

State Program on Scientific Support of Nuclear Power Development in Belarus

A. Mikhalevich

Institute of Power Engineering / National Academy of Sciences,
Minsk, Belarus

Abstract. Following the decision on NPP construction in Belarus, the Organization on Technical and Scientific Support of Nuclear Power Development (Joint Institute of Power and Nuclear Research – “Sosny”) has been nominated. In 2009, the Government adopted the State Program on Scientific Support of Nuclear Power Development in the Republic of Belarus for period up to 2020. The paper reviews activities implemented within the framework of this Program.

In accordance with the Concept of Energy Security adopted in September 2007 by the President of the Republic of Belarus the decision to construct an NPP was made on January 31, 2008. In this regard, the following organizational structures were set up by the President of the Republic of Belarus:

- Executive Directorate of the NPP;
- State Nuclear Regulatory Body (Gosatomnadzor);
- Department of Nuclear Power within the Ministry of Energy.

The National Academy of Sciences was assigned to the responsibility of conducting research activities, and the Joint Institute of Power and Nuclear Research –“Sosny” of the National Academy of Sciences was appointed as a technical and scientific support organization of nuclear power development in Belarus.

In 2009, the Government of Belarus adopted the State Program on Scientific Support of Nuclear Power Development in Belarus in 2009-2010 and for the period up to 2020.

The Program concentrates on development and introduction of optimal technologies for enhancing nuclear safety, providing more efficient radiation protection and protection of the environment, ensuring physical protection of nuclear facilities and materials, and improving effectiveness of the nuclear energy infrastructure.

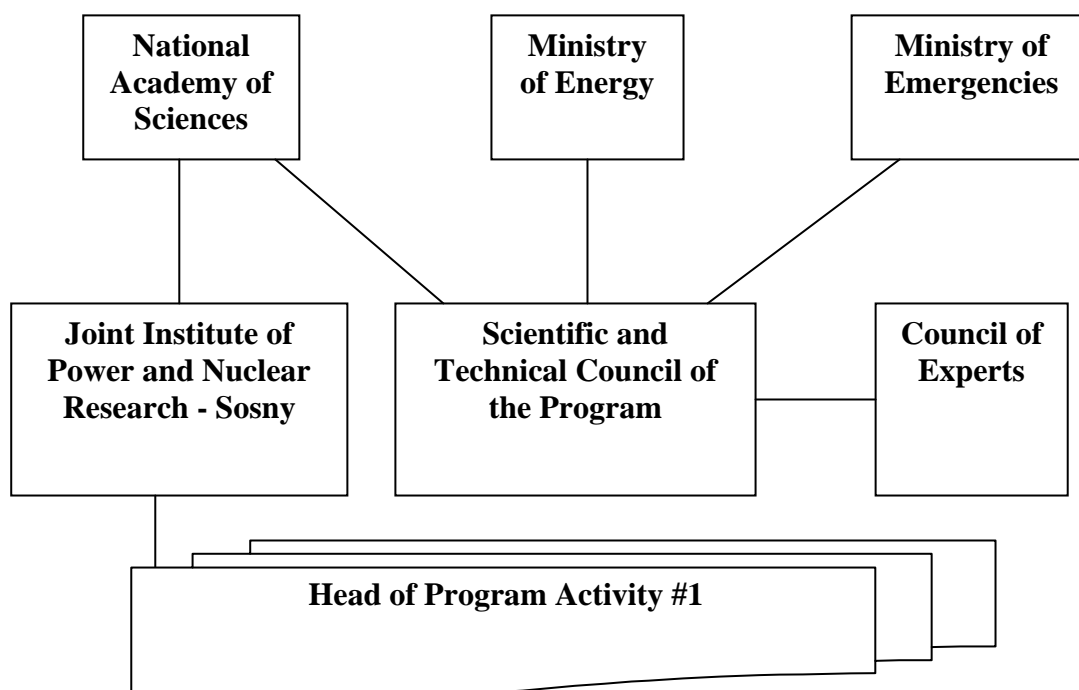


FIG.1. Diagram of program management

The Ministry of Energy, Ministry of Emergencies, and National Academy of Sciences were appointed State Supervisors of the Program. In turn, they established the Scientific and Technical Council and Expert Council of the Program.

The Program consists of the following activities:

1. Development of legal and technical regulatory requirements in the area of nuclear safety;
2. Development of quality assurance methods and systems;
3. Simulation and analysis of processes in NPP equipment;
4. Spent fuel and radioactive waste management;
5. Environmental impact assessment;
6. Physical protection upgrade;
7. Human resources development;
8. International cooperation;
9. Public acceptance;
10. Perspective researches.

The activity #1 is aimed to developing regulations and standards in the following areas:

- Storage and transportation of nuclear and radioactive materials;
- NPP operation;
- Physical protection of nuclear facilities;
- Radioactive waste management;
- Verification of software;
- Information security.

Development of the quality assurance methods and systems (activity #2) is envisaged at both construction and operation phases. In particular, the system of seismic monitoring in the vicinity of the NPP site will be set up.

Development of the relevant software and subsequent calculations will be provided during commissioning, operation and decommissioning of NPP according to the activity #3 of the Program. The areas covered by this activity include:

- Neutron and reactor physics and thermo-hydraulics;
- Burnout of nuclear fuel;
- Nuclear fuel cycle efficiency;
- Diagnostic of reliability of equipment and systems;
- Decision support during emergency situations;
- Emergency preparedness;
- Information security and others.

A special computer center including an appropriate database will be set up in the Joint Institute of Power and Nuclear Research –“Sosny” on the basis of a new Belarus-Russian supercomputer.

In the framework of activity #4 the following methods will be developed:

- Measurement of radionuclide concentration in waste;
- Treatment of radioactive waste;
- Analysis of radioactive waste management safety.

The site selection for disposal of different categories of radioactive waste will be provided in 2010-2015.

An integrated system of environment monitoring will be set up in 2009-2016 according to the activity #5.

In September 2008, the State Human Resources Development Program for Nuclear Power has been adopted by the Government of Belarus. According to this Program, a number of new departments and

specializations were set up in the Belarus State University, Belarus National Technical University and Sakharov Radioecological University. Moreover, the State Program on Technical and Scientific Support of Nuclear Power Development (activity #7) introduces training in research facilities such as critical assembly and subcritical buster system for high school and post-graduate education.

Activity #8 includes a number of international cooperation projects, first of all, with the IAEA.

In particular, the Republic of Belarus takes part in the INPRO project. Objectives of the INPRO project are the following:

- (i) To perform a full-scope Nuclear Energy System Assessment for Belarus according to all seven INPRO areas:
 - NPP and Nuclear Fuel Cycle Safety,
 - Infrastructure,
 - Proliferation Resistance,
 - Physical Protection,
 - Waste Management,
 - Environment and Economics;
- (ii) To identify follow-up actions for implementation of nuclear energy program in Belarus and to confirm that the strategic plan for Nuclear Energy Deployment is sustainable.

We expect the next outcome of the INPRO project:

- A Belarus National NESAs report is assumed to be included in the INPRO data base as a comprehensive reference case;
- The Belarus NESAs report will have a structure similar to the reports from existing assessments and will contain detailed results of assessments of the planned NES deployment in all INPRO areas;
- Added value for INPRO methodology.

In the framework of this activity the II International Conference «Nuclear technologies of XXI century» will be held in Minsk on 6-8 October 2010. The aim of the conference is to discuss the main up-to-date criteria of atomic power engineering to be met and technical solutions to achieve them.

The conference will cover the following topics:

- Safety of nuclear reactors;
- Reactor processes simulation;
- Fuel cycles;
- Design and site selection for Nuclear Power Plant;
- Radioactive waste storage and disposal;
- Nuclear power plant decommissioning;
- Comparative analysis of nuclear, thermal and renewable energy sources;
- Nuclear technologies in the real sector of the economy and social sphere;
- Environmental and social aspects and nuclear energy economy.

Activity # 9 stipulates the sociological monitoring of public opinion about nuclear safety of the existing NPPs and further nuclear power development. The first poll in Belarus was conducted in 1995. About 40% of respondents were in favor of the development of a national nuclear power program and approximately the same percentage did not support the nuclear option.

The last poll, which was conducted in December 2007 – February 2008, demonstrated that a number of supporters of nuclear power has been raised to 55%, whereas a share of the opponents of nuclear power decreased to 23% (FIG.2). In this connection, it is interesting to examine the distribution of opinions as to various categories of the interviewed persons (FIG.3). The more positive attitude

towards nuclear power was observed among men, businessmen and managers (above 60%) and relatively negative - among women, pensioners, students and pupils (less than 50 % were in favor).

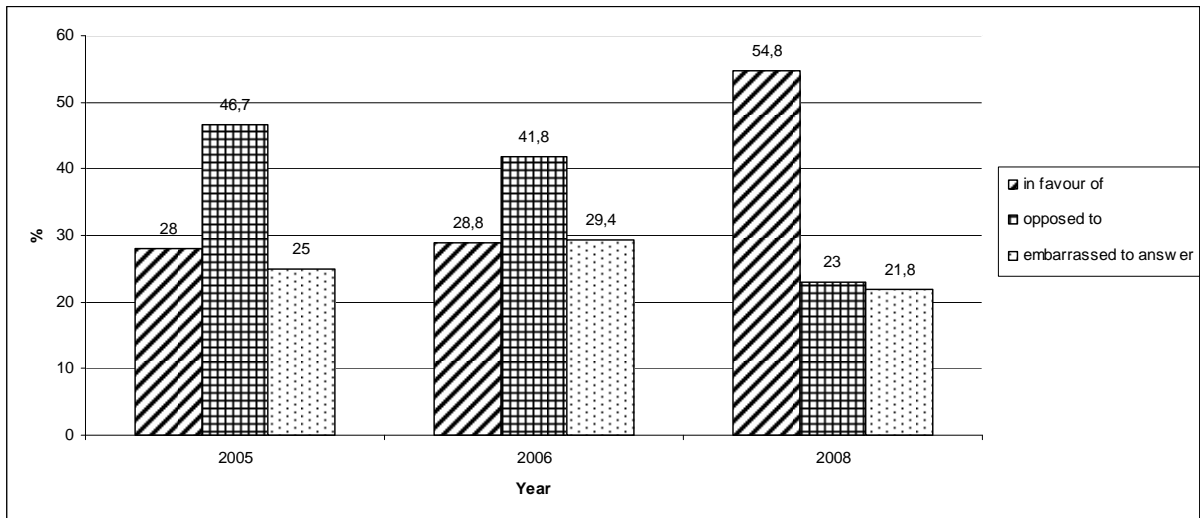


FIG.2 Public opinion on nuclear power development in Belarus

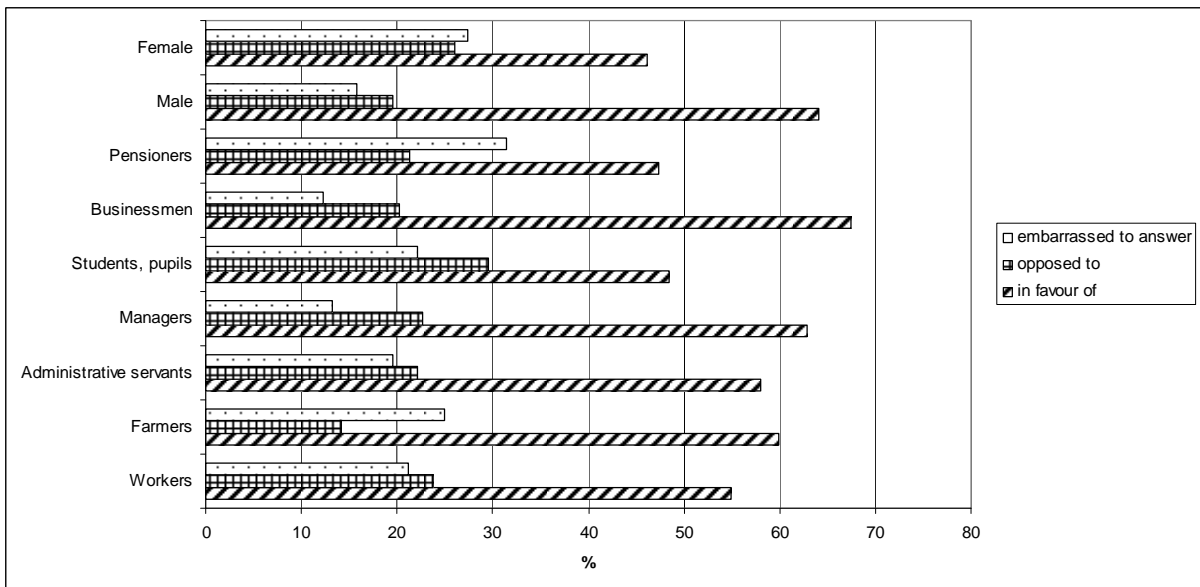


FIG. 3 Distribution of public opinion on nuclear power development