Information and data for Status & Trends Project on Spent Fuel and Radioactive Waste

a. National Framework for management of radioactive waste and spent fuel (policies, strategies, roles and responsibilities of different stakeholders (e.g institutions overview, implementing organizations))

Policy related to spent fuel

As a preparation for the disposal of the high level waste an underground research laboratory should be built in Boda Claystone Formation, which can be found in the Mecsek hills. Should the results of the investigations be successful, the planned repository may well be able to serve for accommodating either directly the spent nuclear fuel or the residues resulting from the reprocessing of the irradiated fuel.

Spent fuel from Paks NPP

As yet, there is no decision on the back-end of the fuel cycle, but - in order to calculate the future costs of radioactive waste and spent fuel management, as well as to assure the necessary funding - some assumptions need to be made. As a reference scenario the postulation of direct disposal of the spent fuel assemblies in Hungary was accepted.

In the course of the elaboration of the strategy for the closure of the fuel cycle it is worthwhile to examine various possibilities, including the shipment of spent fuel abroad. In principle, this latter is a possible option due to the protocol on conditions concerning the reshipment to the Russian Federation of Russian-made spent fuel assemblies signed on 29 April 2004 by the Government of the Republic of Hungary and the Government of the Russian Federation. That future decision should be based on technical, economic, political, social considerations and also on achievable guarantees at intergovernmental level.

The document supporting the new programme regarding the treatment and management of radioactive waste and spent fuel was finalized by the beginning of 2010, and it provides a comparison between several options regarding the closure of the fuel cycle, based on qualitative and quantitative aspects. Based on analyses a decision was made that Hungary considers the direct disposal of the spent fuel as a reference scenario. This scenario is the basis for the budget plan justifying the financial contribution of the Paks NPP Ltd to the Central Nuclear Financial Fund. In the future, it might become necessary to revise and amend the long-term policy as well as the reference scenario taking into consideration the tasks arising from the implementation of the two new nuclear power plant units planned at the site of the Paks NPP.

Spent fuel from the Budapest Research Reactor and from the Training Reactor

Advantageous changes have occurred with regard to the fuel elements of the Budapest Research Reactor since the completion of the previous National Report. The first step of the repatriation process to the Russian Federation initiated and financially supported by the US DOE was completed in 2008 in the frame of the IAEA RER/4/028 programme; all fuel used before 2005 was repatriated. The second step took place during October and November of 2013, following which Hungary is free from highly enriched fuel. The Budapest Research Reactor is over the phase of conversion, the core operates with low enriched fuel elements.

According to plans, the operation of the Budapest Research Reactor will finish in 2023. The repatriation of the low enriched fuel assemblies will be possible in line with the effective intergovernmental agreement. The earliest possible date of transport is 2025. Nevertheless, as an alternative solution to repatriation the disposal within Hungary could also be mentioned.
Currently spent fuel is not stored in the Training Reactor. The replacement of the irradiated fuel by fresh fuel as well as its transport is a theoretical option; the related technical aspects are under consideration.

Policies related to low and intermediate level waste

Radioactive Waste Treatment and Disposal Facility

It is expected that the repository will be able to dispose the institutional waste for several more decades after its safety and capacity have been increased. The complete reconstruction of the treatment building located on the repository site has provided a long-term solution for centralised interim storage of the long lived radioactive wastes and wastes containing nuclear material until the repository for the disposal of high level long lived radioactive wastes is completed.

National Radioactive Waste Repository

Low and intermediate level waste of nuclear power plant origin generated during the operation and decommissioning of the plant will be disposed of in the National Radioactive Waste Repository. Closure of the repository is not planned prior to decommissioning the nuclear power plant. The repository – based on appropriate geological and geophysical measurements – can be expanded in order to accommodate the increased amount of waste stemming from the planned life-time extension of the nuclear power plant.

Responsibility of the licence holder

In general, the Act on Atomic Energy and its executive orders make the licensee responsible for the safe use of atomic energy and the fulfilment of safety related requirements. In the context of the Convention it means that prime responsibility for the safety of spent fuel management and radioactive waste management rests with the licensee of the relevant operational licences of spent fuel management facilities and radioactive waste management facilities, the Public Limited Company for Radioactive Waste Management.
Public Limited Company for Radioactive Waste Management is responsible for the following activities:

- elaboration of its medium- and long-term plans (strategies);
- elaborating cost estimates to identify the necessary payments into the Central Nuclear Financial Fund (Fund) each year;
- development of proposals on the national policy and national programme related to management of radioactive wastes and spent fuel;
- preparation of technical and financial reports for the activities financed from the Fund;
- preparation for the construction of facilities for the storage and disposal of radioactive wastes and their establishment;
- construction (extension) and operation of the storage facility for interim storage of spent nuclear fuel, viz. the Spent Fuel Interim Storage Facility;
- preparation for construction of a disposal facility for HLW and construction of an underground research laboratory for site selection research;

- completion of work required for decommissioning of nuclear facilities (after final shut-down of nuclear facilities – till the demolition – the maintaining, guarding, decommissioning of nuclear facilities and remediation of their sites);
- operation of the existing low- and intermediate level repository of institutional wastes, i.e. the Radioactive Waste Treatment and Disposal Facility;
- operation of the nuclear power plant originated low and intermediate level waste repository, the National Radioactive Waste Repository;
- provision of information and maintaining public relations.

The basic tasks of the Public Limited Company for Radioactive Waste Management as a licensee are – within its field of activities – as follows:

- to establish the technical, technological, financial and human conditions for the safe operation of the facilities;
- to elaborate a safety policy which reflects implementation of the principle that safety prevails over all other considerations;
- to elaborate, introduce and maintain an appropriate quality management system;
- to prevent the occurrence of any supercritical nuclear chain reaction;
- to prevent the evolution of any unacceptable damage affecting employees, the public, the environment, material assets, caused by ionising radiation or any other factor;
- to keep the exposures of the personnel and the public as low as reasonably achievable (taking into account the social and economic factors);
- to take into account, from the aspect of safety, the limits of human performance;
- to establish and operate a radiation protection (health physics) service which plans and controls all actions and measurements necessary to adhere to the basic principles of radiation protection;
- to maintain (regulatory and/or its own) dosimetry control;
- to derive the estimated annual discharge limits from the dose constraint specified by the radiohygiene authority and to submit them for approval to the environmental protection authority and to the nuclear safety authority;
- to determine the planned (airborne and liquid) discharges for normal operation;
- to ensure compliance with the annual discharge limits;
- to monitor/control radiation levels and concentrations of the radionuclides in the environment continuously and provide the local public with relevant information;
- to maintain an appropriate organisation which is capable of accomplishing each and every prescribed periodic and event reporting obligation in due time (including categorisation of all events according to the International Nuclear Event Scale (INES));
- to ensure that the qualifications, professional education, and health of the employees are in line with the prescribed requirements;
- to carry out continuous activities in order to maintain the highest possible level of safety through continuous improvements, including evaluation of all relevant operation experience available, and to finance the costs of related research and development activities;
- to regularly revise and upgrade the licensee's own management system in order to fulfil the safety-related requirements;
- to qualify subcontractors and suppliers for the task, taking into account that their quality management system prescribed by law is a prerequisite;
- to maintain an emergency preparedness organisation, to have ready emergency plans as required to handle all possible emergency situations on-site, and to co-operate with the local, regional and national level emergency forces;

- to ensure the physical protection of the site by armed guards, and to prevent unauthorised persons from access to nuclear materials and equipment;
- to ensure the financial coverage of indemnity (insurance);
- to maintain the necessary records prescribed for the inventories of nuclear and radioactive materials, and the operational data necessary for the evaluation of safety and the planning of decommissioning;
- to participate in the fulfilment of obligations of Hungary arising from international treaties, conventions, and multilateral and bilateral agreements.

As a means of regulating responsibilities and measures for all orphan or confiscated radioactive/nuclear materials (spent fuel and radioactive wastes included) a governmental decree 17/1996. (I. 31.) on the actions in connection with the found or confiscated radioactive or nuclear materials is in force.

b. National legal and regulatory framework (primary legislation, regulations, regulatory organization, specific activities and facilities under regulation, and guidance on implementation)

Legislative and regulatory framework

The Hungarian Parliament approved the Act on Atomic Energy in December 1996, it entered into force on 1 June 1997. The codes and guides of the International Atomic Energy Agency provided a basis for the establishment of the Act, and recommendations of the European Union and the OECD Nuclear Energy Agency were also considered. Due to the Modification of the Act on Atomic Energy, and the related decrees, the legislation relating to the supervision of the radioactive waste repositories has changed.
From the 1st of July 2014, the HAEA is the principal licensing and supervising authority regarding radioactive wastes, instead of the public administration bodies responsible for health. This eliminates the divided authority and regulatory system and ensures that regarding nuclear facilities and radioactive waste repositories, the distribution of roles of the authorities are based on function, thus equivalent in every establishment. This way, the competent authorities can manage and supervise the establishments more efficiently. As a member of the European Union, Hungary brings into force the laws, regulations and administrative provisions, necessary to comply with the Council Directive 2011/70/EURATOM. The Act on Atomic Energy was modified in such manner, that the compliance with the above mentioned directive's regulations was taken into account.

Regulatory body

According to the Act on Atomic Energy, the relevant authority regarding nuclear facilities and thus regarding, among others, the spent fuel management facilities is the Hungarian Atomic Energy Authority.
The HAEA is a government office dealing with peaceful usage of atomic energy, acting under the control of the government with independent task and regulatory competence; it is independent both organizationally and financially. The HAEA is supervised by a minister designated by the prime minister (in the reporting period the minister for national development) independently of his portfolio. The HAEA cannot be instructed in its scope of authority defined by law.

Licensing (at facility, system and system-component level) and inspection of the nuclear safety of nuclear facilities, regulatory licensing an inspection of design, operation and modification of physical protection systems of nuclear facilities, radioactive waste storages and repositories, radioactive sources and radioactive wastes, accountancy for and control of nuclear and other radioactive materials as well as the licensing of related shipments and packaging designs, taking a stand as special authority in the licensing procedure of nuclear export and import, evaluation and coordination of research and development related to the safety of the application of atomic energy, fulfilment of regulatory tasks falling under its jurisdiction in the field of nuclear emergency preparedness, approval of emergency response plans of nuclear facilities, and the related international relations all come under the competence of the HAEA.

Enforcement of the regulatory requirements

Decree of the Minister of Health, Social and Family Affairs 47/2003. (VIII. 8.) EszCsM have been issued on radioactive waste management yet. However the annexes of the Decree address certain specific, technical issues like the waste classification system, the requirements of sitting, design and safety assessment of repositories.
The conditions for enforcing legal mandates of the authorities are included in the Act on the general rules of regulatory procedures and services in the public administration, in the Penal Code, and in governmental decrees.
In order to enforce the requirements of the regulations the authority is entitled to initiate an administrative procedure and, within the framework of this, may oblige the licensee to eliminate any deviations from the regulations that may be detected. The authority can oblige the licensee to pay a fine if there is an infringement of any requirement of law, safety regulations, or if the licensee fails to meet the stipulations of any resolution being in force. In cases falling under the Penal Code the authority has a reporting obligation.

c. Radioactive waste management, decommissioning and spent fuel strategy and current practise and technologies (waste and spent fuel management activities/facilities, overview of main waste and spent fuel issues, overview of research and development programmes, overview of financing of waste and spent fuel management)

Practice related to spent fuel and high level waste

Since all the feasible scenarios of the fuel cycle back-end lead to disposal of HLWs, the issues of HLW and spent nuclear fuel are discussed together.

Hungary has three nuclear facilities producing spent fuel: Paks Nuclear Power Plant, the Budapest Research Reactor in the Centre for Energy Research of the Hungarian Academy of Science (Budapest Research Reactor), and the Training Reactor of the Institute of Nuclear Techniques at Budapest University of Technology and Economics (Training Reactor).

HLW is generated during the operation of Paks Nuclear Power Plant and is temporarily stored in purpose-designed storage tubes (pits) at the plant. Inevitably, decommissioning of the power plant will also produce HLW in the future. The decommissioning of the other two nuclear facilities will also produce radioactive waste, but to a much smaller extent, out of which the high level wastes can be disposed together with the similar wastes of the nuclear power plant.

From the very beginning it was obvious that all the problems associated with the management of HLW would have to be solved by Hungary on its own, irrespective of whatever solution might be found for the issue of the fuel cycle back-end.

In 1995 a programme was launched as a means of solving the disposal of high level and long lived radioactive wastes. Although this programme outlined long-term ideas, it mainly focused on the in-situ site investigations carried out by the Mecsek Ore Mining Company in the area of the Boda Claystone Formation at 1100 m depth (accessible from the former uranium mine) during 1996-98. The programme was limited to three years because of the closure of the mine in 1998; the reason for this was that the existing infrastructure of the mine could be economically maintained only during this time period. The studies were completed by the end of 1998 and summarised in a documented form. According to the final report there were no circumstances questioning the suitability of the Boda Claystone Formation for HLW disposal purpose. In 2001, in order to support the step-wise decision-making, a preparatory study was elaborated.

In line with the development of the strategy, the investigations of the Boda Claystone Formation aimed at its exploration and the selection of a suitable site have continued since 2004. The primary objective of the re-started research has been to select the location of an underground research laboratory. The project aiming at selection of site for an underground research laboratory had to be revised. At the beginning of 2008 a document entitled "Updated concept of the long term research programme of the Boda Claystone Formation including content, financial and schedule aspects" was prepared. On the level of a draft concept, the study discusses the possible extent, expected costs and scheduling of the preparatory research activities aimed at the domestic disposal of the high level waste and spent nuclear fuel.

The Public Limited Company for Radioactive Waste Management is prepared to professionally manage the site selection of a deep geological disposal facility of HLWs. During 2012-2013 the Public Limited Company for Radioactive Waste Management prepared its geological survey plan for the next stage of the investigation of the Boda Claystone Formation, which was approved by the competent authority (Pécs Mining District Authority). The objective of the present investigation stage, which is planned to be implemented between 2014 and 2018, is the general qualification of the host formation and the provision of geological data and information required for the safety assessment.

The long term programme will inevitably need to be updated from time to time in the light of new knowledge. The investigations have been supported by the adjacent nine municipalities.

Spent fuel from Paks NPP

A Hungarian-Soviet Inter-Governmental Agreement on Co-operation in the Construction and Operation of Paks Nuclear Power Plant was signed in 1966, and an Additional Protocol was added to it in 1994. In these agreements, still in force, the Russian party undertakes to accept delivery of the spent fuel and the Hungarian party undertakes to purchase the necessary new fuel assemblies exclusively from Russia for the whole life-time of the nuclear power plant. After having shipped back the spent fuel, until now Hungary did not have to take back the radioactive waste and other residuals from the reprocessing of such fuel.

The major part of the spent fuel was shipped back to the Soviet Union (later Russia) between 1989 and 1998. However, in the 1990's, contrary to the terms of the original agreement though in accordance with international practice, the responsible Russian authorities wanted Hungary to take back the residual radioactive waste and other by-products created during reprocessing. At present Hungary does not have the capability to dispose of high-level or long lived radioactive waste.

It was for these reasons that the licensing and construction of an interim spent fuel storage were started in 1993. Paks Nuclear Power Plant commissioned the British company GEC Alsthom to build a dry storage facility of the MVDS (modular vault dry storage) type. One of the advantages of this type of construction and storage technology is that the number of storage modules can be increased in a modular system. Currently the facility contains 16 modules in the Western side (each having a storage capacity of 450 fuel assemblies) and 4 modules in the Eastern side (each having a storage capacity of 527 fuel assemblies). The facility for the interim storage of spent fuel allows for the storage of the assemblies for a period of 50 years. The site of the Spent Fuel Interim Storage Facility is in the immediate vicinity of Paks Nuclear Power Plant. It is situated at a distance of 5 km south of Paks.

Spent fuel from the Budapest Research Reactor and from the Training Reactor

In addition the operation of the Budapest Research Reactor and the Training Reactor contributes to spent fuel generation.

The spent fuel of the Budapest Research Reactor can be and up to now has been temporarily stored in wet storage facilities. However, for long-term storage, dry storage in an inert gas atmosphere is more advantageous. Therefore, the operator of the Budapest Research Reactor, in agreement with the Hungarian Atomic Energy Authority, decided to modify the storage conditions. Based on the new concept, the fuel elements will be encapsulated and stored in a nitrogen atmosphere. Currently, after the repatriation of the spent fuel assemblies to the Russian Federation, the storage tank is empty.

The Training Reactor is operating with the fuel elements that were placed in the core at the start of the operation and after the reconstruction in 1980. The burning rate of the reactor fuel elements is slow as a result of the low maximum power and the carefully planned operation in connection with student training and research activities. Adequate fuel cladding condition was confirmed by analyses. Consequently, the reactor can operate for many years further without refuelling.

Practice related to low and intermediate level waste

The solid and liquid radioactive wastes that are generated during the operation of the nuclear power plant are processed and temporarily stored in the plant. In addition to these wastes, radioactive wastes are generated in research institutes, in medical, industrial, and agricultural institutions and in laboratories.

Radioactive Waste Treatment and Disposal Facility

The repository for institutional low and intermediate level radioactive wastes, the Radioactive Waste Treatment and Disposal Facility, was commissioned in 1976. It is situated at Püspökszilágy some 40 km north-east of Budapest. The repository is a typical near-surface facility, composed of concrete trenches (vaults) and shallow wells for spent sealed sources.

The competent authority issued the final operational licence for the facility in 1980. In the absence of waste acceptance criteria, the repository has accepted almost all kinds of radioactive wastes generated during the utilisation of nuclear technology and isotope applications. Between 1979 and 1980, radioactive wastes stored up till then in a facility in Solymár were transferred for disposal to the Radioactive Waste Treatment and Disposal Facility. Judging from the geological investigations, it is not possible to expand the Radioactive Waste Treatment and Disposal Facility for the disposal of the waste originating from the operation and decommissioning of Paks Nuclear Power Plant. The low-level, solid

waste from Paks Nuclear Power Plant was transported to the repository in Püspökszilágy only as a provisional solution. At the same time the capacity of the Radioactive Waste Treatment and Disposal Facility was increased with the financial support of the power plant. The total capacity of the repository is now 5040 m^3.

Since 1 July 1998, the facility has been operated by the Public Limited Company for Radioactive Waste Management. The Radioactive Waste Treatment and Disposal Facility is operated based on the extendable license that is currently valid until 28 February 2015.

The results of the safety assessments, at the same time, unambiguously indicated that certain spent radiation sources may pose a risk in the distant future, after the closure of the repository in case of human intrusion (see Section H). Therefore, with the aim of enhancing the long term safety of the repository (effecting, in the first place, future generations), a multi-year programme was launched in the framework of which the 'critical' waste types are segregated from the recovered waste and then the rest are – as far as possible – compacted before redisposal in the vaults. By doing so, the repository – which reached capacity in 2004 – can continue to accommodate the institutional radioactive waste from all over the country.

National Radioactive Waste Repository

Since the expansion of the Radioactive Waste Treatment and Disposal Facility to the extent that would satisfy the total needs of the nuclear power plant is impossible, after several attempts a national programme was launched in early 1993 with the aim of finding a solution for the final disposal of LLW/ILW of the plant. In 1996, based on the final document resulting from the geological investigations as well as from safety and economic studies, and taking into account the willingness of host communities, a proposal was made to carry out further explorations for a geological disposal site in granite in the vicinity of Bátaapáti about 45 km south-west of Paks. At the end of 1998 the Geological Institute of Hungary made a recommendation to start the detailed site characterisation in the Bátaapáti research area.

By 2003, as a result of the 4-year research programme, the surface-based geological investigations were completed. As the first phase of the construction of the repository, the above surface facilities were completed in 2008. It has enabled the temporary storage of solid waste from the nuclear power plant in 2008. The competent Radiation Health Centre of the National Public Health and Medical Officer Service granted license for commissioning the National Radioactive Waste Repository on 25 September 2008; the scope of the license also covered the operation of the above surface facilities.

The first two disposal shafts were completed by the end of 2011 (I-K1, I-K2), in 2012 the licensing authority granted the operating license for the accomplished portion of the National Radioactive Waste Repository: the above surface facilities and the I-K1 shaft. The license became executable on September 10, 2012. The transport and final disposal of the first reinforced concrete containers took place in the frame of a ceremony on December 5, 2012.

Financial resources

As required by the Act on Atomic Energy, the Minister supervising the Hungarian Atomic Energy Authority disposes over the Central Nuclear Financial Fund operating as of 1 January 1998. From January 1, 2014 the ministry lead by this Minister is responsible for the management of the Fund (until December 31, 2013 the Hungarian Atomic Energy Authority was responsible for its management). The Fund is a separate state fund pursuant to the Act on public finance. It is primarily earmarked for financing the construction and operation of

disposal facilities for the final disposal of radioactive waste, the interim storage of spent fuel, the closure of nuclear fuel cycle, and the decommissioning of nuclear facilities.

A medium and a long-term plan (covering up to the decommissioning of the various nuclear facilities) and an annual work schedule on the use of the Fund shall be prepared by the Public Limited Company for Radioactive Waste Management and shall be approved by the minister supervising the Fund. The long- and medium-term plans are to be reviewed annually and revised as required.

The due payments into the Fund are defined in accordance with these plans. The annual financial obligations of the Paks NPP to the Fund are proposed by the minister supervising the Hungarian Atomic Energy Authority. Due payments are based upon submittals prepared by the Public Limited Company for Radioactive Waste Management preliminary assessed by the Hungarian Atomic Energy Authority from professional aspects, to which the Expert Panel of the Fund supporting the work of the Minister shall develop a preliminary opinion.

The institutes disposing 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 Atomic Act. For nuclear facilities financed from the central budget (the Budapest Research Reactor and the Training Reactor), the sources required to cover payments into the Fund are provided by the central budget, when necessary.

The rate of payments into the Fund shall be specified in such a way as to provide appropriate sources for all costs of management of radioactive wastes and spent fuels and of the decommissioning of nuclear facilities. These sources also provide coverage for supporting the municipal associations aimed at public control and information activities as well as for the operational expenses of the existing repositories. A government decree regulates the support of control and information purpose municipal associations.

In order to ensure that the Fund maintains its value, the Government annually contributes to the Fund with a sum that is calculated on the average assets of the Fund in the previous year using the average base interest rate of the central bank of the same period.

The Central Nuclear Financial Fund is managed within an individual account of the Hungarian State Treasury. The State Audit Office of Hungary annually audits the budget planning of the Fund, the execution of the budget plan and the fulfilment of tasks.

Decommissioning

With regard to the Paks Nuclear Power Plant, the Budapest Research Reactor, the Training Reactor and the Spent Fuel Interim Storage Facility, the safety codes contain provisions that decommissioning shall be taken into account at the design stage. The accepted decommissioning strategy includes a 20 year protected preservation of the primary circuit; thus it entails postponed dismantling. The summary of the preliminary decommissioning plan constitutes an obligatory part of the documentation prior to commissioning as well as of the final Safety Assessment Report. The decommissioning plan is required to be regularly revised in accordance with the regulations in force; revision results are required to be submitted to the Hungarian Atomic Energy Authority. The finalised decommissioning plan is a prerequisite of the licensing procedure aimed at decommissioning. All decommissioning plans have to cover organisational and qualification issues together with technical ones. It is a change that the new regulation determines the main steps of withdrawal of the facility from nuclear safety authority oversight following the termination of the decommissioning process.

In the case of Paks Nuclear Power Plant no preliminary decommissioning plan was originally made. This situation was corrected in the early 1990s and since then it has been updated regularly. The third revision of the plan was carried out in 2008. The Preliminary Decommissioning Plans shall be updated every five years. However, together with the service life extension documentation, the final decommissioning plan had to be submitted to the authority (HAEA) in relation to Unit 1. Thus the next revision period counts from 2011, and the next submission is expected in 2016. In parallel to the service life extension activities, but independently of them, the NPP launched the public procurement process for the revision of the 2008 plan, and the revision has been carried out.

In the case of the Budapest Research Reactor and the Training Reactor, the IAEA provided professional support to prepare the preliminary decommissioning plans in the form of expert missions. In 2010 a mission took place in the Budapest Research Reactor. Now both facilities, the Budapest Research Reactor and the Training Reactor have Preliminary Decommissioning Plans approved by the Hungarian Atomic Energy Authority.

The Spent Fuel Interim Storage Facility was designed by taking into account all relevant requirements of decommissioning, so this facility had already possessed a simplified preliminary decommissioning plan from the beginning. Based on the requirements of the periodic safety review conducted in 2008, the document was updated and submitted to the authority in 2011.

d. Radioactive waste classification, waste and spent fuel quantities (inventory, including disused sources that are declared radioactive waste)

Table 1: Radioactive waste in storage - Until December 31, 2013

Route Waste Class	Processed (type)/ unprocessed	Total Current Volume	Estimated Disposal Volume	Distribution							Planned Disposal Route (If known)
				RO	FFE	RP	NA	DF	DC/RE	ND	
		(m^3)	(m^3)	(%)							
Total of all Classes	-	10454,6	8899	-	-	-	-	-	-	-	-
LILW – NRWR storage hall	compacted waste + reinforced concrete containers	490	1813	100	0	0	0	0	0	0	NRWR chamber
LILW – RWTDF storage hall	unprocessed	97	145	0	0	0	80	0	0	20	geological disposal
LILW – RWTDF storage hall	compacted	17	29	0	0	0	80	0	0	20	geological disposal
LILW – RWTDF storage hall	cemented	12	13	0	0	0	80	0	0	20	geological disposal
LILW – RWTDF vaults	cemented	15	15	0	0	0	80	0	0	20	geological disposal
LILW – RWTDF vaults	compacted	33	58	0	0	0	80	0	0	20	geological disposal
LILW – RWTDF wells	unprocessed or capsulated	1,6	10	0	0	0	80	0	0	20	geological disposal
LILW – NPP solid waste in storage hall	compacted	1260	2205	100	0	0	0	0	0	0	NRWR chamber
LILW – NPP solid waste in storage hall	unprocessed	840	7680	100	0	0	0	0	0	0	NRWR chamber
LILW – NPP liquid waste in storage tanks (later treatment for LWPT + cementation)	unprocessed	4732		100	0	0	0	0	0	0	NRWR chamber
LILW – NPP liquid waste in storage tanks (later cementation)	unprocessed	3353		100	0	0	0	0	0	0	NRWR chamber
HLW – NPP solid waste in wells	unprocessed	98	100	100	0	0	0	0	0	0	geological disposal

Table 2: Radioactive waste disposed (as disposed volume) - Until December 31, 2013

Route Waste Class	Processed (not)	Total Volume	Distribution							Disposal Route Used
			RO	FFE	RP	NA	DF	DC/RE	ND	
		(m^3)	(%)							
Total of all Classes	-	6167	-	-	-	-	-	-	-	-
LILW – NRWR	compacted waste + reinforced concrete containers	1267	100	0	0	0	0	0	0	NRWR chamber
LILW – RWTDF	unprocessed	3186	20	0	0	20	0	10	50	RWTDF vaults
	compacted	1680	80	0	0	0	0	0	20	
	cemented	34	0	0	0	80	0	0	20	

LILW – low and intermediate level waste
HLW – high level waste
RO – reactor operations
FFE – fuel fabrication and enrichment
RP – fuel reprocessing
NA – nuclear applications
DF – defence
DC/RE – decommissioning and remediation
ND – not determined
NRWR – National Radioactive Waste Repository
RWTDF – Radioactive Waste Treatment and Disposal Facility
NPP – nuclear power plant
LWPT – liquid waste processing technology

Table 3: Spent fuel in storage - Until December 31, 2013

Type	Current Amount (NPP)	Current Amount (Research Reactors)
	(MTHM)	
Total Spent Fuel Storage	1117	0,008
Wet Storage (AR)	210	0,008
Wet Storage (AFR)	-	-
Dry Storage (AR)	-	-
Dry Storage (AFR)	907	-
Total spent fuel held in storage for other countries (amounts also included above)	-	0,008

Table 4: Spent fuel sent for reprocessing (in home country or sent to another country) - Until December 31, 2013

Type	Current Amount (NPP)	Current Amount (Research Reactors)
	(MTHM)	
Total amount of spent fuel sent for reprocessing (in your country)	0	0
Total amount of spent fuel sent for reprocessing (in another country)	273	0,52
Total amount of spent fuel received from another country for reprocessing and recycling	0	0
Total amount of spent fuel (MTHM) or radioactive waste (cubic meter) returned to country of origin for storage/**disposal**	273	0,52

Table 5: Translation matrix that can be used for transition from a national classification system to IAEA classification

National waste classification Name	**VLLW**	**LLW**	**ILW**	**HLW**
LILW	20	45	30	5 (LILW-LL)
HLW	0	0	0	100

National waste classification of radioactive waste for more than one radioisotope

Radioactive waste class	Activity concentration ratio
Low level	$\sum_i \frac{AC_i}{EAC_i} \leq 10^3$
Intermediate level	$\sum_i \frac{AC_i}{EAC_i} > 10^3$

where AC_i is the activity-concentration of the ith radioisotope existing in the radioactive waste, and the EAC_i is the exemption activity-concentration of the ith radioisotope.

Table 6: Facilities for management of spent fuel and radioactive waste

Type	Planned	Construction	Commis-sioning	In operation	Shutdown	Decommis-sioning	Other	Total
Spent fuel storage	1	0	0	1	0	0	0	2
Spent fuel reprocessing and recycling	0	0	0	0	0	0	0	0
Spent fuel conditioning	0	0	0	0	0	0	0	0
Spent fuel disposal	1	0	0	0	0	0	0	1
Waste processing	0	0	0	2	0	0	0	2
Waste storage	1	0	0	3	0	0	0	4
Waste disposal	1	0	0	2	0	0	0	3

Table 7: Major sources of radioactive waste (number of facilities)

Type	Planned	Construction	Commis-sioning	In operation	Shutdown	Decommis-sioning	Other	Total
Research reactors	0	0	0	2	0	0	0	2
Nuclear power reactors	2	0	0	4	0	0	0	6
Spent fuel reprocessing and recycling	0	0	0	0	0	0	0	0
Spent fuel storage	1	0	0	1	0	0	0	2

Table 8: Expected future quantities of spent fuel and radioactive waste

Type	**Current amount**	**Estimated current amount when prepared for disposal**	**Current disposal capacity**	**Total forecast at 2030**	**Total forecast at 2050**
	(MTHM)				
Spent fuel storage	1117			2026	3257
Wet storage (AR)	210			464	471
Wet storage (AFR)	0			0	0
Dry storage (AR)	0			0	0
Dry storage (AFR)	907			1562	2786
Total amount of spent fuel sent for reprocessing and recycling	0			0	0
Total amount of spent fuel disposed	0		0	0	0
	(m^3)				
Waste in storage	10948,6	12914		2721	3031
LILW – NRWR storage hall	490	1813		500	500
LILW – RWTDF	175,6	276		716	956
LILW – NPP solid	2100	3045		300	300
LILW – NPP liquid	8085	7680		500	550
HLW – NPP1+2 solid	98	100		205	225
LILW – NPP2	0	0		500	500
	(m^3)				
Waste disposal	6167		8533	18730	22960
LILW – NRWR	1267		3633	13830	18060
LILW – RWTDF	4900		4900	4900	4900
HLW	0		0	0	0

g. Sources of data, assumptions and references

NATIONAL REPORT (Fifth Report) prepared within the framework of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, 2014
NATIONAL PROGRAM on the Spent Fuel Management and on the Radioactive Waste Management, 2015
Nuclear Energy Data (Brown Book) 2014