RADIOACTIVE WASTE MANAGEMENT AND DECOMMISSIONING IN HUNGARY

(REVISED TEMPLATE)

1. NATIONAL FRAMEWORK FOR MANAGEMENT AND REGULATION OF RADIOACTIVE WASTE AND DECOMMISSIONING

1.1 National framework

1.1.1 Overview of national policy

The Act CXVI of 1996 on Atomic Energy (as amended) (hereinafter Act on Atomic Energy) regulates among others the basic aspects of radioactive waste management and authorises the Government and the competent Ministers to issue executive orders specifying the most important requirements in this field.

The Act requires that a licence for the application of atomic energy shall be granted only if the safe interim storage or final disposal of the radioactive waste and spent fuel generated by the licensed activity can be assured in accordance with the most recent proven results of science, internationally accepted norms, as well as experience.

The main producer of radioactive waste and spent fuel is the Paks NPP with four VVER 440/2013 type units. In the framework of an agreement between the Government of Hungary and the Government of the Russian Federation - promulgated in the Act II of 2014 - two VVER-1200 type nuclear power plant units are planned to be commissioned in 2025 and 2026 at the Paks site. The present country report of Hungary does not cover the spent fuel and radioactive waste management issues of the new units.

Hungary complies with Council Directive 2011/70/EURATOM (establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste), and transposed its requirements in the national law. The National Policy on the management of spent fuel and radioactive waste was adopted by the Parliament in its resolution 21/2015. (V. 5.) in April 2015. The National Programme based on the National Policy was also elaborated and it was approved in Government Decree 1459/2016. (VIII. 24.).

The Hungarian policy for the closure of the nuclear fuel cycle follows the principle “do and see”. This means that the management of our HLW shall be solved in Hungary in a deep geological repository, irrespective from the way how the fuel cycle is closed. The technical and economical preparation for the establishment of a HLW repository is based on a reference scenario, supposing the direct disposal of spent fuel. In this procedure the national and international developments shall be taken into account allowing a review of the National Policy and National Programme. As the Spent Fuel Interim Storage Facility provides for 50 year storage of the spent fuel from the Paks Nuclear Power Plant, it is not urgent yet to make a decision on the closure of the nuclear fuel cycle. However, the deadline for commissioning

of a HLW repository should be in accordance with the schedule of the decommissioning of the Paks Nuclear Power Plant and in this respect the National Policy prefers a deferred decommissioning after 20 years of safe enclosure.

The National Policy foresees the disposal of LLW and ILW in repositories on Hungarian territory. This requirement is fulfilled by the operation of the Radioactive Waste Treatment and Disposal Facility for institutional waste and by the National Radioactive Waste Repository for the waste generated in the nuclear power plant.

1.1.2 Overview of relevant institutions

As required by the Act on Atomic Energy, the Central Nuclear Financial Fund (CNFF) was set up on 1 January 1998 in order to finance radioactive waste disposal, interim storage of spent fuel, the closure of the nuclear fuel cycle as well as decommissioning of nuclear facilities. In line with the Act, the Government authorised the Director General of the Hungarian Atomic Energy Authority (HAEA) to establish the Public Limited Company for Radioactive Waste Management (PURAM), now in operation since 2 June 1998. The Minister supervising the HAEA (hereinafter referred to as the Minister) controls the Fund, while the ministry led by the Minister (currently the Ministry for National Development) is responsible for its management.

PURAM is responsible for the proposals to update the National Policy and National Programme as well as for up-dating the medium- and long term plans of the activities financed from the Central Nuclear Financial Fund. PURAM is responsible also for the execution of the tasks defined in the National Policy and in the National Programme.

1.2 National, technical regulatory organisation(s)

Key organisations with regulatory functions are the following:

HAEA is the competent regulatory body for licensing and supervising nuclear facilities and radioactive waste disposal facilities. It also fulfils regulatory tasks in safeguards and security issues, as well as in transportation, packaging, export - import and recording of radioactive materials. The regulations are promulgated by the Government.

From January 1, 2016 the HAEA took over the regulatory tasks for radiation protection. The minister responsible for health fulfils the regulatory tasks in the field of radiation health through the ministry directed by him, and through certain designated government offices.

The HAEA also has regulatory competences in construction of civil structures and buildings of nuclear facilities and radioactive waste repositories.

The HAEA is supervised by a minister (now the Minister of National Development) designated by the Prime Minister. The resolutions of HAEA can only be appealed and amended in court.

The Act on Atomic Energy authorises the relevant Ministers to regulate and enforce – through the competent organisations – various aspects of the application of atomic energy that fall into their scope, e.g.:

the minister responsible for environment protection:	release of radioactive material and radiological supervision of the air and water environment
the minister responsible for soil and food chain safety:	soil protection, radiation control of plants, animals and food,
the minister responsible for law enforcement:	public order and physical protection,
the minister responsible for emergency preparedness:	fire protection, civil defence and nuclear emergency preparedness,
the minister responsible for national defence:	all aspects of the application of atomic energy in national defence

In accordance with the Act on Atomic Energy, the work of the HAEA is supported by a Scientific Council having members of nationwide reputation. The Council's main function is to deal with major issues in principles as well as to consider those research areas and developments that are related to safety and prevention of accidents.

1.3 National implementing organisations

As highlighted above, PURAM performs the tasks related to the final disposal of radioactive waste, as well as the interim storage of spent fuel, the closure of the nuclear fuel cycle and to the decommissioning of nuclear facilities. It is responsible for the following activities:

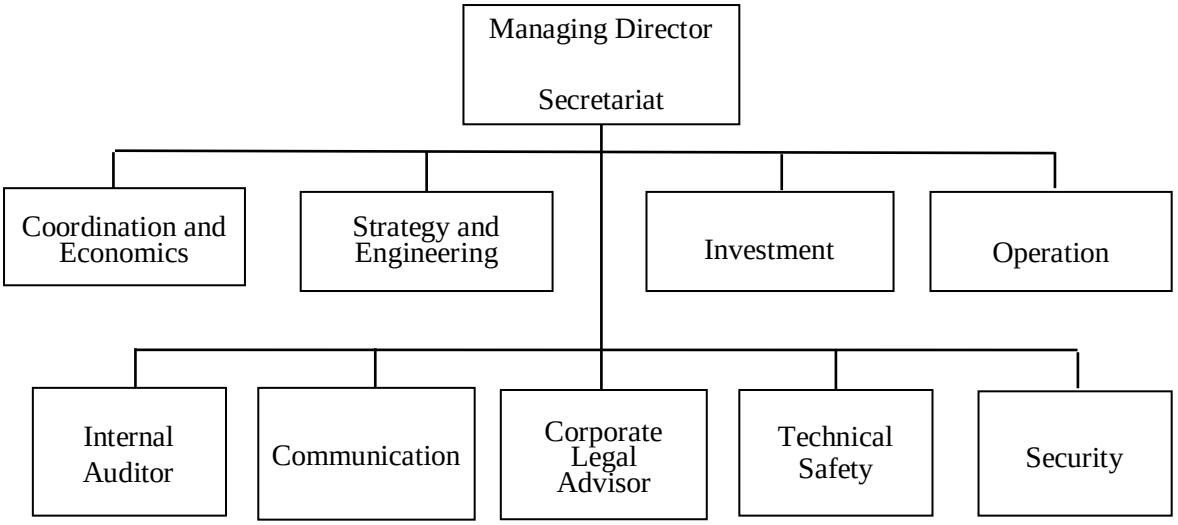
- elaboration of proposals for the preparation and amendment of the National Policy and National Programme of spent fuel and radioactive waste management;
- elaboration of the medium- and long-term plans (strategies);
- cost estimates to identify the necessary payments into the CNFF each year;
- preparation of technical and financial reports for the activities financed from the CNFF;
- construction (extension) and operation of the National Radioactive Waste Disposal Facility (for LLW/ILW from Paks NPP);
- preparation for the establishment of a HLW disposal facility;
- construction (extension) and operation of the Spent Fuel Interim Storage Facility;
- preparatory work required for decommissioning of nuclear facilities;
- operation of the Radioactive Waste Treatment and Disposal Facility (for LLW/ILW from small scale waste producers);
- public relations and information.

The Minister supervising the CNFF approves the proposals of PURAM on the medium- and long-term plans, annual working programs and annual reports on the accomplished tasks. In order to support the ministerial decisions the CNFF Committee was established that consists of the representatives of relevant ministries and organizations.

In 2013, the ownership of PURAM was transferred from the HAEA to the Hungarian National Asset Management Inc., however, the regulatory tasks remained among the competences of the HAEA.

The financial resources for the operation of PURAM are provided from the Central Nuclear Financial Fund established in accordance with the Act on Atomic Energy. The status and operational conditions of PURAM are defined by the Civil Code, the public law and the relevant Act on public benefit organisations.

Organizational scheme
of the Public Limited Company for Radioactive Waste Management:



2. LEGAL FRAMEWORK

As prescribed by the Act on Atomic Energy, the Parliament's prior approval (decision-in-principle) is required – among others – to initiate the establishment of a radioactive waste disposal facility.

The most important laws, governmental decrees and ministerial decrees are the following:

- Act CXVI of 1996 on Atomic Energy;
- Govt. decree 112/2011. (VII. 4.) on the scope of tasks of the Hungarian Atomic Energy Authority in association with nuclear energy related European Union and international obligations, the designation of co-authorities contributing to the regulatory procedures of the Hungarian Atomic Energy Authority, the amount of imposed penalties, and on the scientific council assisting the work of the Hungarian Atomic Energy Authority;

- Govt. decree 118/2011. (VII. 11.). on the nuclear safety requirements of nuclear facilities and on related regulatory activities (Annex No. 1-10: Nuclear Safety Codes);

- Govt. decree 190/2011. (IX. 19.) on physical protection requirements for various applications of atomic energy and the corresponding system of licensing, reporting and inspection;

- Govt. decree 215/2013. (VI. 21.) on the designation, activity and funding of the organization performing certain tasks in relation with radioactive wastes and spent fuel;

- Govt. decree 155/2014. (VI. 30.) on the safety requirements for facilities ensuring interim storage or final disposal of radioactive wastes and the corresponding authority activities (Annex No. 1-2: Safety Codes);

- Govt. decree 71/2015. (III. 30.) on the designation of the organisations performing regulatory and administrative tasks in environment protection and nature conservation;

- Govt. decree 487/2015. (XII. 30.) on the protection against ionizing radiation and the corresponding licensing, reporting (notification) and inspection system;

- Govt. decree 489/2015. (XII. 30.) on monitoring radiation conditions relevant for public exposure of natural and artificial origin and on the scope of quantities obligatory to be measured;

- Govt. decree 385/2016. (XII. 2.) on performing the public health obligations of the municipal and county government office and the district (municipal district) government office, and on the designation of the government organisation in health care;

- Ministerial decree 15/2001. (VI. 6.) of the Minister of Environment on radioactive releases to the air and water during the use of atomic energy and on their control;

- Ministerial decree 47/2003. (VIII. 8.) of the Minister of Health, Social and Family Affairs on certain issues of interim storage and final disposal of radioactive wastes, and on certain radiohygiene issues of naturally occurring radioactive materials concentrating during industrial activity;

- Ministerial decree 47/2012. (X. 4.) of the Minister of the Interior on police tasks corresponding to the use of atomic energy;

- Ministerial decree 51/2013. (IX. 6.) of the Minister of National Development on shipping, carrying and packaging of radioactive materials;

- Ministerial decree 5/2015. (II.27.) of the Minister of the Interior on specific fire safety requirements associated with the application of atomic energy and on the method of their enforcement in the practice of authorities.

General regulations – beyond those contained in the Act on Atomic Energy and its executive orders – are laid down e. g. in the Act LIII of 1995 on the General Rules of the Protection of the Environment, including the regulation of public hearings.

Nuclear safety requirements related to nuclear facilities (including their decommissioning) are laid down in the Nuclear Safety Codes. Safety requirements related to radioactive waste repositories are prescribed in Safety Codes. The Nuclear Safety Code Volume 8 deals with the decommissioning of nuclear facilities. The recommended methods on how to meet the requirements of the codes are given in legally not binding guides issued by the Director General of the HAEA.

For a detailed list of legal regulations governing the peaceful use of atomic energy see the website of the Hungarian Atomic Energy Authority (www.oah.hu).

3. WASTE MANAGEMENT STRATEGY AND CURRENT PRACTICE

3.1 Waste classification and quantities

Most of the radioactive waste in Hungary is generated by operation of the Paks NPP, and much smaller quantities are generated by other (rather institutional, non-NPP) users of radioactive isotopes.

The following classification scheme is based on Appendix 2 in the Ministerial Decree 47/2003 (VIII. 8.) of the Minister of Health, Social and Family Affairs on certain issues of interim storage and final disposal of radioactive wastes, and on certain radiohygiene issues of naturally occurring radioactive materials concentrating during industrial activity.

General classification of radioactive waste

1. Radioactive waste is classified as being low and intermediate level where the waste's heat production during disposal and storage is negligible.
   a) Low- and intermediate-level radioactive waste (LLW/ILW) is short-lived where the half-life of the radionuclides is 30 years or less. Short-lived ILW contains long-lived alpha emitter radionuclides only in limited concentration (this concentration is 4000 Bq/g in the case of collecting packaging, and 400 Bq/g on average for the whole quantity of waste).
   b) Low- and intermediate-level radioactive waste is long-lived where the half-life of the radionuclides and/or the concentration of the alpha emitter radionuclides exceeds the limits for short-lived radioactive waste.
2. High-level radioactive waste is waste where the heat production is so significant (above 2 kW/m^3) that it has to be considered during the design and operation of storage and disposal options.
3. Within the above classifications the authority can prescribe more detailed classifications for low, intermediate and high level radioactive wastes.

Classification for low- and intermediate-level radioactive waste

1. The classification of the radioactive waste into low- and intermediate-level classes shall be performed based on the activity-concentration (AC) and exemption activity-concentration (EAC) of the radioisotope contained in it. For low-level wastes the activity concentration is between 1 EAC and 10^3 EAC.
2. If the radioactive waste contains more radioisotopes, then the classification shall take into account all radioisotopes. In that case for low level wastes the sum of the AC/EAC values for all the radioisotopes shall be under 10^3.

Quantities of radioactive waste and spent fuel

I. Yearly arising quantities

a) LILW from the NPP (4 units)	
– solid waste (compacted)	180 m^3
– liquid waste (unprocessed)	280 m^3
b) Solid HLW from the NPP (4 units)	5 m^3
c) Spent fuel from the NPP (4 units) (average, 15 month fuel cycle)	326 assemblies
d) other applications (non-NPP producers)	
– solid waste	10 m^3
– spent sealed sources (partly smoke detectors)	1000-1500 pieces

II. Total amount (assuming 50-year NPP operation life-time)

a) LILW from the NPP (solid and solidified operational waste)	15 900 m^3
b) LILW from the NPP decommissioning*	26 700 m^3
c) HLW from the NPP operation	210 m^3
d) HLW from the NPP decommissioning	70 m^3
e) Spent fuel from the NPP (without the earlier reshipped assemblies)	17 717 assemblies

* This amount includes also VLLW (very low level waste), a category of waste to be introduced in the near future.

3.2 Waste management strategy

Low and intermediate level waste

The national policy foresees the disposal of LLW and ILW waste in repositories on Hungarian territory. This requirement is fulfilled by the operation of the Radioactive Waste Treatment and Disposal Facility for institutional waste and by the National Radioactive Waste Repository for the waste generated in the nuclear power plant.

Low and intermediate level waste from non-NPP producers

In 1976, a radioactive waste treatment and disposal facility at Püspökszilágy was commissioned to condition, store and dispose of institutional LILW waste. The Radioactive Waste Treatment and Disposal Facility is a near-surface type repository with concrete disposal trenches and storage wells. In parallel with the safety enhancement programme a capacity freeing has been in a good progress in the past few years. According to plans, the repository will be able to receive LILW short-lived institutional waste for decades.

Low and intermediate level waste from Paks NPP

The general concept, laid down in the late 1960s for the management of radioactive waste of VVER type NPPs, was to store on-site and postpone the decision on conditioning and disposal until the decommissioning stage. This concept was revised by the competent Hungarian organs in the 1980s and a site selection procedure started in 1983 with the aim to construct a LILW repository for the Paks NPP's needs. This procedure had to be interrupted in 1990 mainly due to the lack of public acceptance. In 1993 a new project was launched and it resulted in the construction of a repository in Bátaapáti. In 2012 the LILW geological repository, the National Radioactive Waste Repository, started its operation (See 3.3).

Spent fuel

The Paks NPP units, just as other East European VVERs, were supplied with fresh fuel by the Soviet Union. As part of the relevant agreement, the Soviet Union undertook to take back all spent fuel.

In 1992, however, Russia passed a legislation which prohibited the import of foreign spent fuel without sending back the high level waste and other products from the reprocessing which had been the practice between Hungary and Russia till that time. Since 1992 the reshipment required therefore lengthy, case by case negotiations. At the same time Ukraine became a transit state and a trilateral governmental agreement was concluded between Russia, Ukraine and Hungary to provide an appropriate legal framework for the shipments. With decreasing storage capacity in its spent fuel ponds and without ensured future acceptance of spent fuel by Russia, Paks NPP had to conclude a contract with GEC Alsthom Engineering Systems in 1992 for the construction of a modular vault dry storage (MVDS) system. In September 1997 the first fuel assemblies were received by the facility which – by 2017 – has got 20 vaults (16 for 450 assemblies and 4 vaults for 527 assemblies) ready and further 4 vaults in construction.

The Hungarian policy for the closure of the nuclear fuel cycle follows the principle "do and see". This means that the management of our HLW shall be solved in Hungary in a deep geological repository, irrespective from the way how the fuel cycle is closed. As yet, there is no decision on the back-end of the fuel cycle, but – in order to be able to estimate the future costs of radioactive waste and spent fuel management, as well as to assure the necessary funding – some assumptions have been necessary to be made. For this funding purpose, the direct disposal of spent fuel assemblies was accepted as the reference scenario in Hungary.

High level waste

Due to the interim storage of the spent fuel from Paks NPP there is no immediate need to establish a deep geological repository before the middle of the century. Also, the relatively small amount of HLW can be stored on-site of the NPP. However, as the site selection process for such a deep geological repository requires a very long period of time, preliminary

exploratory works were done in a promising clay-stone formation (in Mecsek Hills, Hungary). Based on existing geological data, a country-wide screening took place later and confirmed that the clay-stone formation is a potential site for future more detailed investigations.

3.3 Waste management issues at national level

Low and intermediate level waste

Radioactive Waste Treatment and Disposal Facility

In the past years, a considerable work has been concentrated on demonstrating the safe operation of the facility and on determining the measures necessary for its future closure. In the on-going safety enhancement programme certain reconstruction and upgrading activities have been done and safety assessments were carried out. This programme has been realised in a stepwise fashion. First a so called demonstration program was accomplished to test the recovery technology and collect the necessary information and experience. Long-lived waste and sources were removed from four vaults to be stored in the technology building, pending re-disposal in a HLW repository, the recovered short-lived waste was – as possible – compacted thus free capacity was gained in the vaults.

Based on the results of the already accomplished demonstration programme, safety assessments will be prepared and the safety enhancement programme will be revised and (if necessary) modified. The next phase will continue with opening the vaults in rows I.-II. of the repository.

National Radioactive Waste Repository

The site selection project (already mentioned in 3.2.) identified a potentially suitable site at Bátaapáti, in a granitic host rock for a repository in mined cavities, 200-250 m below surface. In 2001 a long-term research project and a research plan was elaborated and approved. There was a final report prepared on the performed geological investigations at the end of 2003, the main statements of which were that from geological point of view it is suitable for final disposal of low and interim level radioactive wastes.

In 2004 a research program for 2004-2007 was launched to select the exact location of the facility in the host rock and to collect the data necessary for the licensing and construction of the facility. From the beginning the research work was supported by the population of Bátaapáti and its vicinity. 75 percent of the inhabitants of Bátaapáti took part in a local referendum held on July 10, 2005, and accepted the construction of the repository with a majority more than 90 percent. This decision was supported by the local governments of the surrounding settlements, too. The approval in principle of the Parliament of November 21, 2005 (as required by the Act on Atomic Energy) certified that construction of the facility for final disposal of radioactive waste serves the interest of the society in large.

Based on the environmental impact assessment and on the pre-construction safety assessment the appropriate licences were issued, the construction work moved along well and in October 2008 the transport of waste started from Paks NPP to the technology building of the repository. In December 2012 the operation of the first underground disposal chamber

started. In 2017 the second disposal chamber was in the phase of commissioning and further two chambers were excavated.

High level waste

The exploratory works to select a site for a HLW repository (already mentioned in 3.2.) started in a clay-stone formation (the Boda Claystone Formation) which was accessible from Hungary's former (then operating) uranium mine in a depth of 1100 m. The uranium mine had to be closed because it got depleted, so the Government took the decision that the clay-stone should be explored as far as possible before the closure of the mine. A research programme was carried out which confirmed the preliminary suitability of the formation in 1998. In line with the policy of HLW management, the investigations of the Boda Claystone Formation aimed at its exploration and the selection of a suitable site have continued since 2004. During 2012-2013 a geological survey plan was prepared for the next stage of the investigation of the Boda Claystone Formation, which was approved by the competent authority. The primary objective of the re-started research has been to select the location of an underground research laboratory by 2030.

3.4 Research and Development

3.4.1 Research infrastructure

As regulated in the Act on Atomic Energy, technical support serving the regulatory control of the safe use of atomic energy shall be funded from the central budget. In order to support its activities, the nuclear safety regulatory authority, the HAEA has concluded agreements with several scientific institutions. Some R&D activities are financed by the MVM Paks NPP Ltd. and from the CNFF.

The following organisations play important role in these activities:

Hungarian Academy of Sciences Centre of Energy Research (MTA EK),
Institute of Nuclear Research of the Hungarian Academy of Sciences (ATOMKI),
Institute of Nuclear Techniques at the Budapest University of Technology and Economics (BME NTI),
Department of Physical Chemistry at the University of Pannonia,
Nuclear Safety Research Institute Ltd. (NUBIKI),
National Research Directorate for Radiobiology and Radiohygiene of the National Public Health Center (OSSKI)

3.4.2 Contents of R&D plans

Low and intermediate level waste treatment

A liquid waste treatment technology was developed in Paks NPP. The application of this technology is now (2017) in preparation. The aim is to remove cobalt, boron and cesium from evaporator concentrates.

Low and intermediate level waste disposal

Most R&D activities performed so far in Hungary on LILW disposal have served the identification of a suitable site for either a near surface or a mined cavity type repository, including site investigations, laboratory analysis of borehole samples, determination of rock characteristics (sorption, water permeability, isotope migration rates, etc.) and performance

assessment. Other important fields of R&D have included waste characterisation, waste acceptance criteria and facility design.

High level waste disposal

Based on preliminary assessments (see 3.3.) the Boda Clay-stone Formation in the Mecsek Hill area is considered suitable for high level waste disposal. To evaluate the suitability of this formation as a location for a waste repository, systematic investigations are carried out to explore the clay-stone.

3.5 Financing of Radioactive Waste Management

3.5.1 Framework and responsibilities

The Act on Atomic Energy requires that the licensee, or in the case of budgetary organisations, the central budget shall be liable to cover the costs of the final disposal of radioactive waste, as well as the interim storage of spent fuel, the closure of the fuel cycle and of the decommissioning of nuclear facilities. The Act established the Central Nuclear Financial Fund to realise this goal. The relevant rules of the Act are the following:

1. The Central Nuclear Financial Fund (hereinafter CNFF or Fund) is a separate state fund exclusively earmarked for financing the construction and operation of repositories for the final disposal of radioactive waste, as well as for the interim storage of spent fuel, the closure of the nuclear fuel cycle and the decommissioning of nuclear facilities.
The member of the Government supervising the HAEA (hereinafter the Minister) shall dispose over the Fund. The manager of the Fund is the ministry led by the Minister (now the Ministry for National Development).
2. The licensees are obliged to fully cover the costs of the final disposal of radioactive waste, as well as the interim storage of spent fuel, the closure of the nuclear fuel cycle and the decommissioning of nuclear facilities by contributing to the Fund.
3. The amount of payments is determined by the law in the annual budget on the basis of the cost estimate prepared by PURAM. It is taking into consideration all the liabilities and it is preliminary assessed by the HAEA. The Minister disposing over the CNFF approves the proposal of PURAM based on the recommendation of the CNFF Committee
4. The provisions on the separate state financial funds of the Act on Public Finance shall be applied to the financial management of the Fund, with the deviations included in the Act on Atomic Energy.
5. In order to ensure that the Fund maintains its value, it shall receive subsidies from the central budget in a sum calculated on the average assets of the Fund in the previous year using the average of the central bank base rate in the previous year. This sum shall be made available to the Fund by January 31 each year.
6. The assets of the Fund shall be recorded separately in a state treasury account.

Medium- and a long-term plans (lasting up to the decommissioning of the various nuclear facilities), as well as annual work programmes on the use of the Fund are being prepared by PURAM. The medium- and long-term plans are to be annually reviewed as required. The medium- and long-term plans and the annual work programmes are to be approved by the Minister supervising the Hungarian Atomic Energy Authority, disposing over the Fund.

The payments into the Fund are defined in accordance with these plans. The rate of payments into the Fund shall be specified in such a way as to provide appropriate sources for all costs of radioactive waste and spent fuel management and the decommissioning of nuclear facilities. These sources also provide coverage for public control and information activities as well as for the operational expenses of the existing facilities.

The proposal for the annual payments into the Fund by the MVM Paks Nuclear Power Plant Ltd. is submitted by the Minister supervising the Hungarian Atomic Energy Authority, in the course of the preparation of the Act on the Central Budget.

The institutes intending to dispose of radioactive waste in the Radioactive Waste Treatment and Disposal Facility are also liable to contribute to the Fund in accordance with the Annex of the Act on Atomic Energy. For nuclear installations financed from the central budget (research reactor and training reactor), the sources required to cover the payments into the Fund are provided by the central budget, when they arise.

3.5.2 Status of financing schemes

The above described financing schemes are in force in Hungary. The Act on the central budget of Hungary contains the annual budget of the Central Nuclear Financial Fund with the obligatory payments of MVM Paks NPP Ltd. into the Fund. In December 2016 the assets of the Fund amounted to 269.0 billion HUF (1 Euro ~ 311 HUF).

4. DECOMMISSIONING STRATEGY AND CURRENT PRACTICE

4.1 Decommissioning strategy

Decommissioning is not an urgent issue for the Hungarian nuclear facilities. Though the design lifetime of the nuclear power units at Paks NPP is 30 years, a 20 years lifetime extension project is now nearly accomplished. Nevertheless, the safety regulations require a preliminary decommissioning plan already during the operation of the facility, and for the purposes of funding, a cost estimate must be also prepared. The preferred option is to defer dismantling and site clearance for 20 years and to maintain the plant in a state of “safe enclosure” in the interim. This option is the basis of the decommissioning cost calculations.

4.2 Status of decommissioning projects

In Hungary there are no ongoing decommissioning projects.

4.3 Decommissioning issues at national level

As mentioned in 4.1, decommissioning is not a current issue for the Hungarian nuclear facilities. Nevertheless this question has been covered in regulations, as the final phase of the life-cycle of the installations. As for all other phases, it requires a nuclear safety licence. For decommissioning, a multi-step licensing procedure is established, where the first step is to obtain the authorities’ consent to terminate operation. A further requirement is a valid environmental protection licence based on an environmental impact assessment and a public hearing. During the dismantling, decontamination and other steps, an ongoing task of the authority will be the control of the radiation situation within the facility and around it, and the

monitoring of personal doses as well as the discharges and the radiation in the environment. Emergency plans have to be updated with new or likely scenarios and any necessary organisational changes required must be adjusted accordingly.

The decommissioning plan shall be regularly reviewed in accordance with the regulations in force; and the results of the review should be submitted to the Hungarian Atomic Energy Authority.

4.4 Research and development

Currently the R&D activity in this field is very limited, it focuses only on the establishment of a decommissioning database for the nuclear power plant.

4.5 **Financing** (see 3.5)

ACRONYMS

HAEA	Hungarian Atomic Energy Authority
PURAM	Public Limited Company for Radioactive Waste Management
CNFF	Central Nuclear Financial Fund