around the world that a project of this nature and the large number of workers required for its implementation justify the need for the report to show how this will affect, inter alia, the labour market, the property market, industry, agriculture, public and private services, tourism and recreation, etc. The effects of an influx of large numbers of workers with their families over the long term associated with the project should be presented in the context of the required infrastructure and service sector development (e.g. accommodation, services - including health, culture, recreation, commerce, transport, education, etc.).

The analysis of socio-economic conditions should also take into account the impact of the project on the quality and living conditions of people (e.g. changes and restrictions in the use of real estate, traffic intensity and safety, tourism and recreation) and on social and living conditions of employees and their families, also taking into account issues resulting from the multicultural structure of employment.

The operative part of the decision separately includes issues connected with the description of natural conditions and the analysis of the impact of the project on biotic elements of the environment. As the starting point for the analyses of the impact of the investment should be a reliable description of the natural environment within the range of the predicted impact of the power plant, in point III.9.1 a detailed scope of information was determined, which was deemed necessary. This scope will be discussed later in the explanatory memorandum. The point III.9.2 GDOŚ presented the requirements for conducting nature studies. Among other things, a requirement was set out that the description of the environment should be made on the basis of up-to-date data obtained during field research, which should form the basis for assessing the impact of the project on the natural environment, including on the objects and conservation objectives of Natura 2000 areas. Additional sources of information on the initial state of the environment should include literature data and data obtained from competent offices, provided

that they are up-to-date and adequate to the conducted research. The purpose of the nature inventory conducted for the needs of the project should be the determination of the current composition of species and the places of occurrence of representatives of individual species, as well as the determination of the functions of the area for given species. A requirement was also formulated to include in the environmental inventory the area of impact of the project, taking into account the areas, where a cumulation of impacts with other investments may occur - mainly those realized in relation to the construction of the nuclear power plant (including accompanying investments), which may generate negative impacts. For example, the technological corridor for power lines leading out from the power plant, with a width of up to 400 m, may pose a significant threat to avifauna, while the construction of maritime logistic infrastructure will result in interference not only in the coastal zone, but also in the Baltic Sea ecosystem. The inventory of natural resources within the range of influence of the main project and the investments connected with the power plant construction will allow to assess their cumulative impact on the biotic environment. With regard to natural habitats and plant and fungi species, a requirement was introduced to conduct inventories at optimal dates, i.e. covering such period of the growing season, when identification of habitats in the field as well as finding plant and fungi species will be possible and most effective. In the case of fauna, the investor was obliged to conduct research for a period of not less than 12 months, with the assumption that the inventory methodology will be adapted to the biology and ecology of the studied species / group of species, taking into account the varied activity of animals in subsequent phenological periods. It should be emphasised that the research should cover the full cycle of activity of particular species or groups of animals, which will allow to draw conclusions concerning, among others, the occurrence of a given species, the level of its activity or abundance. For example, in the case of avifauna, seasonal variation of species composition (breeding season, migrations, winter period) is important. Another example of a group of animals with diversified activity characteristics, which use a given area in a different way in the annual cycle, is chiroptero fauna, therefore bats should be studied during spring and autumn migration, breeding and swarming periods and studies should be conducted aimed at searching objects which are their winter shelters.

GDOŚ draws attention to the possibility to conduct field research on the basis of developed good practices, methodological guides, guidelines and standards (including methodological guides and guidelines issued by Chief Inspectorate of Environmental Protection - GIOŚ). In order to obtain reliable data and enable its verification, it is necessary to provide in the report detailed information on the applied methods of environmental inventory. Surveys of the aquatic environment and laboratory analyses should be conducted in accordance with methodologies used in monitoring of waters carried out within the framework of the Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 *establishing a framework for Community action in the field of water policy* (OJ EU.L.2000.327.1) - hereinafter *Water Framework Directive*, and the Directive 2008/56/EC of the European Parliament and of the Council *establishing a framework for community action in the field of marine environmental policy* - hereinafter *Marine Strategy Framework Directive*. It is also advisable to take into account the standards binding in the procedures of marine biological research, applied within the framework of the international monitoring of the Baltic Sea (HELCOM guidelines) and the monitoring of Polish marine areas (within the framework of the State Environmental Monitoring - SEM). Use of the above mentioned methodologies will ensure appropriate quality of measurements and research and reliability of data obtained on their basis.

GDOŚ also obliged to indicate the area of marine environment research located outside the range of impact of the variant proposed by the applicant, being a potential reference area for monitoring the impact of the power plant on marine ecosystem. The results of research conducted in the reference area will provide valuable information on possible changes in the qualitative and quantitative characteristics of waters and elements of the marine environment as a result of the impact of factors other than those generated by the project, as well as a reference point for monitoring and determining the actual impact of the power plant on particular components of the marine environment.

The point III.9.1 of the decision determined selected requirements regarding the scope and manner of presentation of information which should be included in the part presenting the description of natural resources located within the range of impact of the planned investment. This description has to take into account valuable natural habitats and plant communities as well as animal, plant and fungi species protected under European law [Council Directive 92/43/EEC of 21 May 1992 *on the conservation of natural habitats and of wild fauna and flora* (Journal of Laws EU.L.1992.206.7) - hereinafter the *Habitats Directive*, and Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 *on the conservation of wild birds* (Journal of Laws EU.L.2010.20.7)], as well as those under national protection, pursuant to the Act of 16 April 2004 *on Nature Conservation* (Journal of Laws 2015.1651 i.e., as amended). Additionally, rare and endangered species listed in the Polish Red Book of Plants and the Polish Red Book of Animals (compiled by the Institute of Nature Conservation of the Polish Academy of Sciences), as well as species included in the national and regional "red lists" should be taken into account. The inventory should enable the compilation of the list of natural habitats and other plant communities, as well as plant and fungi species, whose localities are located within the investment site and the range of its impact. The basic tool for identification of terrestrial natural habitats and plant communities forming them should be phytosociological photographs including characteristic and distinguishing species. Due to the fact that some elements of the technical infrastructure of the power plant (e.g. cooling water intake and discharge) will interfere with the seabed of the Baltic Sea, the research on marine environment should enable the determination of distribution of marine habitats listed in Annex I of the *Habitats Directive* and seabed biotopes.

The analysis of impact of the project on the natural environment should take into account the current surface and condition of natural habitats as well as the condition of populations and habitats of plant, animal and fungi species. It is advisable to take into account the parameters specified in the Regulation of the Minister of Environment of 17 February 2010 *on preparation of the draft plan of protection tasks for the Natura 2000 area* (Dz.U.2010.34.186) and the indicators used in the monitoring works conducted by the Chief Inspector of Environmental Protection when assessing the condition of preservation of natural habitats and populations of plant and animal species listed in the *Habitats Directive*. The condition of preservation of the populations of other animal species as well as plants and fungi should be determined by comparing the obtained indices with the data available for other areas where the species occur in the country, their habitat requirements, on the basis of literature data and unpublished data. Moreover, it is justified to indicate the most valuable patches of natural habitats within the area covered by the inventory. As regards fauna, within the framework of the natural inventory it is necessary to know its species composition and abundance and to collect data on the distribution and density of animals. Moreover, in order to properly assess the impact of the investment, it is necessary to examine



the value of the above mentioned areas for a given species / group of species by determining, among other things, the intensity and manner of using the inventoried space by them (resting, breeding, wintering, feeding and roosting sites). The study of the characteristics of local and regional movement patterns of animals will allow to identify their migration corridors. The decision also obliged to take into account the various stages of development of animals, which is important due to the fact that they use different types of habitats (e.g. amphibians undergo the initial stages of development in an aquatic environment, and after the completion of larval development and transformation, most species have a terrestrial lifestyle).

One of the key impacts of the planned project on the natural environment will result from the construction and operation of the cooling water intake and discharge facilities, which may significantly affect the receiving ecosystem. For this reason, the requirements regarding data specific for aquatic environment were included in the decision in a more detailed manner.

By obliging the investor to present information regarding the taxonomic composition, abundance and biomass of phytoplankton and zooplankton as well as phytobenthos and zoobenthos, due to a very clear seasonal variability of both the species composition and the abundance and biomass of individual taxa, it was pointed out that in the case of phytoplankton and zooplankton the annual fluctuations should be taken into account. The study of aquatic environment in the scope of the above mentioned elements is justified not only by the fact that planktonic and benthic organisms are an important element of the food chain, but also by the fact that the state of phyto- and zooplankton and phyto- and zoobenthos are biological indicators taken into account in the assessment of ecological state of water, in accordance with the requirements of the *Water Framework Directive* and *the Marine Strategy Framework Directive*.

In terms of zooplankton, it is important to determine copepod biomass, mesozooplankton microphage biomass and average zooplankton size. These elements are included in the *Marine Waters Monitoring Programme 2014 - 2019* prepared by the Chief Inspectorate of Environmental Protection (GIOŚ) in July 2014, as proposed indicators to be taken into account in assessing the status of zooplankton for the purpose of assessing the environmental status of marine waters, in accordance with the requirements of the *Marine Strategy Framework Directive*. It is necessary to provide information on the distribution and value of bottom cover by plants [%], as it is one of the parameters in the field of phytobenthos included in the above mentioned Monitoring Programme of the Chief Inspectorate of Environmental Protection. The results of the research on marine environment and the analysis of the impact of the project on that body of water should be presented taking into account the assessment of the condition of marine waters and in reference to the set of environmental objectives for marine waters.

As regards ichthyofauna it was found necessary to present in the description of the environment data on species composition, abundance, biomass, distribution and density of ichthyofauna, as well as age structure and length composition (specifying that it is the total length [Lt]). Furthermore, it was stressed that the qualitative and quantitative analysis should include both adult forms and ichthyoplankton.

In the case of marine avifauna, the investor was required to provide information on species composition, distribution and abundance and to determine the density index (number of birds per 1 km<sup>2</sup>) and the total abundance of the species per 1 hour of boat trip. With regard to seals, it was agreed that information is required on the number of sightings of live and dead individuals, as well as the number of individuals seen. According to the PIS, seal observation will continue throughout the year at a frequency

of twice per month. Inventory surveys should be planned to include seal counts conducted along the coast and during ship cruises. In the case of harbour porpoises, it is considered necessary to investigate their activity by continuous monitoring using hydro-acoustic detectors, which will allow, among other things, to determine the days on which their presence is recorded. The results of the harbour porpoise surveys should be compared with previous results from similar surveys conducted as part of the harbour porpoise monitoring project SAMBAH (an international project co-funded by the European Union LIFE+ funds, the main purpose of which is to acquire data on the occurrence and abundance of Baltic harbour porpoises). In the part presenting description of the environment related to mammals, it is necessary to indicate the key areas for the occurrence of seals and harbour porpoises as well as their migration routes in the Polish coastal zone and offshore area. For this purpose it will be advisable to use the results of research conducted within the SAMBAH project as well as information on seal occurrence collected by the Marine Station of the Institute of Oceanography of the University of Gdańsk in Hel (e.g. data from the WWF Blue Patrol, information on migration collected with the use of telemetry surveys).

Due to the fact that underwater noise is a significant anthropogenic pressure in the marine environment, the decision imposed an obligation to present results of underwater acoustic background monitoring for particular seasons of the year. These results are to be used for the assessment of the impact of underwater noise, generated within the execution of the investment, on the ecosystem of the receiving body of cooling waters, its fauna, and in particular on mammals, which have a low tolerance for this type of impact. It is reasonable to include in the above analysis the results of monitoring of the marine environment with respect to underwater noise, pursuant to the requirements of the *Marine Strategy Framework Directive*, performed with the use of indicators specified in the above mentioned Monitoring Programme of the Chief Inspectorate of Environmental Protection (number of days of the occurrence of impulsive sounds exceeding the threshold of noise causing displacement of individuals of the population of marine fauna and averaged noise level for 1 year, related to the ambient noise in two-third octave bands within the frequency range of 63 and 125 Hz).

The authority requested a description of the coastal biocoenosis, in particular the wash margin and the *Talitrus saltator*. This habitat is highly dynamic and highly dependent on marine activities, but GDOŚ considered that it is necessary to determine the taxonomic composition and spatial distribution of this community as wash margin on the seashore is an Annex I habitat of the *Habitats Directive* (Code 1210). Due to the *Talitrus saltator* being under partial protection, a reconnaissance of its occurrence (including determination of its abundance and distribution) is warranted.

The report should also address the threat related to the appearance and spread of invasive alien species of fauna and flora, within the meaning of Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 *on preventive and remedial action against the introduction and spread of invasive alien species* (Journal of Laws EU.L.2014.317.35). Therefore, it is reasonable to devote a separate part of the environmental description to present the information obtained during the field surveys on their abundance and distribution. On the basis of these data and the data collected within the framework of environmental monitoring (including monitoring of marine waters), it should be analysed whether the planned investment will contribute to the intensification of pressure related to the presence of these species.

In addition, this decision requires an assessment of the biodiversity of the studied area, including species richness and diversity of habitats and ecosystems. This assessment should be carried out using commonly used indicators, such as the Shannon-Wiener index. It should be noted that the need to take into account biodiversity results not only from Polish legal regulations, but also from the Directive 2011/92/EU *on the assessment of the effects of certain public and private projects on the environment*. In the analysis of the project's impact on biodiversity, it is necessary to take into account not only negative but also positive impacts.

On the basis of the analyses referred to above, as well as the data concerning the inventoried natural resources, one should make a natural valorisation of the area located within the range of the predicted impact of the planned power plant. Zones of different nature values should be indicated within this area and the elements of nature determining this value should be specified. The results of the comparative analysis of the variants of project's location should also be presented, as well as the extent to which the natural values of the project site stand out in comparison to the values of sites in the region with similar characteristics - for example, indicate which species and their density stand out in the region/country. The results of the nature inventory (e.g. location of habitat patches, species stands, migration routes) and the above mentioned valorisation should be presented on maps at an appropriate scale to enable the proper presentation of the collected data. These maps should also show the location of particular variants of the project and elements of the accompanying infrastructure.

Taking into account the specificity of the project and environmental conditions of its planned locations, in point III.9.3. GDOŚ indicated possible impacts on the natural environment, which in particular should be analysed in the report. It is necessary to consider all the impacts on fauna, flora and vegetation, as well as on the ecological structures and processes that condition the proper functioning of natural habitats and plant and animal populations. The above analyses should take into account physical (removal of vegetation cover, soil, transformation, destruction of habitats, creation of barriers for migration and dispersion of organisms, etc.), chemical (such as changes in the level of biogenic substances, salinity) and biological (increase in pressure from invasive alien species, changes within the population - such as decrease in numbers, change in density, structure) effects of the planned power plant implementation. It is particularly important to examine the impact on places of key importance to the functioning of animal populations, such as breeding, resting, feeding areas, migration routes. When determining the significance of the impact on particular components of the environment, one should take into account the trends in changes in the environment, sensitivity of a given species/habitat to negative impact, as well as trends in changes in the population size of species that may be affected by the planned power plant. The decision also requires that an assessment of the impact of the project on commercial fish stocks be presented and that the factor of increased anthropopressure be included in the analyses.

Due to the fact that changes in the size and dynamics of water flow, changes in the direction and velocity of sea currents, changes in depth and structure of the seabed and shoreline transformations may affect the organisms inhabiting the waters of the receiving body and other elements of the hydrographic network within the range of impact, the investor was obliged to determine the impact of anticipated transformations of hydromorphological conditions on the natural environment, including phytoplankton, zooplankton, macrophytes, zoobenthos and ichthyofauna. An important issue to

consider are indirect impacts resulting from direct interference in the environment associated with the execution of the project. An example of such impacts are the processes of transformation or degradation of hydrogenic habitats (peat bogs, riparian forests, etc.) as a result of changes in groundwater conditions resulting from the drainage of areas allocated for the project and the formation of a depression cone. Therefore, GDOŚ decided that the impact analyses should take into account the influence of changes in hydrogeological conditions.

Separately, issues connected with the impact of the investment on the receiver's ecosystem were included in the decision, in particular the effects of construction and operation of the installation for intake and discharge of cooling water. Above all it is necessary to analyse the threat connected with substance emissions and water quality changes as a result of the discharge of heated cooling water and its chemical treatment (anti-scaling agents, anti-corrosive agents, biocides, etc.) as well as wastewater and rainwater and snowmelt. It is important to present in the report an analysis of possible changes in the species composition, range of occurrence, abundance and biomass of fauna and flora of the receiver, resulting from the execution of the project. It is also necessary to refer to the risk associated with the phenomenon of ingress of fish and other organisms into the cooling system and the issue of the presence of structures which may constitute an artificial habitat colonised by aquatic organisms. The construction of the above-mentioned installations may cause disturbance of the bottom sediments, which will result, e.g. in increased concentration of suspended solids in the water. Moreover, contaminants released from sediments to the water may deteriorate water quality. This may adversely affect the condition of organisms living in the receiving waters. These issues should be addressed in detail in the report using dispersion and sedimentation modelling. In addition, the report should consider the impact of the power plant on the receiving waterbody ecosystem, both during normal operation and under emergency conditions.

In relation to the above-mentioned natural conditions, the point III.9.3 of the decision imposed the obligation to analyze the impact of the project on forms of nature conservation referred to in Article 6 of the *Act on Nature Conservation*, whereby the issue of species protection should also be taken into account. Taking into consideration the location, specific nature and scale of the project, as well as the provisions of Article 33 of the *Act on Nature Conservation*, the impact of the power plant on Natura 2000 areas, including their objects of protection and integrity, require particularly thorough analysis. During the aforementioned analyses the coherence of the Natura 2000 network should also be taken into account, therefore the impact of the aforementioned project on the continuity of the ecological corridors connecting them should be examined. The forecast range of the project's impact on Natura 2000 areas will cover a zone within about 14 km radius from both location options. In the opinion of GDOŚ, such a wide buffer will enable the analysis of the impact of the project on the coherence of Natura 2000 network (e.g. on the continuity of ecological corridors connecting individual areas). In both location variants the following Natura 2000 areas are located within the borders of the aforementioned zone or in its close vicinity:

- areas of Community importance: Białogóra PLH220003, Piaśnickie Łąki PLH220021, Opalińskie Buczyny PLH220099, Widowo PLH220054, Jeziora Choczewskie PLH220096, Orle PLH220019, Trzy Młyny PLH220029, Mierzeja Sarbska PLH220018, Bielawa and Bory Bażynowe PLH220063, Ostoja Słowińska PLH220023, Wejherowo PLH220084,

– special protection areas for birds: Lasy Lęborskie PLB220006, Przybrzeżne wody Bałtyku PLB990002, Puszcza Darżłubska PLB220007, Bielawskie Błota PLB220010, Pobrzeże Słowińskie PLB220003.

The scope of field studies and analyses relating to the impact of the power plant on the natural environment, as specified in the operative part of the order, takes into account the suggestions of the affected countries. It was deemed necessary to analyse the impact of the project on the Baltic Sea ecosystem both in normal operation conditions and in the case of an emergency. As part of the environmental impact assessment for the project, the investor was also obliged to determine the impact of the power plant on the subjects of protection of both onshore and offshore Natura 2000 areas. Moreover, it obliged to take into account all natural habitats and plant and animal species listed in the annexes of the *Habitats Directive* and the *Birds Directive*, located within the range of the projected impact of the investment, regardless of whether they are located within the boundaries of the said areas. As regards the alleged necessity to minimize and compensate the effects of the construction of the power plant, GDOŚ indicates that the statement formulates the obligation to present actions and methods preventing, limiting and compensating the negative impact of the investment on biotic components of the environment. However, the necessity to plan and implement measures compensating for the negative impact on the natural environment, in particular on the objectives and subject of protection of Natura 2000 areas and the integrity of those areas results directly from art. 66 par. 1 sec. 9 of the EIA Act.

One of the most specific and significant impacts of the planned investment is radiological impact (resulting from the presence of ionising radiation), as its normal operation (exploitation) is associated with emission to the atmosphere and water environment of radioactive substances, the levels of which will have to meet the applicable standards. In accordance with the requirements of Polish regulations (art. 36f.2.1 of the *Atomic Law*), under the operating conditions of a nuclear facility, including normal operation and anticipated operational events, the annual effective dose (effective dose) from all exposure pathways may not exceed 0.3 mSv. In order to determine the predicted environmental impact of such an event, it is necessary to provide information on the baseline (background) radiation situation of the location region. The spatial scope of the "location region" is defined in § 1 point 3 of the Regulation *on the detailed scope of assessment of the site for the location of a nuclear installation, the cases excluding the possibility of considering a site as meeting the requirements for the location of a nuclear installation and on the requirements for the location report for a nuclear installation* and is 30 km from the boundaries of the planned location of a nuclear installation. Under § 3(1), in conjunction with § 2(10) of that Regulation, the distributions of concentrations of radioisotopes in the ground, surface water, groundwater and atmosphere and the analysis of the distribution of the power of ionising radiation doses as at the date of the site assessment shall be considered within a range appropriate for their assessment in a selected area not smaller than the site region. It is important to establish a reference level for quantities characterising the radiological parameters of the environment (e.g. doses, dose powers, concentrations of radioactive substances in various components of the environment) in order to be able to present in the report the predicted impacts, and subsequently to assess the actual impact of the facility on the environment, in accordance with IAEA recommendations (e.g. IAEA *Safety Guide No. RS-G-1.8 on Environmental and Source Monitoring for Purposes of Radiation Protection* oraz IAEA *Safety Standards Series No. WS-G-2.3 on Regulatory Control of Radioactive Discharges to the Environment. Safety Guide*) and with international practice. The basic quantities which characterise radiological parameters of the environment, which should be measured in the context

of assessment of the radiation situation in the country, are contained in the Ordinance of the Council of Ministers of 17 December 2002 *on radioactive contamination early detection stations and facilities conducting measurements of radioactive contamination* (Journal of Laws 2002.239.2030) and they concern such components of the environment as among others: soil, surface water, drinking water, atmospheric aerosols, milk and other food products. The declaration in the PIS assumes that pre-execution radiological monitoring will be carried out *"in accordance with the principles of the National Radiological Monitoring Network"*. However, taking into account the specificity, location and scale of the project, GDOŚ obliged in III.10.a of the decision to present the radiation background also for other components of the environment (apart from those mentioned in the above mentioned regulation) collected and representative for the region of the location, such as bioindicators or groundwater. The said authority assumes that in the case of construction of a nuclear power plant it is necessary to provide the radiation background covering the full spectrum of elements of the environment covered by the scope of the predicted impact of the planned project, as required by art. 66 par. 1 item 2 of the EIA Act. The indicators indicated in pt. III.10.a characterising the radiation background of the environment also result from international practice (e.g. IAEA document: *„Managing Environmental Impact Assessment for Construction and Operation in New Nuclear Power Programmes"*).

GDOŚ determined the term of pre-execution radiological monitoring for at least 12 months, to include seasonal phenological changes, which is also a proposal included in the PIS. Drawing up a detailed description of the radiation status of the environment within the aforementioned time limit will also allow to capture the trends in changes of radiological parameters for the region of the project's location.

GDOŚ also obliged to present in the report the health condition of the residents along with the spatial diversification of the occurrence of diseases which can result from the exposure to ionising radiation (in particular tumours), in order to determine the initial state in this respect.

In the point III.10.b of the decision GDOŚ obliged the applicant to present an analysis of radiation impact, taking into account two basic ways of releasing radionuclides - to the air (through the reactor ventilation stack) and to water (discharge of cooling water to a receiver). The competent authority identified the typical radioactive isotopes released during normal operation of the nuclear power plant (for PWR, BWR and PHWR) to be included in that analysis and required an assessment of the effects of their release, in terms of annual doses (total annual effective doses from the different exposure pathways and thyroid dose) for different age groups, resulting from the assumed annual releases of radioactive isotopes into the environment. Operation of the nuclear facility will involve release of radioactive substances to various components of the environment (including directly to the air, surface water and indirectly to groundwater, food, etc.). The basis for the analyses in the report regarding the predicted releases of radionuclides to the environment and their consequences should be the parameters adopted for the determination of the BCE, in order to take into account the maximum values of the above-mentioned releases during normal operation of the power plant.

The analysis of total annual effective doses from individual exposure pathways and annual thyroid dose for different age groups resulting from the assumed annual releases of radioactive isotopes (including iodine) into the environment, as indicated in the order, makes it possible to assess the exposure of workers and members of the general public in this respect (compliance with the dose limits for ionising radiation), on the basis of the Regulation of the Council of Ministers of 18 January 2005 *on dose limits for ionising radiation* (Journal of Laws 2005 .20.168). The radioactive isotopes listed in the decision and

indicated for analysis during normal operation of the power plant cover the whole range of possible releases of radioactive substances to the atmosphere in various forms (aerosols, gases) and to water (in particular, the content of H-3 in water is an indicator of the size of releases to the aquatic environment). Radioactive iodine isotopes (in particular the isotope I-131) require special attention because of their potential negative effects on the human body.

When analysing the releases, it is also necessary to take into account accident cases, to assess their effects, as well as to determine the potential exposure of individuals and populations. GDOŚ has imposed an obligation to list in the report all isotopes that may be released during an accident. The listed isotopes (i.e. H-3, Cs-134, Cs-137, Sr-90, I-131 (particulate, aerosol, gaseous fractions)) have the greatest impact on the potential total effective dose received by the population as a result of the accident, due to their half-life and effects on the human body and environment. The assessment of the level of radioactive contamination and doses during an accident releasing radioactive substances into the environment allows, among others, to provide data necessary for the process of analysing the advisability of conducting intervention actions aimed at protecting the population and introducing restrictions on production and consumption of contaminated food and drinking water, in accordance with the Ordinance of the Council of Ministers of 27 April 2004 *on the values of intervention levels for particular types of intervention actions and criteria for cancelling such actions* (Journal of Laws 2004.98.987). GDOŚ obliged to provide in the report predicted sizes of zones, where introduction of intervention actions in case of emergency is considered.

Providing information in the report about the impacts of the nuclear power plant under normal operation conditions and in case of emergency (as well as about possible transboundary impact and potential releases of radioactive substances to the Baltic Sea ecosystem) was one of the demands made by the exposed countries and was taken into account in point III.10.b and c of the decision.

The same authority also included a requirement to specify in the report the predicted extent of the area of restricted use, delimited on the basis of calculations of the permissible annual effective doses from all exposure pathways (taking into account the design operating states and in the case of an accident without melting of the reactor core, where the annual dose from all exposure pathways will not exceed 0.3 mSv and 10 mSv, respectively). **The requirement to designate such an area around the nuclear facility under the rules set out in the EIA Act results from Article 36f(1) of the Atomic Law.** GDOŚ points out that the above requirement implies the necessity to attach to the report a copy of the cadastral map, certified by the competent body, with the marked boundaries of the area where the establishment of the limited use area is necessary, in accordance with art. 66 par. 4 of the EIA Act.

Pursuant to art. 66 par. 1 sec. 6 of the EIA Act, the report should specify the predicted environmental impact of analysed variants, including in case of a serious industrial accident. In case of high-risk technologies, such as nuclear technologies, it is the industrial accidents that may potentially cause significant impacts on people and the environment. Affected States emphasise in their positions that the most important element in a transboundary environmental impact assessment procedure is the analysis of potential incidents and accidents in a planned nuclear power plant, arguing that there is a potential for release and dispersion of radionuclides in the atmosphere, in the case of a severe accident, over long distances, covering their territories. In their positions, they pay special attention to detailed analysis of the issues of project safety, accident consequences and measures to minimise emissions, with particular emphasis on emergency situations. GDOŚ shares the view included in transboundary

comments that analyses related to nuclear safety should be presented in the report (e.g. on the basis of data provided by reactor technology manufacturers), even if the technology will be selected at a later stage. The detail of these analyses should be adequate to the information available at this stage of the investment process. Impacts from the accident should be presented in the context of the latest reference documents (including *IAEA*, *WENRA - Western European Nuclear Regulators Association*, *EUR*) and the extent to which these documents will be binding for the nuclear power plant design. The report should also provide a description of internal and external events (along with the methodology for identifying significant events) that could pose a safety risk to the nuclear power plant, as was also requested by the affected states. Additionally, it should be noted that nuclear safety issues related to the planned project will be subject to appropriate detailed analyses in the proceedings for issuing a nuclear facility construction permit, conducted by the President of the State Atomic Energy Agency (art. 36d of the *Atomic Law*). An element of these proceedings is, inter alia, the location report, in accordance with § 6 of the Regulation *on the detailed scope of assessment of the area intended for the location of a nuclear installation, cases excluding the possibility of considering the area as fulfilling the requirements for the location of a nuclear installation and on requirements for a location report for a nuclear installation*, which is subject to the assessment by the above-mentioned body.

Pursuant to Art. 77 par. 2 item 2 of the Act on *Atomic Law*, there is an obligation to transmit (by the President of the State Atomic Energy Agency, through national contact points) to the *IAEA*, the European Commission and contact points in other countries notifications of radiological incidents which occurred on the territory of the Republic of Poland. However, the GDOŚ considered that due to the interest of exposed countries and the significance of the issue, information on legal requirements concerning the system of early notification of neighbouring countries in case of an accident should be included in the report.

Given that the process of selection of the nuclear reactor technology supplier is beyond the competence of the GDOŚ, this authority has not taken into account in this decision the suggestions of the exposed states relating to this process on aspects of ageing management of the plant. It should be emphasised here that issues related to ageing of the facility constitute specialised analyses performed as part of safety analyses, exceeding the scope of the environmental impact assessment of the project, and their performance is required by law - § 2.3.4 of the Regulation of the Council of Ministers of 31 August 2012 *on the scope and manner of conducting safety analyses conducted prior to the application for a permit to construct a nuclear facility, and on the scope of initial safety report for a nuclear facility* (Journal of Laws 2012.1043), at the stage of obtaining a permit to construct a nuclear facility. However, the applicant was obliged to provide in the report information on legal and procedural conditions for ageing of facilities, in the context of long-term operation of a nuclear power plant, as an important element of nuclear safety.

In accordance with art. 66 par. 1 item 8 of the EIA Act, the report should contain, among others, the description of anticipated significant cumulative impacts of the planned project on the environment, hence all investments not covered by the application (existing and planned) should be included in the report - including accompanying investments. The local authority, in point IV of its decision, drew particular attention to projects and activities with potentially significant cumulative effects with the planned nuclear power plant, e.g. transport and communication in the area of investment (at all stages there will be a significant impact resulting from the need to transport workers and materials), power



infrastructure (in particular transmission corridors will involve the occupation of a significant area, constitute an ecological barrier, as well as pose a risk of collision for avifauna and chiroptero fauna), location of the pumped storage power plant in Żarnowiec (in the case of the Żarnowiec variant, there will be a possible cumulative impact on e.g. Lake Żarnowieckie and landscape), extraction of fossil resources - crude oil, natural gas, shale gas (in the area of both location variants of the power plant there are identified deposits of the above mentioned fossil resources, the extraction of which may cause significant demand for water, emit vibrations etc.) and activities undertaken in the maritime area (e.g. implementation of offshore wind farms).

The requirements regarding the presentation of the predicted actions to prevent, minimise and compensate for the negative impact of the project on the environment were formulated in pt. V of the decision. According to GDOŚ, it is necessary to indicate, among others, actions aimed at limiting the nuisance to people associated with the execution of the project. Due to the scale of the power plant construction, the investor was obliged in particular to indicate the ways of minimizing the impact on surface and underground waters, i.e. organization of the works, ways of protecting the soil and water environment against pollution with chemical substances, measures limiting the drainage of the area and the range of depression cone. Due to the specificity of the investment resulting from the use of nuclear fuel and management of radioactive waste and spent nuclear fuel, it is necessary to present in the report the measures minimizing the associated risks, including methods of protection against penetration to the environment of: the melted reactor core, natural releases of radioactive substances as a result of pressure reduction in the primary circuit and in the safety casing in the envisaged operating conditions and emergency conditions, radioactive substances from the OCS/CCS system and technological ventilation (in normal operating conditions and under emergency conditions). In addition, the report should include measures to minimise other impacts of the project (with the specification of equipment and its parameters), e.g. air emissions, noise and vibration, climate change and the resulting predicted impact on the power plant infrastructure, measures and methods to reduce the impact on biotic components of the environment.

In order to investigate the technological (and economic) feasibility of minimising the emission of thermal energy to the atmosphere or the receiving body of cooling water, the local authority has also imposed an obligation to provide an analysis of combined heat and power (CHP) measures. The possibility of using a cogeneration system has a significant impact on the potential minimisation of the thermal impact of the power plant.

In order to verify the credibility of the forecasted environmental impacts of the project presented in the report, it is necessary to present the methods of the analyses conducted along with the literature sources (point VI of the decision).

In view of the above, it was decided as in the sentence.

This decision is final in the administrative proceedings and may not be appealed against. It may be challenged only in the appeal procedure against the decision on environmental conditions (Article 142 of the Code of Administrative Procedure).

Receive:

- 1) Bogumiła Ożarska-Karbowiak - attorney of PGE EJ 1 Sp. z o.o., 49 Mokotowska St., 00-542 Warsaw,
- 2) other parties to the proceedings - in accordance with Article 49 of the CAP, by announcement or other customary way of public announcement in the following offices:
  - Wejherowo commune office
  - Władysławowo commune office
  - Krokowa commune office
  - Puck commune office
  - Gniewino commune office
  - Choczewo commune office
  - Łeba City Hall
  - Wicko commune office
  - Pomeranian Voivodship Office
  - Marshal's Office of the Pomeranian Voivodship
  - Maritime Office in Gdynia
  - General Directorate for Environmental Protection

For the attention of:

- 1) Pomeranian Voivodship State Sanitary Inspector, 4 Dębinki St., 80-211 Gdańsk,
- 2) Director of Maritime Office in Gdynia, 10 Chrzanowskiego St., 81-338 Gdynia.