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**RESEARCH ON SAFETY IMPROVEMENT OF NUCLEAR ENERGY
APPLICATIONS IN HUNGARY**

PhD THESIS SUMMARY

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Introduction

The legal and institutional conditions of peaceful and safe use of nuclear energy have been established in Hungary. Hungary was among the first countries which acceded to the Additional Protocol of the Non-proliferation Treaty; it was the first country among those that operates nuclear power plant, about which the International Atomic Energy Agency declared that, based on a comprehensive safeguards inspection, the nuclear energy is used only for peaceful purposes. The nuclear safety was an emphasized area during our accession to the European Union.

Subsequent to a full-scope evaluation covering all aspects the Commission and the Council declared that both our legal system and our institutions meet the highest international standard. It was determined about the Paks Nuclear Power Plant that as the result of long-term safety improvement measures its safety meets the level of the western type power plants at similar age.

The terror threat of Hungary increased during the Yugoslavian wars. The physical protection of the nuclear power plant was then reviewed and strengthened, thus the periodic evaluations made after 2001 revealed no immediate tasks.

The lifetime extension and the power uprate of the nuclear power plant are on the floor. Their safe implementation is an important task for the operators, as well as for the regulatory body and the technical support organizations. In the course of the modification of the governmental structure the guarantees of safety shall be preserved. Only a strong, independent regulator, with sufficient resources can guarantee to preserve the high safety and security standards of the nuclear energy applications in Hungary.

Research objectives

The general objectives of my research were the complex review, analysis and evaluation of the nuclear energy applications in Hungary; and the determination of the measures necessary for improving safety. In line with the international trends and results two wide and actual areas were selected for detailed analysis; the research objectives are as follows:

1. Review of the regulatory system overseeing the safety of nuclear energy applications in Hungary, revealing the overlapping and missing areas. Based on the analysis elaboration of a suggestion in the frame of the governmental reform for a simpler, more efficient and cost-effective performance of the tasks.

2. Elaboration of the complex evaluation methodology of the nuclear terrorist threat, periodic review of the situation in Hungary, determination of the measures to be implemented.

Research methodology

The complexity of the tasks required team work. Following the basic analyses the objectives were determined, and the tasks were distributed, continuous consultation process ensures the harmonization of the results of the various fields, then the conclusions were drawn and the reports were finalized. The reports may include sensitive information and data, and they aim at supporting decision making so generally, accordingly they are not public. Ensuring the necessary security requirements the public research results were time to time published in professional journals.

Regulatory supervision of the safety of nuclear energy applications

Diagnosis:

The regulatory system of the safety of nuclear energy application, similar to the regulatory systems of the developed countries, evolved in connection to the existing institutions. The radiation protection was traditionally the duty of the public health, since the ionizing radiation was most widely used for diagnostic and therapy in the early ages. In the 1950s' the nuclear techniques appeared in the industry, agriculture, geological research, and last but not least in the military technology. In most states, so in Hungary as well the atomic energy committees were established, which, as high level governmental organizations, on the one hand facilitate the spreading of the new technique; on the other hand they coordinate and distribute the newly appeared duties. The secretary of the Hungarian Atomic Energy Commission (HAEC) coordinated these activities. The construction of the Paks Nuclear Power Plant brought several new tasks, which were distributed among the ministries by the HAEC. The creation of the legal background of the safe use of nuclear energy was a brand new task. Another relevant task was the nuclear safety oversight of the plant. That time the first Atomic Act regulated the issue, but it did not strive to meet the most advanced western requirements. The Nuclear Department was established inside the State Energy and Energy Safety Supervisory Body as the nuclear safety regulator. In 1990, at the change of regime, the Hungarian Atomic Energy Authority (HAEA) was established created from this Department and the secretary of the HAEC. Each ministry organized

their own apparatus for the administration and regulatory duties generated by the nuclear power plant. The Hungarian Atomic Energy Commission, which was chaired first time by the president of the Hungarian Technical Development Committee, then by the minister of economical issues, played coordinating role furthermore. In the course of our accession to the European Union the Commission comprehensively and deeply analyzed the safety of nuclear energy applications in Hungary and provides relevant support to improve the regulatory system. An important milestone was the second Atomic Act, which laid down the most modern principles, but did not terminate the widely puzzled historical regulatory system, and kept the HAEC with promotion and supervision authorities. In 2003 according to the demand of the EU the HAEC was ceased, the independence of the HAEA was sufficiently guaranteed by the amended Atomic Act, but the decentralized system remained. The disadvantages of the decentralized system are revealed especially by two horizontal issues. On the one hand the emergency response, the significance of which was clearly revealed by the catastrophe of the Chernobyl Nuclear Power Plant; on the other hand the nuclear terrorism, which appeared during smuggling of nuclear and radioactive materials, while the event of September 11, 2001 in New York demonstrated the relevance of nuclear terrorism as a new menace.

The decentralized regulatory system made several parallel activities, while some tasks got not enough emphasis. The international experience shows that the modernization and unification of the regulatory activities is a common trend in the countries which operate nuclear power plant.

The Government of the Republic of Hungary started the modernization process of the governmental system in 2006. Each organization is obliged to review its operation and performance and to make suggestions for the modernization.

Nowadays the Hungarian Atomic Energy Authority is the only governmental organization, which main duty is to supervise the peaceful and safe use of nuclear energy; the Atomic Act gives coordination tasks to the HAEA. At the same time many jurisdictional, supervision and acting authority remained at other ministries, where the tasks connecting to the use of nuclear energy (mainly to radiation protection) are in the shadow of other very important tasks.

The analysis covers the following sub-areas:

- review of the legal background, regulatory scope and task sharing concerning the peaceful use of nuclear energy;

- operation of the current complex regulatory system;
- current structure and operation of the nuclear and radiological emergency response system;
- evaluation of current situation, making recommendation for its potential improvement;
- evaluation of the establishment and possible ways of realization of the unified regulator, by analyzing organizational, legal, infrastructural and financial aspects.

The PhD study, by analyzing examples, demonstrated that the current, divided regulatory and radiation measuring systems lead to legal difficulties and hinder the efficient regulatory work.

The legal prescriptions concerning radiation protection principles are issued by the minister for public health affairs, he/she determines the public and occupational dose limits, and the public health institutes determine the dose constraints for certain facilities. The release limits to be derived from dose constraints in general and for institutes using radioactive sources (mainly for hospitals conducting isotope-diagnostic examinations and making therapy treatments) are determined by the minister of environmental protection; but in case of nuclear facilities the facility itself shall derive the limits individually, based on model calculations, then these “facility tailored” data are authorized by the HAEA, but the HAEA shall ask the special authority opinion of the environmental protection regulatory body prior to issuing the resolution. Consequently, several public administration organizations are involved into the determination of release limits, the time consuming harmonization process is conducted in more steps.

The law making is hindered by the situation that - excepting the HAEA - the law making duties are ordered to such ministries, where the radiation protection is, totally understandably, not a principal issue among the many duties of the ministry. Consequently, the law making is often time-consuming.

The highest allowed radioactivity concentrations in food-stuffs are prescribed by the minister responsible for agricultural issues. It may be disputed, if the minister who is responsible for public health determines the dose constraint from radiation, then why the minister responsible for agricultural issue determines the radioactivity concentrations of foods consumed by the population, since the food consumption means the ingestion part of the public radiation exposure.

The ÁNTSZ belonging under the ministry for health affairs is responsible for licensing the possession and operation of radioactive materials and equipment with ionizing radiation, but the HAEA supervises the nuclear and radioactive materials, grants license for export-import of nuclear materials and technologies; the registration of the materials current place and owner is also the duty of the HAEA.

The process of decision support and the decision making in the case of a nuclear or radiological emergency is even more complicated. The analysis, evaluation and the estimation of potential releases are unambiguously the duty of the HAEA.

The evaluation of the radiological situation in the environment is also the duty of the HAEA, but the General Directorate of Emergency Management belonging under the Ministry of Local Government and Regional Development also operates an evaluation and analysis center. The analysis is conducted in parallel at these organizations by partly identical, partly different software.

The nuclear safety requirements are prescribed and their meeting is supervised unambiguously by the HAEA. In accordance with the Atomic Act the duty of licensing and inspection in technical radiation protection issues in case of nuclear facilities, but the Act does not explain the definition of technical radiation protection. Consequently, no legal guarantee exists for preventing any conflicts between the public health organization and the HAEA concerning regulatory, licensing and inspection. The reason why such conflicts did not evolve in practice is the good human-professional relations between the experts of the regulatory bodies.

Because of the complex regulatory system, during the construction of a new facility or licensing of modifications the facility shall request license, in closely related issues, sometimes from the public health authority, sometimes from the environmental protection authority and sometimes from the HAEA. This results, of course, in slowing down of the licensing process.

It is difficult to follow the movement of radioactive sources, the professional-staff being acquainted with the radiation protection and legal norms of the field has to be maintained in two separated organization. Due to this shared competence the physical (not the book-keeping only) verification of the existence of the sources has not been completed till now, however its significance came into view in the recent years, since the politics recognized the importance of preparing for a terrorist threat aiming at utilizing radioactive materials.

One of the most disadvantages of the Hungarian divided system is the (human and cost demanding) overlapping caused by the parallel operation of the monitoring (environmental

measuring) systems. In 2004-2005 an expert group of the European Commission reviewed the operation of the radioactive release measuring and radiation protection environmental monitoring systems. The review stated that Hungary possesses the required monitoring system, instruments and professionals, but among its recommendations it revealed that “concerning the Article 35 and 36 of the Euratom Treaty the Hungarian Government shall treat the complexity of the ministerial authorities in the field of environmental monitoring”.

The regulatory environmental radiation protection monitoring of the Paks Nuclear Power Plant is performed by several laboratories of three ministries, which laboratories are established close to each other, so they provide no real additional data. Summarization of the measurements made around Paks is the task of the HAKSER (Regulatory Environmental Radiation Protection Monitoring System), in the frame of which the measurements results of the various regulatory bodies are published.

In the field of measurements made at other points of the country, the situation is even more complex. Environmental sampling and sample measurements are performed by the laboratories of three different ministries.

The environmental inspectorates and the supreme inspectorate of the Ministry for Environmental Protection and Water Affairs operates 13 measuring and evaluation points, where, among others, radiation protection measurements are also carried out. Besides these, the Hungarian Meteorological Service belonging to the ministry operates aerosol sampler on its two stations. Similar samples are measured by 8 ÁNTSZ (National Public Health and Medical Officer Service) laboratories belonging to the ministry for health affairs (the measurements of these laboratories are compiled by ERMAH, the radiological regulatory system of the ministry for health), and by 14 stations belonging to the ministry for agriculture.

Due to lack of sufficient coordination, overlapped areas are revealed from the report of the Hungarian Environmental Radiation Protection Monitoring System (OKSER) established for collecting the measurement data of regulators and operators; so more regulatory laboratories measure identical samples, and some important samples are out of the scope. Naturally, the instrumentation and measurement techniques of the laboratories are different; consequently the unified evaluation is also impossible.

The various systems lead to difficulty in understanding the various names and abbreviations even among the specialist of this field. The same measuring result of the

same monitoring station may appear in the database of the ERMAH, the HAKSER, the OKSER and the OSJER as well.

There are two separated radiation protection environmental evaluation and emergency decision support organization in the country for responding to nuclear or radiological emergencies occurred inside or outside the territory of Hungary. In the case of an emergency – especially in its early phase – the fast decision making and implementation of countermeasures are significant; it is unacceptable to submit two different decision support documents in front of the decision makers.

An important element of recognizing emergency entailing radiological consequences is the Hungarian Radiation Monitoring System (OSJER). The OSJER measures the gamma radiation in the whole country by about 100 AMAR measuring stations; the measured data are compiled in the OKF NBIÉK center. Currently the measuring stations are under the supervision of four ministries, consequently the installation is ad-hoc, they do not cover the whole territory of the country, “white spots” appear. Their unified operation, maintenance and renewal have not solved.

Nuclear emergency with the magnitude close to the Chernobyl catastrophe has not occurred in the last 20 years, and as the result of the many safety improvement measures implemented within the nuclear energy production industry it probably will not occur. On the other hand several “smaller” incidents entailing a few victims have occurred due to loss of industrial, medical radioactive sources, careless operation of radiation sources and equipment. These incidents draw the attention to the importance of the preparation for responding to smaller, so-called radiological incidents that occur in non-nuclear facilities. This preparation demands further endeavors in Hungary as well.

In order to respond a radiological emergency the institute belonging to the Ministry of Health possesses a duty service. This service shall thus identify in-situ the found sources. If the localization of the source demands to surround public places, then it is the duty of the GDCM. The found source shall be transported to an institute of the Hungarian Academy of Science, while the identification of the source is made on the ground of the registry handled by the HAEA.

Plan for establishing the unified authority

The fundamental task of HAEA, as it is declared by the Atomic Act, is to harmonize and perform the regulatory work related to the safe application of nuclear energy, especially to the security of nuclear material and facilities and to nuclear emergency preparedness. Accordingly, the HAEA developed its expertise basis that is able to oversee the whole range of nuclear applications; the conditions for establishing the unified radiation and nuclear safety authority to be created.

All the currently dispersed technical and legal expertise would be available within the new unified organization. Bringing the nuclear safety, safeguards, radiation protection, physical protection and legal experts into one institution would serve the possibility of creating a significantly more coherent regulatory system that would meet the modern requirements in a more adequate manner. A unified regulatory hierarchy (act, decrees, regulations, guides) could be established as well as it is already developed for the area of nuclear safety.

Unification of nuclear emergency decision support would also be realizable inside the currently existing emergency response center of HAEA. The OSJER system may practically and uniformly be managed within HAEA.

The HAEA yet developed a considerable infrastructure. It holds a management system qualified against MSZ EN ISO 9001:2001 standard.

HAEA is well-equipped with computers, the Lotus based electronic documentation system has been successfully operating for several years. The HAEA, besides its headquarters in Budapest, has also a local office at Paks that essentially performs the inspection tasks related to the power plant. If the unification is carried out it would be practical to install further radiation protection tasks (licensing, inspection) thereto as well as the regulatory environmental laboratory of the power plant. So as to reduce the travel costs additional local offices should be established in each region. These local offices would perform the local regulatory inspections, on-scene gathering of environmental samples, their measuring or delivering to the Budapest laboratory.

Operation and maintenance of the OSJER monitoring stations and the operation of measuring laboratories may be carried out in different ways; however the point is the uniform and professional control and development.

Currently the radiation protection law-making, inspection and operation of monitoring stations belong to such ministries where the major tasks are different. Radiation protection law-making, regulatory work and the development of measuring stations are justified to be pushed behind other development demands and tasks of the ministry. Relocation of regulatory and inspection activities to the Hungarian Atomic Energy Authority would entail that all issues that concerns the safe application of nuclear energy would be concentrated at an organization where this is the main duty. At the HAEA the practice of publishing regulatory guides as a regulation tool for nuclear safety has been already introduced. This system may also be implemented for radiation protection licensing. Following the EU's law-making processes as well as the adjustment of new EURATOM regulations would become simpler, since Hungary is usually represented by HAEA experts in the relevant EU committees. Based on the entitlement of the Atomic Act the HAEA is the contact point for communicating with the International Atomic Energy Agency, thus the insertion of radiation protection recommendations of the International Atomic Energy Agency into the Hungarian legal system would be realized directly. HAEA prepares the national reports to justify the fulfillment of the different conventions managed by the IAEA. The administrative procedures would speed up since the sometimes long lasting harmonization between the authorities belonging to different ministries would be terminated. A uniform approach in the assessment of license applications and inspections would prevail; uniform methods could be introduced, thereby the feeling of legal stability of the licenses would increase. The system of guides to be issued for enhancing radiation protection licensing would facilitate the work of license appliers (such as physicians who wants to operate x-ray equipment). The uniform structure of guides issued by the HAEA would facilitate the preparatory work of the facilities applying nuclear safety and radiation protection license. Advantages in measurement techniques would be first of all that a consequent regulatory measurement programme for the whole country would be possible to be realized. Overlaps and dead spots would be wound up. By unifying the measuring methods the result would be directly comparable. A uniform set of instruments could be developed. Through the establishment of the unified authority the regulatory environmental control system, operated only around the Paks NPP, would become superfluous, or a uniform regulatory measurement system covering the whole country could be built up. The activity of the OKSER could be reduced to summing up the results of the regulatory and facility systems. The measurement results of the National Radiation

Monitoring, Alerting and Controlling System networks and of the laboratory results would appear at one and the same authority under normal and emergency conditions.

The confusion of systems, names and abbreviations would be ceased; the regulatory environmental radiation protection results would appear at the same center. The results of measurements performed outside the regulatory system (in the facilities or research institutes) could be integrated into the uniform system based on contracts. All international contacts would be concentrated to one focal point.

The dispersion of weakened radiation protection research would be reduced, a uniform research and development programme serving the as basis for the regulatory work can be developed.

In the operation of the decision support and implementing organizations playing key roles in nuclear and/or radiation emergency management the parallel activities could be terminated. By centralizing the decision support tasks under HAEA management, and the implementing tasks under the responsibility of the Directorate General for National Disaster Management the clarification of responsibilities for fulfilling the emergency tasks and a faster, justified decision making is expectable. The complex knowledge basis (safeguards aspects, material balance, export/import monitoring, technological and physical knowledge) necessary for the full-scope regulatory oversight of nuclear and radioactive materials would be available inside one institution, thereby reducing the risk of illegal application. The HAEA maintains the registry of radioactive materials, and practices the regulatory tasks both over these materials and the nuclear facilities. The HAEA has the expertise for the organizational aspects of security. The nuclear safety authority has the task of ensuring the success of security and other aspects during the establishment, modification, etc. of nuclear facilities (such as due time emergency management and response based approach, possibility of quick escape).

By the clear definition and minimization of relation between the different authorities, by employing the necessary experts for technical aspects of security, one authority, the HAEA alone could coordinate the implementation of state tasks, such as the licensing, inspection and assessment of security systems realized at the licensees.

The feasibility of the recommendation, namely the organizational issues and the necessary law modifications were assessed. The proposed modification would result in the simplification of infrastructure and introduction of modern administration system, as well as it would bring economical advantages.

Nuclear terror threat in Hungary

Altogether 438 power and 248 research reactors operate in the world. The protection of these and the other facilities of nuclear fuel cycle, the spent fuel storage facilities, the larger medical, industrial and research related radiation sources against diversion and other terror attack have been carefully designed and organized whole over the world. In the 90s', due to the disintegration of the Soviet Union, to the Balkan wars and to the terror acts the protection was reinforced and every effort was done to increase the protection of nuclear facilities against penetration and to increase the safety of radioactive and nuclear materials. The terrorist attack on September 11, 2001 created a situation that was new in quality. The immediate actions of the Hungarian government and the competent authorities aimed at increasing the preparedness in accordance with the extraordinary situation have reassured the public. The type of the events and the increased public attention on nuclear risks justified a thorough analysis and assessment of the situation and the determination of long term actions. Due to the complexity of the issue the cooperative work of the nuclear, police and national security experts was necessary so as to perform the analysis.

The areas to be assessed, the methods to be used were identified and an analysis report was prepared in 2002. Then the assessment focusing on the changes was repeated biannually.

The terror threat, the legal and preventive aspects of national preparedness was overviewed. The risks and preventive protection at the potential targets of the terror attacks were analyzed in detail, as well as the preparedness of the emergency response bodies for coping with the consequences of a terror attack was assessed. The international practice, the activity of relevant international organizations was described and recommendations on the necessary measures were identified.

It was declared that our legal system, organizations and nuclear facilities are reliably prepared against the actually credible terror threat. The Atomic Act and its executive orders cover the areas to be regulated. Protection against illicit trafficking of nuclear and radioactive materials had been begun more than 10 years before and has been operating effectively since then. Hungarian Custom Office appropriately analyses the risks, controls the borders, preparedness of its equipment and personnel is in commensurate with the European level. Our nuclear emergency response system was not developed for this purpose, however its tools, availability, and international relations make it able to cope with the consequences of a terror attack. The Paks NPP evaluated its own threat by analyzing the potential terror acts, and beyond that took account of other possible threats

(malevolent actions with radiation sources and nuclear fuel), the weak points and possibilities for economical damaging. The stable, regulatory approved, many-sided preparedness of the NPP in nuclear safety, security and emergency preparedness relation is set up against the mentioned threats. The Budapest Research Reactor, originating from its small power, as well as from the manageability and consequences of the maximal hypothetical reactor accident may not be regarded as significant target; its threat may be judged as average. The security of the reactor is reliably solved in organizational as well as in technical respect. The BUTE Training Reactor should not be regarded as real target due to its power, only damaging may be discussed, however its actual motivation has low probability. The Spent Fuel Temporary Storage Facility is beside the site of Paks NPP, its terror threat (terrorist value) is lower than of the power plant. Its protection concerning security, accident prevention and response (on the reason of harmonization and integration with the power plant) is reliably solved. The Püspökszilág low and middle level radioactive waste management facility should not be regarded as significant risk, however its security is at high level. It can be declared in respect of nuclear and radioactive materials that in Hungary, the legally owned and used radioactive materials are under continuous control, inspection and, in wider sense, severe security.

Important result of the first assessment was that prompt governmental action was not necessary, but recommendations on urgent, middle and continuous actions were formulated. The urgent actions were implemented.

The below tasks continuously should be kept on the agenda and should be built into the daily tasks of the competent persons:

Centralization of the control and monitoring systems of the border checkpoints; ongoing, refreshing training and exercising of the experts.

Continuation of the non-proliferation treaty related activities in the frame of safeguards system serving the control of nuclear material.

Further modernization of registry of radioactive materials, enhancement of inspection, police authority review of physical protection of facilities with large radiation sources.

Taking account of consequences of terror attacks during the review of National Emergency Plan, organization of a common terror attack and nuclear emergency response exercise.

Continuous development of guarding in the nuclear facilities.

Development of transport security regarding Püspökszilág facility.

Middle term tasks:

Identification and implementation of actions necessary based on the military terror threat assessment of the power plant, ratification of the security convention, and the consequent modification of the laws, impetus of R&D, survey, categorization and legal protection of sensible technical data.

New scientific results

1. In depth analysis of the status of nuclear and radiation safety related domestic regulatory tasks connected to peaceful application of nuclear energy, within that:
 - overview of legal background, regulatory competence and task distribution of peaceful application of nuclear energy,
 - assessment of current, complicated operation of authority system,
 - survey of status of regulatory radiation measurement systems and networks, recommendation on unification,
 - analysis of structure and operation of national nuclear and radiological emergency response system,
 - evaluation of current situation and demonstration of weak points to be modernized, revelation of parallelism, overlapping and severe difficulties of coordination.
2. Elaboration of concept of unified authority and feasibility study of its establishment including organizational, legal, infrastructural and financial aspects.

*As the result of the analysis, research and revelation efforts the following new conclusion was drawn: **the Hungarian nuclear regulatory system may take up the challenges of the 21st century only under unified organization and management; the particular organizational reform adequate for that purpose was elaborated; it was evaluated that how the requirements for a simpler, more transparent, effective and economical domestic law-making, licensing, inspection and emergency preparedness can be met by merging the tasks.***

The plan elaborated for the unification of the nuclear regulatory competences may contribute to the carry through of the below directives of the “New Hungary” governmental program:

- *to reduction the number of decentralized authorities;*

- *to development of a smaller and more effective system of state offices;*
- *to modernization of public administration;*
- *to establish a predictable, transparent and safe legal environment;*
- *to further development of disaster management;*
- *to increase the efficiency of the fight against terrorism.*

3. After the September 11, 2001 terrorist attack the comprehensive review of nuclear terror threat of Hungary was initiated.

- Scope of assessment was determined, methodology of analysis was elaborated, and work of expert team performing the analysis was organized.
- Complex analysis of preparedness of the domestic nuclear facilities and the related areas was performed by taking account of the most recent international recommendations. Based on the analysis it was clearly demonstrated that efficient defense against terrorism, including the emphasized protection of nuclear facilities both from professional and organizational aspects, may exclusively realized through comprehensively and uniformly as a whole, in which not a single component may be neglected, since this would be the weak point.
- Systematic assessment of military terror threat of the NPP and the spent fuel storage facility was initiated; the evaluation is currently in progress.
- **The most important practical statement of the analysis was that the level of Hungarian nuclear defense preparedness from national security, police, defense and technical aspects was appropriate.**
- The urgent and middle term development and law-making tasks were identified; their implementation is monitored by the biannual repetition of the analysis.

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Curriculum vitae

In 1970 I obtained my master of science degree as physicist on the Faculty of Natural Science of the Roland Eötvös University.

Between 1970 and 1979 I was performing research and development activity in the field of laser-physics and holographic applications in the HAS KFKI and the Hungarian Optical Works.

In 1973 I obtained my doctor univ degree with „summa cum laude” qualification on the Faculty of Natural Science of the Roland Eötvös University.

From 1979 to 1999 I was working at the Paks Nuclear Power Plant; between 1979 and 1989 as the leader of the radiation protection service, between 1989 and 1992 as nuclear chief engineer, between 1993 and 1999 as the head of the emergency preparedness organization.

In 1999 the Prime Minister nominated me to be the director general of the Hungarian Atomic Energy Authority.

As the director general of the HAEA I direct professional activities of public administration as follows:

- nuclear safety regulatory activity
- preparation and implementation of international treaties
- law preparation
- regulatory control
- representation of the Republic of Hungary in international organizations
- tasks derived from the accession to the European Union
- parliamentary and governmental relations
- research and development of safety of nuclear applications.

I am the chairperson of the Atomic Energy Coordination Council, which coordinates the regulatory tasks regarding the safe application of nuclear energy.

As the professional deputy of the chairperson of the Governmental Coordination Committee I provide professional leadership for the nuclear emergency response system.

I lead the Professional Committee supervising the Central Nuclear Financial Fund.

From 1998 to 2004 I was the president of the Radiation Protection Section of the Roland Eötvös Physical Society.

I am a member of the International Nuclear Safety Advisory Group.

I represent Hungary at the International Atomic Energy Agency, at its Board of Governors, and at the OECD Nuclear Energy Agency.