National Report of Hungary

at the 6th Review Meeting
of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Presentation outline

Mr. Balázs Molnár (PURAM) :

1. *National Policy*
2. *National Program*
3. *SF and RW management practices*

PURAM

Mr. István Lázár (HAEA):

1. *Regulatory framework – integrated authority system*
2. *Recent developments in legal framework*
3. *Organizational developments of HAEA*
4. *Licensing*
5. *Other issues in focus*
6. *Summary*

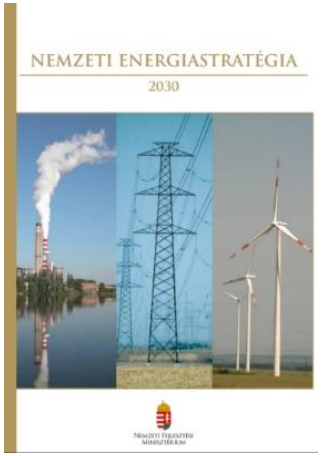
Hungarian Atomic Energy Authority

Special emphases of the Presentation

- **Developments since the 5th Review Meeting**: legal, regulatory and organizational framework, as well as facility development projects
- **Follow-up of challenges** identified by the 5th Review Meeting
- **Updates since the publication of the 6th National Report**
- **Some reflections** to the certain questions received from other Member States

NATIONAL POLICY & PROGRAMME

Hungary's energy strategy



Nuclear power has ~ 50% share in domestic electricity generation

National Energy Strategy (2011) - Long-term commitment to nuclear energy

- **Lifetime extension of the four (VVER-440) units of the Paks NPP** (1982-87, 2012-17), plus 20 years
- **Capacity of the Paks NPP shall be substituted by commissioning new nuclear capacities in due time:** intergovernmental agreement between Hungary and the Russian Federation in 2014, **two new units (VVER-1200) in Paks (2025-26, 60 years) are in preconstruction phase**

Safe management of RW and SF is essential in the context of Hungary's energy strategy.

Radioactive Waste and Spent Fuel Management Directive in EU
(Council Directive 2011/70/Euratom)

- Community framework for the responsible and safe management of SF&RW management, setting out ultimate responsibility of Member States
- Each MS shall have a national policy on SF and RAW management - principles
- National programme – to ensure the timely implementation of the national policy
- Close references to the Joint Convention
- **HUNGARY: separate documents and decisions**
  - **National Policy was approved in a resolution by the Parliament in April 2015**
  - **National Programme was approved in a resolution by the Government in August 2016**

National Policy – principles

Nuclear energy shall only be used

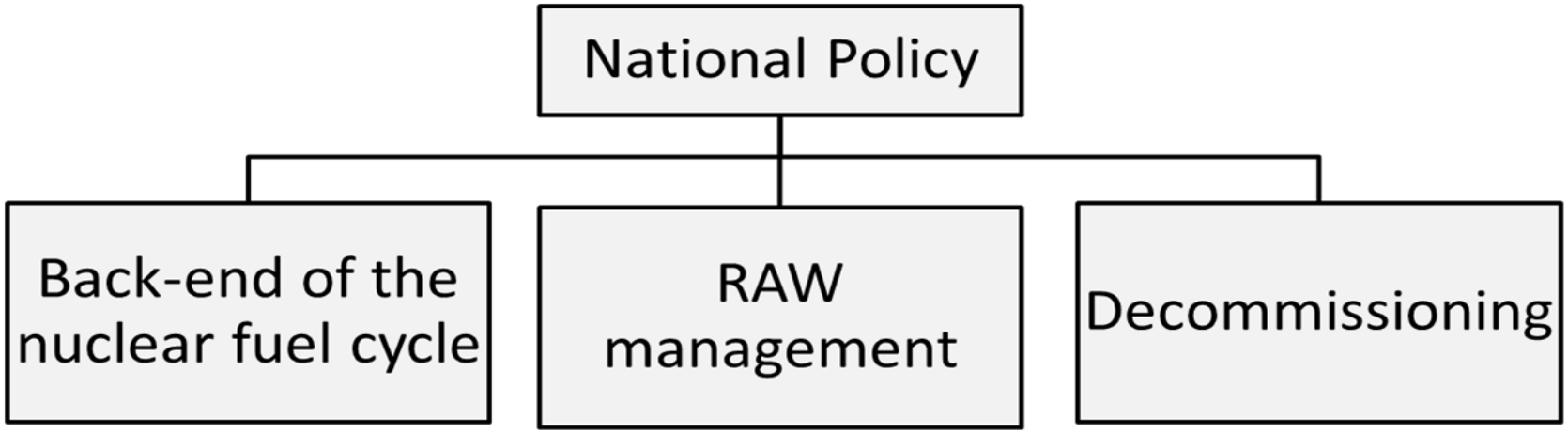
- within the socially-acceptable level of risk;
- without posing any hazards to present and future generations, environment and material assets
- by ensuring a regular review and update of safety requirements;
- by ensuring that the quantity of generated RW is kept as low as achievable.

Spent fuel and radioactive waste

- shall be managed by recognizing the **ultimate responsibility of the Hungarian State;**
- **shall be disposed of in Hungary** unless an agreement has entered into force between Hungary and another Member State or a third country;
- shall be managed **without place any undue burden on future generations**

National Policy – subpolicies (1)

National Policy consists of three fundamental subpolicies



National Policy – subpolicies (2)

I. Back-end of the nuclear fuel cycle

- **No final decision yet** on the back-end of the nuclear fuel-cycle;

”Do and see” principle

- **The open fuel cycle option is set as a reference scenario, until decision is not available**
- Key decision nodes at certain time points are identified; a flexible step-by-step decision-making process is applied with regard to
  - **the construction of new NPP units at Paks**;
  - **future technological advances**
- **A domestic deep geological repository is necessary regardless of the future decision on the back-end of the fuel cycle**

National Policy – subpolicies (3)

II. Radioactive waste management policy

- **LILW-SL** shall be disposed of in domestic disposal facilities
- **LILW-LL, HLW** shall be disposed of in a deep geological disposal facility in Hungary. (Note: If the option of the direct disposal is chosen, SF will be declared as HLW.)

III. Decommissioning policy

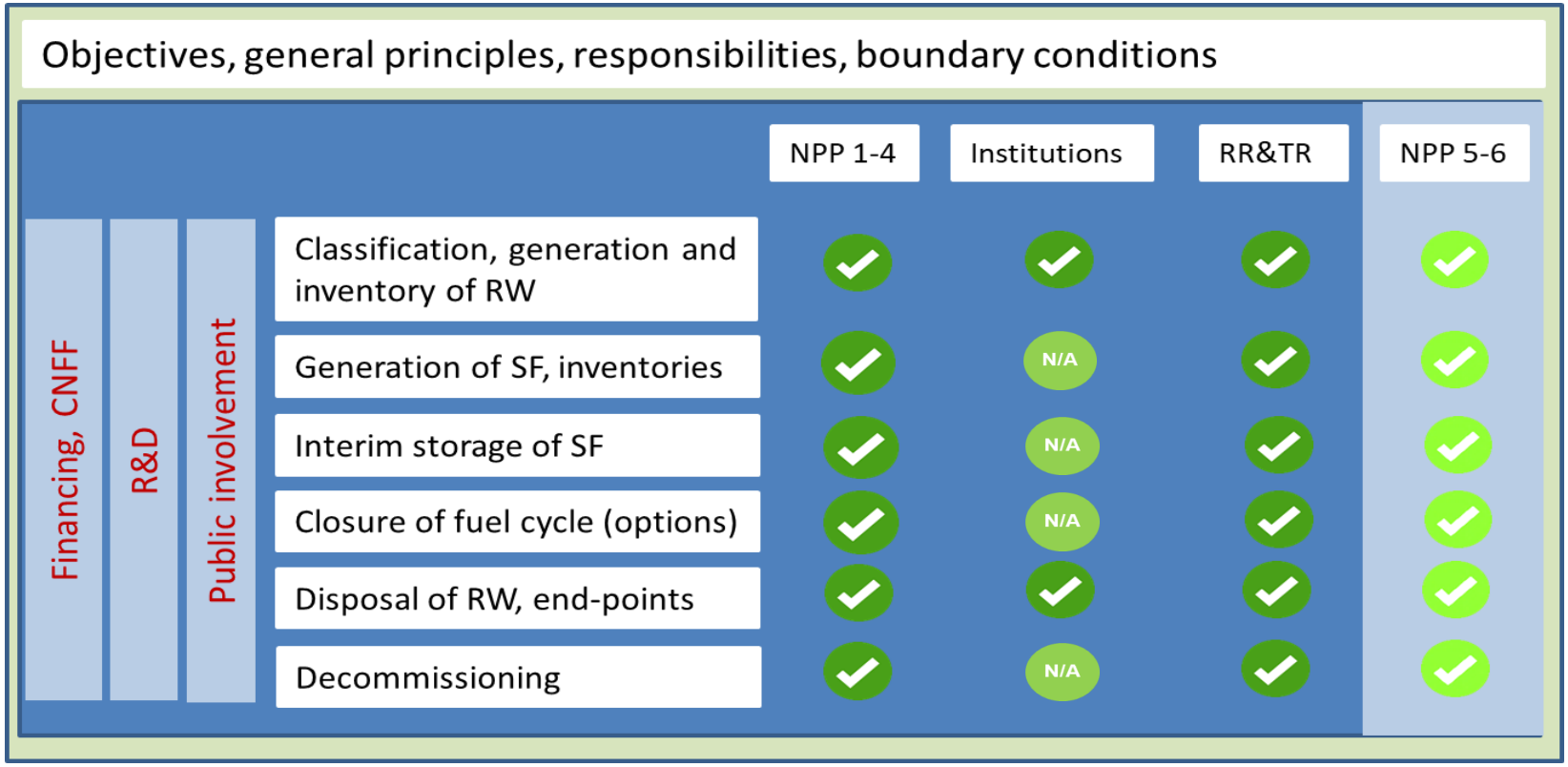
- Decommissioning plan shall be prepared, regularly reviewed and updated to follow up changes in regulation and developments technology
- Decommissioning plan shall include **appropriate timing and set out** the **final state that has to be achieved** by decommissioning in view of the long-term utilization concept of the site.
- **Possible synergies between site specific decommissioning plans** of different nuclear facilities shall be taken into the account

National Policy - financing

- **A segregated state fund was set up** for financing specific tasks of SF and RW management, as well as decommissioning;
- **Managed by the ministry** of the minister supervising HAEA;
- **”Polluter pays” principle** – Payments into the fund shall be made by waste producers; the main contributor is Paks NPP;
- **Fund shall exclusively finance** the objectives set forth in the Act on Atomic Energy:
  - *Final disposal of radioactive waste;*
  - *Interim storage of spent fuel ;*
  - *Closure of nuclear fuel cycle;*
  - *Decommissioning of nuclear facilities;*
  - *Financial support to social control and information associations of municipalities*
- **The annual contributions to and expenditures from the Fund shall be defined by the Act on Central Budget.**

National Programme (1)

- **Technical implementation and scheduling** of the National Policy
- **New units are already included** but only **at preliminary level (2015)**, on-going work for more elaborated integration



National Programme (2)

- **Disposal of low and intermediate level radioactive waste** from the Paks NPP - *National Radioactive Waste Repository (NRWR) at Bátaapáti*
- **Processing, storage and disposal of institutional radioactive waste** – *Radioactive Waste Treatment and Disposal Facility (RWTDF) at Püspökszilágy*:
- **Interim storage of SF:** *Spent Fuel Interim Storage Facility (SFISF) at Paks*
- **Disposal of HLW and long lived RW**: Research activities for the siting of a deep geological repository - *Boda Claystone Formation in the southwest Mecsek Hills*

Operating SF/RW facilities and HLW siting area by *Public Limited Public Limited Company for Radioactive Waste Management (PURAM*)

National Programme (3)

Paks NPP

1982-2037,
20-yr safety enclosure
Full decom by 2072

Storage of SF

SFISF, Paks

1997-2062
Full decom by 2068

Training & research reactors

Other institutions

Non NPP SF

Russia

Storage of long-lived waste

Disposal of institutional LILW-SL

Disposal of operational and decommissioning LILW-SL

Disposal of operational and decommissioning HLW and LILW-LL

Decision

Disposal of SF

Disposal of vitrified HLW

1976-2064
AIC: 150 yrs

RWTDF, Püspökszilágy

NRWR, Bátaapáti

2012-84
AIC: 50 yrs

2064-84
AIC: 50 yrs

Future HLW repository

Disposal of long-lived waste

National Programme (4)

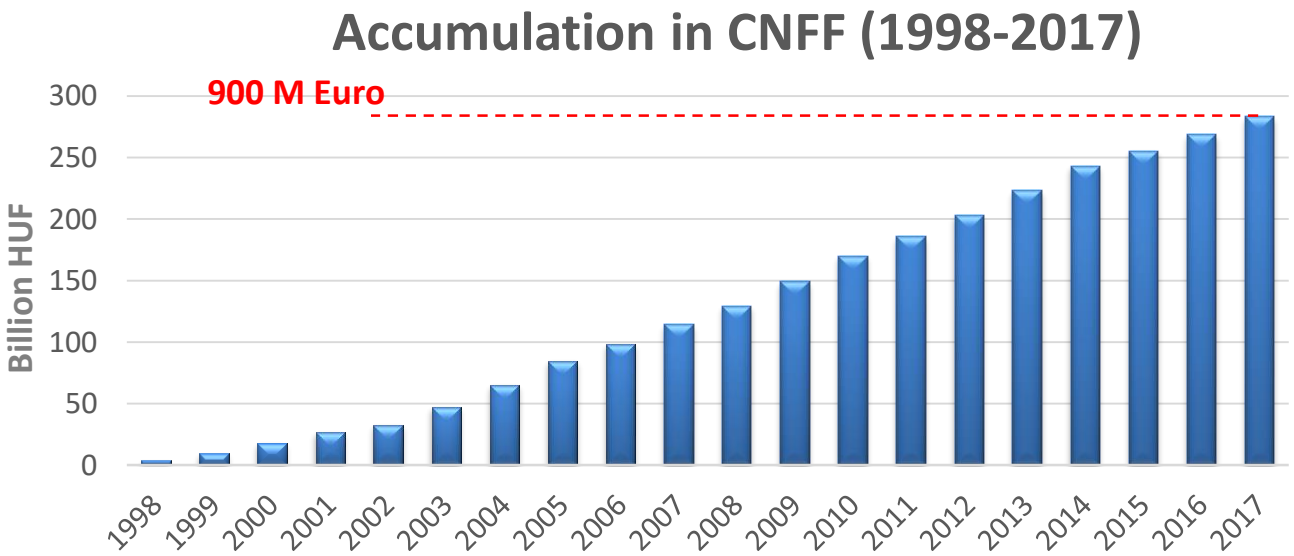
- **Decommissioning**
  - **Decommissioning plan** – reviewed periodically (5 year);
  - **Deferred dismantling** – 20-year safe enclosure of primary circuit
- **Financing**
  - Central Nuclear Financial Fund (CNFF)- **segregated state fund**
  - **Medium and long-term plans annually prepared by PURAM**
    - **Calculation and specification** of payments into the CNFF;
    - **Cost estimation for activities** to be paid from the CNFF: operation of RW disposal and SF storage facilities, construction and extension of facilities (including deep geological repository) and other activities (such as financial support to municipal associations)

National Programme (5)

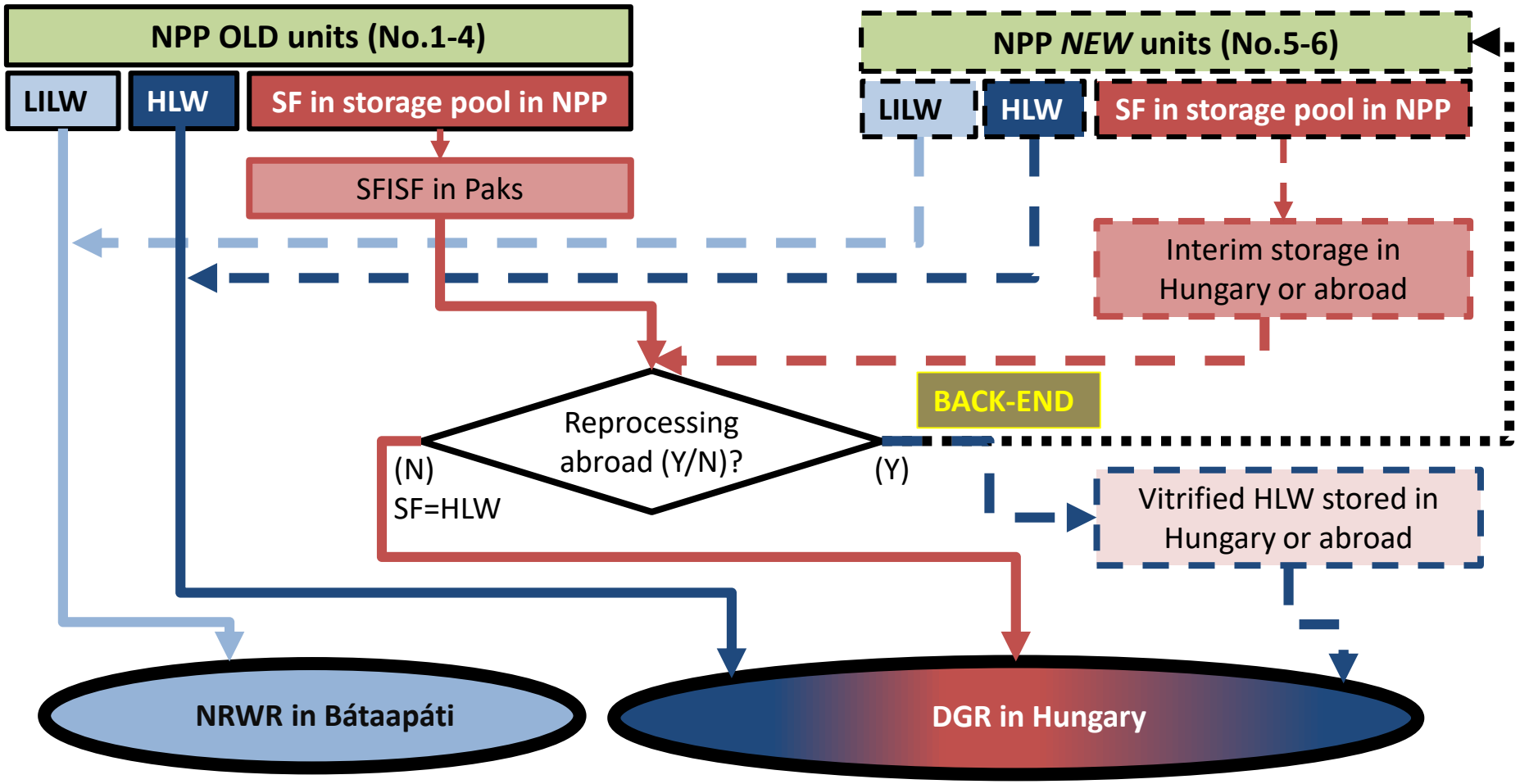
Central Nuclear Financial Fund (CNFF)

- the main contributor is Paks NPP (according to the reference scenario)
- new units have not contributed so far, decision has not been made yet, whether the new units will contribute to the CNFF or to an independent new Fund (to be set up)

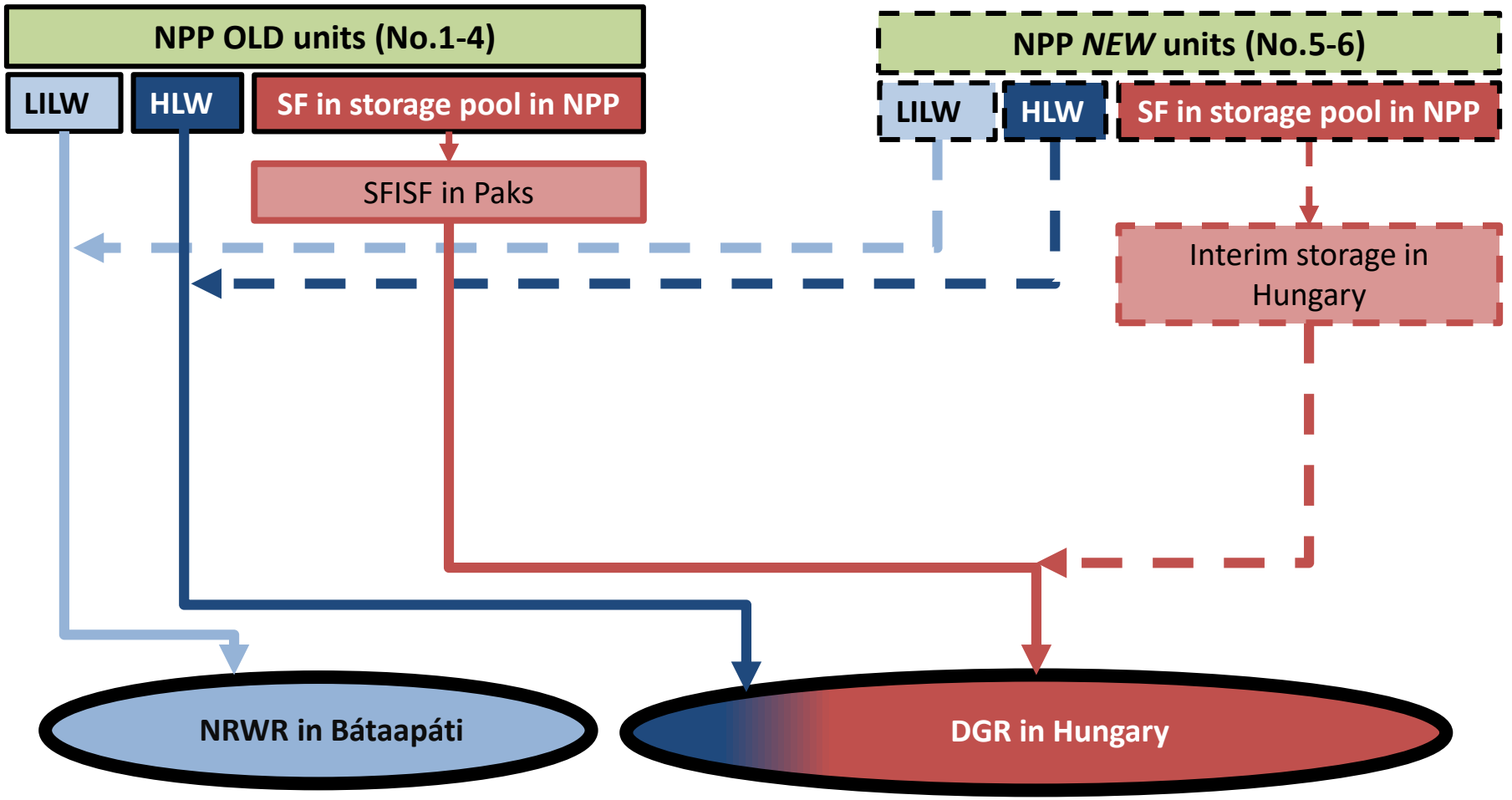
1 Euro ~ 315 HUF



National Programme – effects of new units



National Programme – new reference scenario



National Programme - public involvement

- Involvement of the public from the start, continuous and transparent information sharing, various outreach activities
- Cooperation through **social control and information associations of municipalities** formed around RW and SF management facilities
  - West-Mecsek Social Information and Control Municipality Association (HLW siting area, Boda)
  - Isotope Information and Control Association (RWTDF, Püspökszilágy)
  - Social Control, Information and Municipality Development Association (SFISF, Paks)
  - Social Control Information Association (NRWR, Bátaapáti)
- Financial support to the four associations in 2017: 1.17 billion HUF (about 3.72 million EUR)

SF AND RW MANAGEMENT PRACTICES

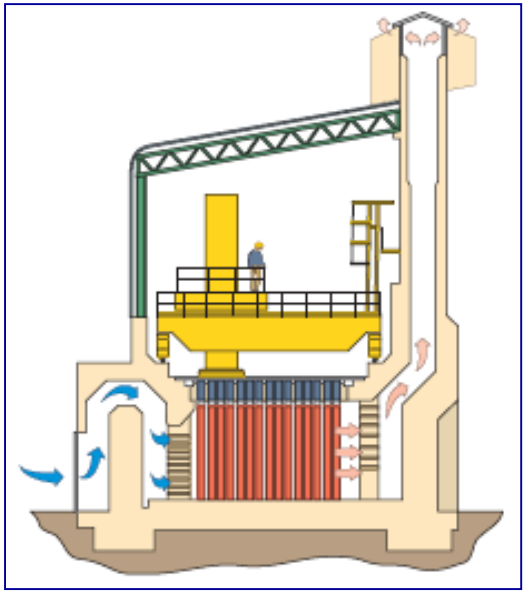
Outline

- Extension and operation of the Spent Fuel Interim Storage Facility (SFISF) in Paks
- Extension and operation of National Radioactive Waste Repository (NRWR) in Bátaapáti
- Operation and modernization & safety upgrading of the Radioactive Waste Treatment and Disposal Facility (RWTDF) in Püspökszilágy
- Siting a future HLW/SF repository in the Mecsek region
- Remediation activities of the former uranium mine

Extension and Operation of SFISF

Spent Fuel Interim Storage Facility (SFISF)

- Modular vault dry storage (MVDS) type,
- SFAs in tubes in inert N_2 atmosphere, cooling is provided by passive airflow

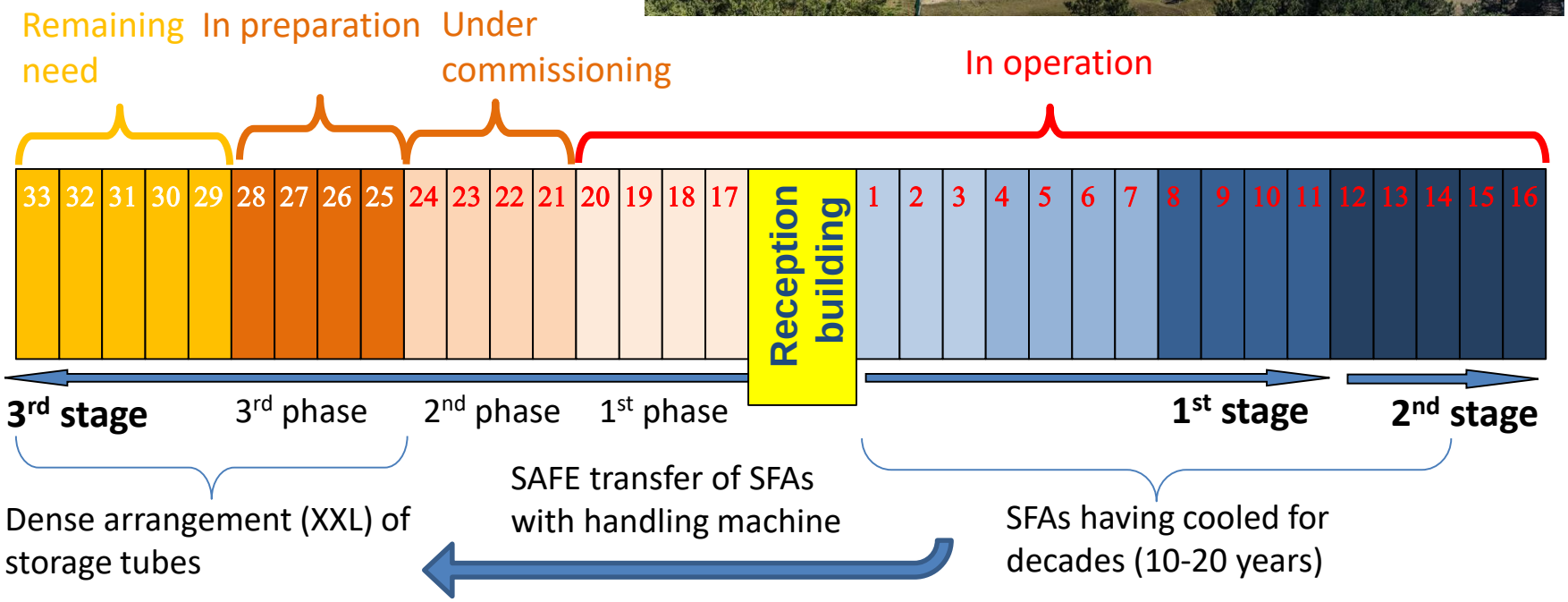


- In May 2018, 9157 SFAs were stored in the facility
- Current total capacity: 11 416 SFAs in 24 vaults
- Total capacity need till the end of the life time: 17 717 SFAs

Major Events Since Last RM

- Construction of last vaults (No. 21-24) started in 2014, subsoil stabilization (2014), **construction (2016) and installation of technology (2017)**
- **Operation licence is expected in 2018** (more about licensing in the next part of the presentation)
- **Reconstruction and modernisation of control technique (2016)**
- **Preparation for the next phase** of extension (No. 25-28), **new storage concept** aiming to further increase the number of SFA's in a vault
  - **Idea:** detailed SAs (criticality, heat generation, radiation protection) show that SFAs have been cooled for decades can be stored in modified vaults with **significantly denser storage tube arrangement**
  - Environmental licence (2015), Construction licence (2016)

Extension of SFISF



	No. 25-33	No. 17-24	No. 1-16
Capacity	703 SFAs(XXL)	527 SFAs (quadrangular)	450 SFAs (triangular, original)
Emplacement	transfer from the tubes where SFAs have been already cooled for decades in SFISF	directly from NPP storage pools	directly from NPP storage pools

Operational Experiences

- SF loading: 2015: 270 SFAs, 2016: 360 SFAs, 2017: 300 SFAs
  - ➢ introduction of new 15-month operation cycle in NPP (higher burn-up)
- Low personnel doses

	2015	2016	2017
Average individual dose ***(μSv)***	1.46	1.60	1.14
Highest individual dose ***(mSv)***	0.31	0.101	0.218

- Low discharge values:

	2015	2016	2017
Calculated excess dose to the public from discharges ***(nSv)***	1.65	2.91	1.72

- Safe operation: no major malfunctions

Extension and Operation of NRWR

- National Radioactive Waste Repository
  - LILW waste from NPP origin (operation & decommissioning)
  - Intermediate-depth disposal facility, granite

Significant Events since Last RM

- The first chamber was put in operation in October 2012, the first container was disposed of in December 2012
- **In September 2017 HAEA issued a new operation licence valid also for the second chamber (I-K2)**

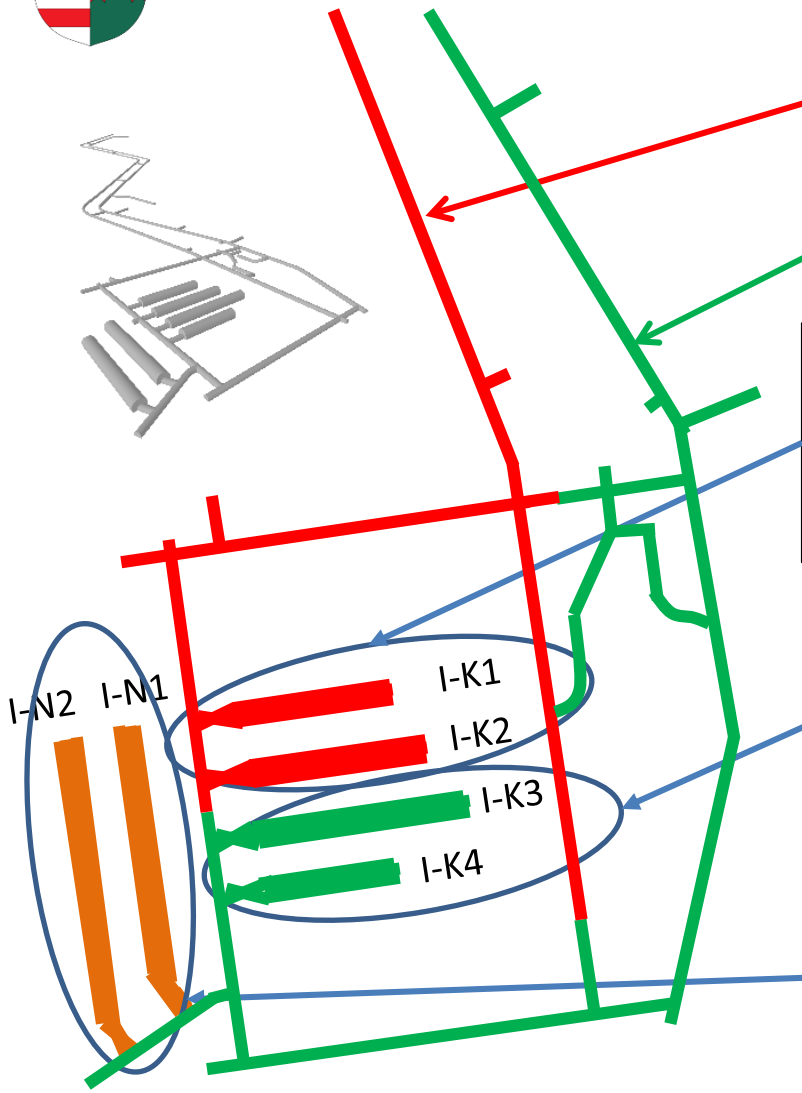
Buffer storage capacity:

- 3000 drums (200 litres each)
- 31.12.2017: 1703 drums

Disposal capacity:

- I-K1: 537 reinforced concrete containers (4833 drums), capacity is FULL by 31.12.2017
- I-K2: 1470 compact waste packages plus 2716 drums, no compact waste package arrived yet

Phased Extension



Active (operation) zone

Construction zone
- under construction licence

Phase I:
- **Excavated by 2012**
- I-K1 in operation since 2012
- I-K2 in operation since 2017

Phase II:
- Excavated **by 2017**
- I-K3, I-K4 to be operational by 2020 and 2026
- Construction work in I-K3 (technology, concrete vault) in preparation phase

Phase III:
- Valid construction licence for I-N1, I-N2
- To be operational from 2035 and 2062

Further tasks

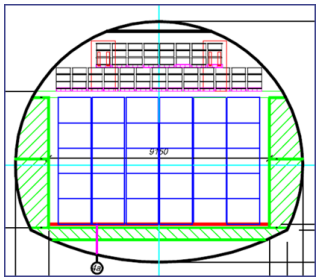
- Phased implementation of extension of the facility, following the needs of the life-time extended NPP
  - operation: 16 000 m^3
  - decommissioning: 27 000 m^3 (22 000 m^3 VLLW)
- **Further optimization, more efficient use of the underground disposal capacities in NRWR => Need for new category (VLLW) and new VLLW repository**
- New legislation has introduced VLLW category (details in the next presentation)
- **LILW-SL of the new NPP units => a new chamber-field has to be identified**

Optimized disposal concept

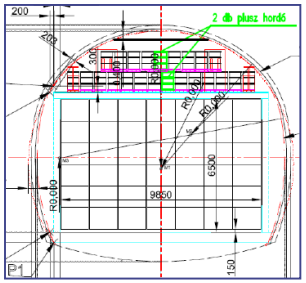
- Optimization of disposal concept in 2012-14 based on using compact waste packages and installing a concrete vault structure within chambers
- New operation licence valid for I-K2 was issued in 2017

Chamber I-K1

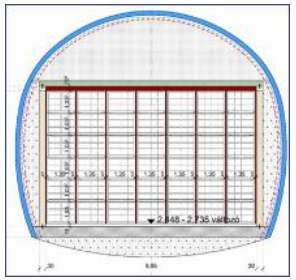
Chamber I-K2

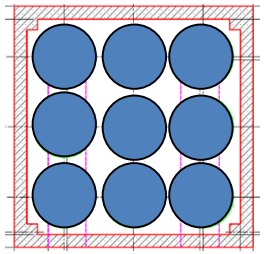


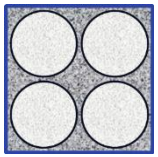
Chambers I-K3, I-N1, I-N2



Chamber I-K4







Compact waste package:

1. **Steel container**
2. **Active cement**
3. **Prepared in NPP**

Changes:

1. Profile of chamber
2. Waste package
3. Barrier

Disposal efficiency (after optimisation): 15-20% => 45-50%

The first chamber (I-K1) is full

The second chamber (I-K2) is completed

Operational Experiences

- Drums (from NPP): 2015: ***800***, 2016: ***256***, 2017: ***0***
- **Low personnel doses**

	2015	2016	2017
Average individual dose ***(mSv)***	0.20	0.20	0.21
Highest individual dose ***(mSv)***	0.28	0.22	0.33

- **Low discharge values**

	2015	2016	2017
Calculated excess dose to the public from discharges ***(nSv)***	80	112	100

- Safe operation: **no major malfunctions**

Operation and Modernization & Safety Upgrading in RWTDF

Radioactive Waste Treatment and Disposal Facility (RWTDF)

- Institutional waste, disposal of LILW-SL, storage of LILW-LL
- Near surface facility in loess with engineered barriers
- Operation licence renewed in 2017

Disposal capacity: 5040 m^3 (full since 2005)

Storage capacity: approx. 1000 drums

Significant Events since Last RM

Safety enhancement programme (waste retrieval)

Safety re-evaluation (1998-2001): certain long-term risk after institutional control period (human intrusion, long-lived historical sources)

- DEMO programme (2006-2009): testing technologies, justification of retrieval, freeing-up disposal capacity (secondary goal of the programme)
- 2010-17: Preparation for continuation of the safety enhancement programme
  - Safety assessment, selection of the vaults in which waste should be fully or partially retrieved
  - **December 2015: HAEA issued the licence enabling PURAM to construct a light structure building (with a crane and inner containment) above vaults and to install necessary technology**
  - **2017: procurement, contracting, to be completed by 2019**

Upgrading:

- 2013-14: Upgrading of the security centre and systems, partly financed by US DOE within the framework of Global Threat Reduction Initiative, new laboratory building
- **2014-2016: Ventilation system was redesigned, licenced and constructed**

Construction of light structure building

Operational Experiences

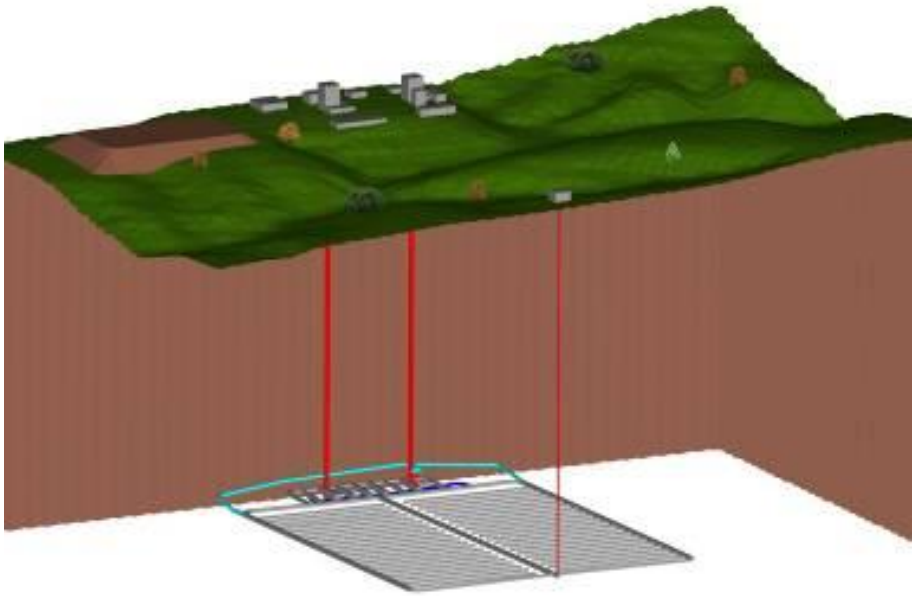
- **Bulk:** 2015: *2.26 m^3*, 2016: *3.26 m^3*, 2017: *3.78 m^3*
- **SRS:** 2015: *229 (8.74 TBq)*, 2016: *275 (5.32 TBq)*, 2017: 329 *(7.56 TBq)*
- **Smoke detectors:** *2015:3 493, 2016: 5 184, 2017: 1 364*

- **Safe operation, low personnel doses and discharge values**

	2015	2016	2017
Average individual dose ***(mSv)***	0.96	1.18	1.11
Highest individual dose ***(mSv)***	1.74	2.50	2.03

	2015	2016	2017
Calculated excess dose to the public from discharges ***(μSv)***	0.85	0.25	0.13

Siting of Deep Geological Repository

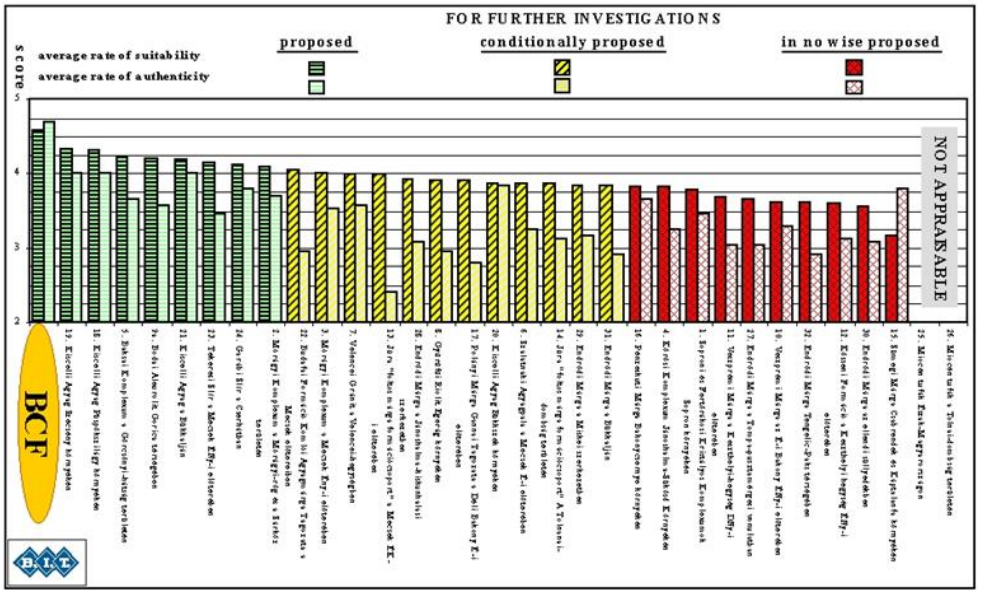


Earlier activities

- 1990's: in-situ investigation (from U-mine), 1995-98 a short-term programme was carried out, Boda Claystone Formation (BCF)

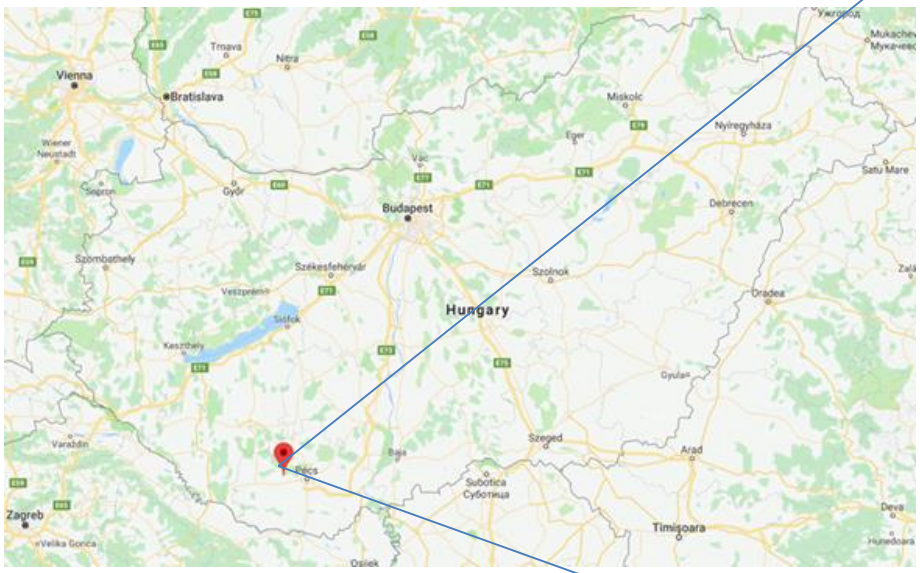
As a result of the investigation programme it was stated that there were no circumstances, which can exclude the suitability of the formation.

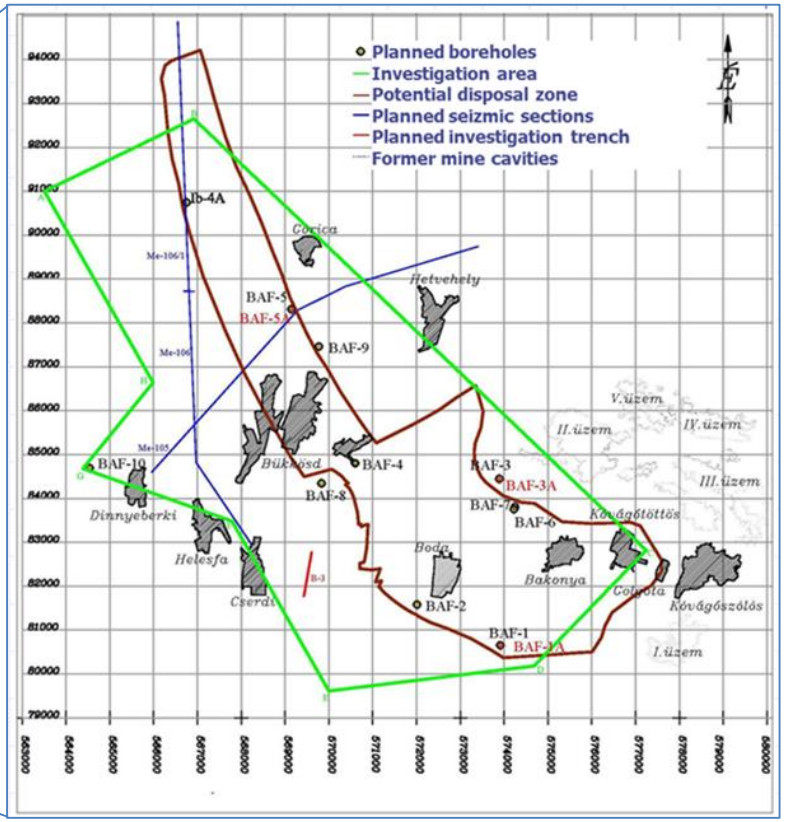
- Closure of the U-mine
- 2000-2003:country-wide screening => BCF was one of the most promising formation
- 2004: surface based investigations



Current phase of investigations

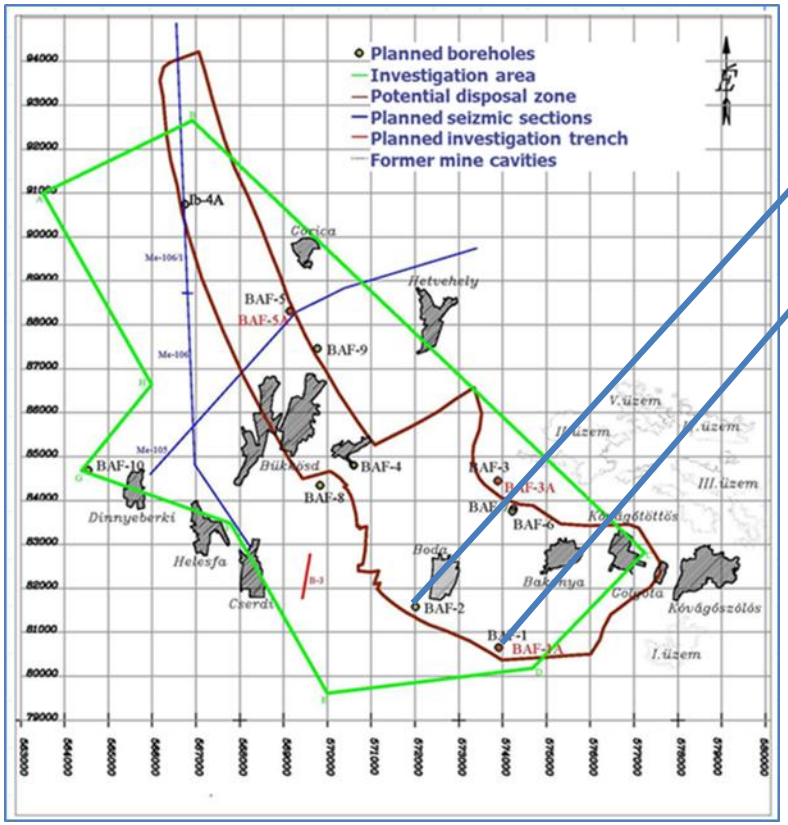
- In 2013 the surface based site selection process was restarted in the Boda Claystone Formation (BCF)
- The aim is to focus the investigation area from 87 km^2 to ~10 km^2





Significant Events Since Last RM (1)

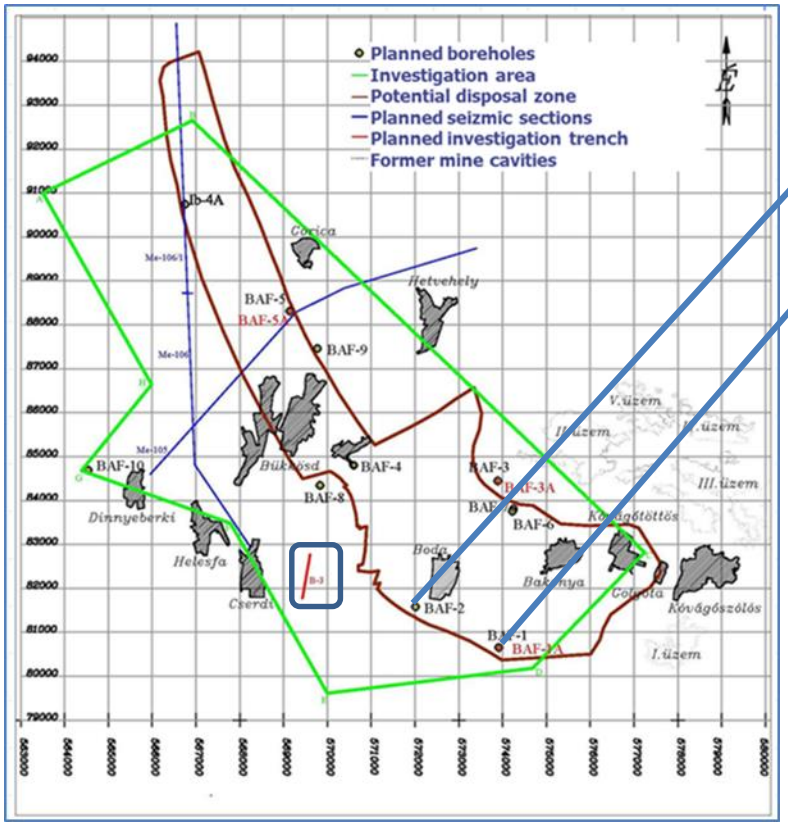
The area of the surface based investigations in the West-Mecsek Hills



- Three deep boreholes were drilled
  - BAF-2 913 m
  - BAF-1A 474 m
  - BAF-1Af 1030 m

Significant Events Since Last RM (2)

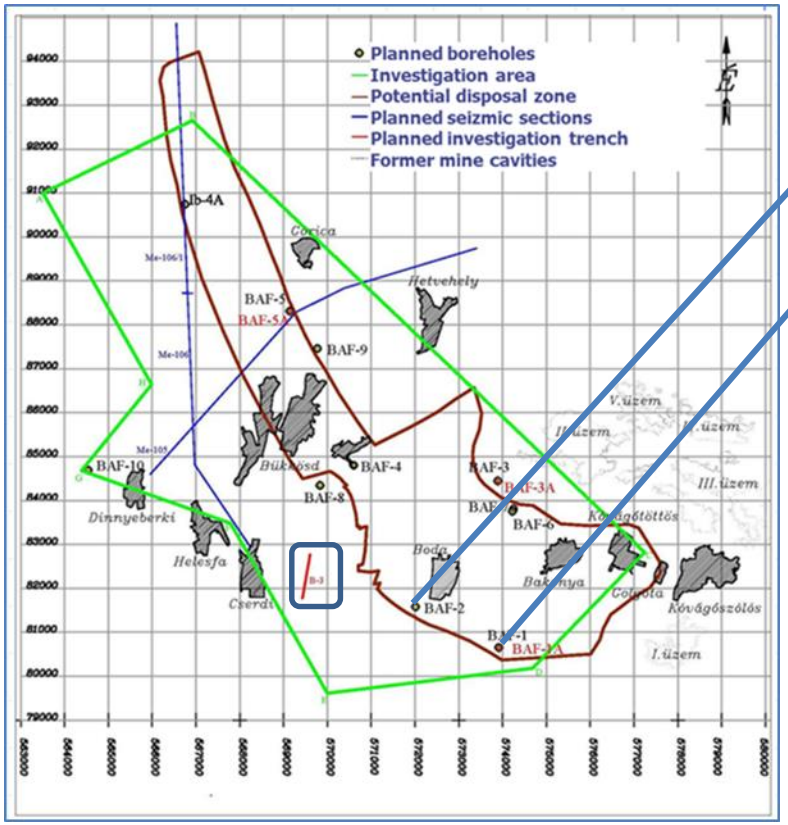
The area of the surface based investigations in the West-Mecsek Hills



- Three deep boreholes were drilled
  - BAF-2 913 m
  - BAF-1A 474 m
  - BAF-1Af 1030 m
- A trench was excavated (700 m long, 2-6 m deep)

Significant Events Since Last RM (3)

The area of the surface based investigations in the West-Mecsek Hills



- Three deep boreholes were drilled
  - BAF-2 913 m
  - BAF-1A 474 m
  - BAF-1Af 1030 m
- A trench was excavated (700 m long, 2-6 m deep)
- 2D seismic profiles were measured (33 km) and evaluated
- Preliminary geomorphological survey was carried out

Milestones

- 2013-2018: Site selection, preparatory phase
- 2018-2023: Site selection phase 1, surface based (~87 km^2 area)

  ↳ **safety assessment**
- 2024-2029: Site selection phase 2, surface based (~10 km^2 area)

  ↳ **safety assessment**
- 2030-2032: preparations of the URL (1-2 km^2 area)

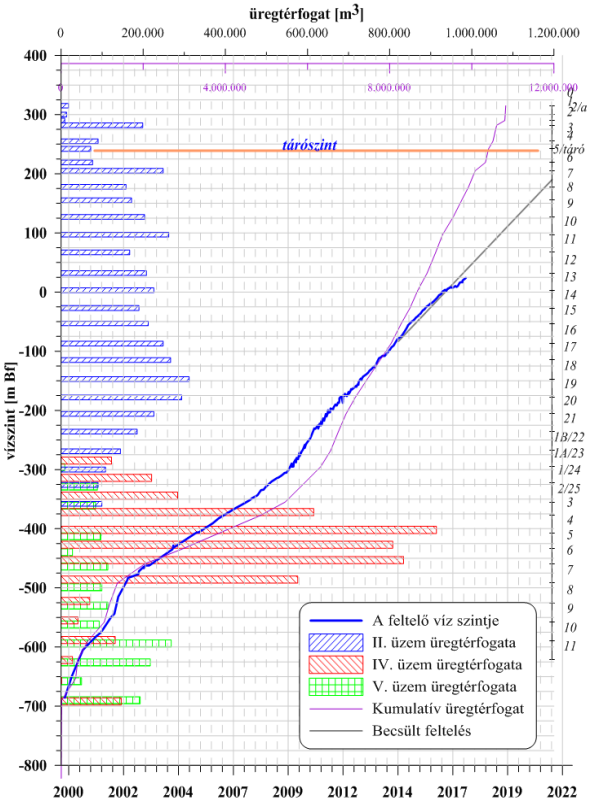
  ↳ **safety assessment**
- In parallel with the field investigations R&D has to be performed in connection with
  - Waste inventory, waste forms,
  - Packaging and engineered barrier system,
  - Layout and repository design

Remediation activities of the former Uranium mine

- **MECSEK-ÖKO Ltd. merged into PURAM on 22 April 2014**
- **Reorganization: U-mine remediation branch of PURAM joined to Mining Property Utilization Ltd. on 13 July 2016**
- First licence including radiation protection prescriptions was granted by the competent regional environmental authority in 1998
- Although the remediation work was finished at the end of 2008 certain long term activities have to be continued (water treatment, environmental monitoring, maintenance)
- Based on the findings of the IAEA peer review (in December 2010) a 30-year strategic plan was worked out.

Current and further tasks

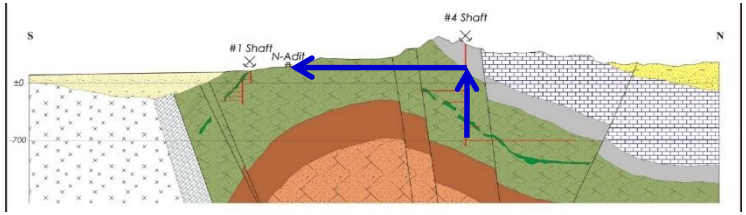
- Due to flooding of the underground mining openings an enlargement of the water management system and mine water treatment plant is inevitable, the works are on-going

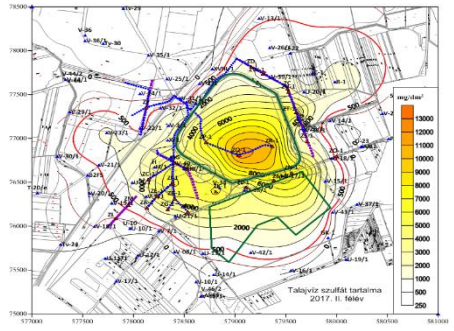


Mine water contaminated with U:

- Before 2015: cca. 0.5 Million m^3/a
- After 2022: cca. 1.2 Million m^3/a

Ground water with high salinity at the tailings ponds area: cca. 0.8 Million m^3/a





István Lázár
Hungarian Atomic Energy Authority

LEGAL FRAMEWORK - DEVELOPMENTS NUCLEAR SAFETY, REGULATORY ASPECTS

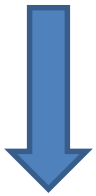
Outline

- Regulatory framework – integrated authority system
- Recent developments in legal framework
- Organizational developments of HAEA
- Licensing Spent Fuel Interim Storage Facility
- Licensing Radioactive Waste Repositories
- Other issues in focus
- Summary

Regulatory framework

The fundamental law is the **Act of 1996 on Atomic Energy** declaring that the control and supervision of the safe use of nuclear energy are Government's tasks. These tasks are fulfilled through the Hungarian Atomic Energy Authority (HAEA) and the responsible ministers.

The Act designates the nuclear facilities (NPP, research/training reactor, spent fuel storage facility)



In Hungary the radioactive waste management facilities are not considered as nuclear facilities

Development of the regulatory system

Past practice - Divided authority and regulatory system (1996-2014)

- HAEA: regulator for nuclear facilities
- Health authorities: for radioactive waste management facilities and radiation protection

Integration of regulatory system

- 2014 July - HAEA took over the regulatory oversight of radioactive waste management facilities

  (New legislation with the requirements)
- 2016 January - the responsibility of HAEA was extended with the radiation protection

  (Implementation of new Basic Safety Standards)

Development in the Legal Framework

New executive orders of the Act on Atomic Energy

(1) Govt. decree 155/2014. (VI. 30.) on the safety requirements of interim storage and final disposal facilities of radioactive waste and the related regulatory activities (entered into force 30 June 2014)

- taking into account all of the safety reference levels formulated by WENRA and other relevant international standards
- elaborating a detailed system of requirements and regulatory processes in a similar manner as those are in the Nuclear Safety Codes for nuclear facilities /renewing the previous regulation (2003)/

Annexes (Safety Codes): 1. Management systems of RW management facilities 2. Design, commissioning, operation, closure, institutional control of RW management facilities **3. Site survey and assessment, siting of a repository** (entered into force in 2018)

- 9 guidelines have already been issued

Developments in the Legal Framework

New executive orders of the Act on Atomic Energy

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

- Radiation protection
  - Change of regulatory system (centralized)
  - Implementation of new Basic Safety Standards
  - National dosimetry register
  - RP training and registered radiation protection experts

Classification of radioactive waste

New radioactive waste class(es)

- ***VLLW***
- *LLW* - *SL*
- *ILLW* - *LL*
- *HLW*

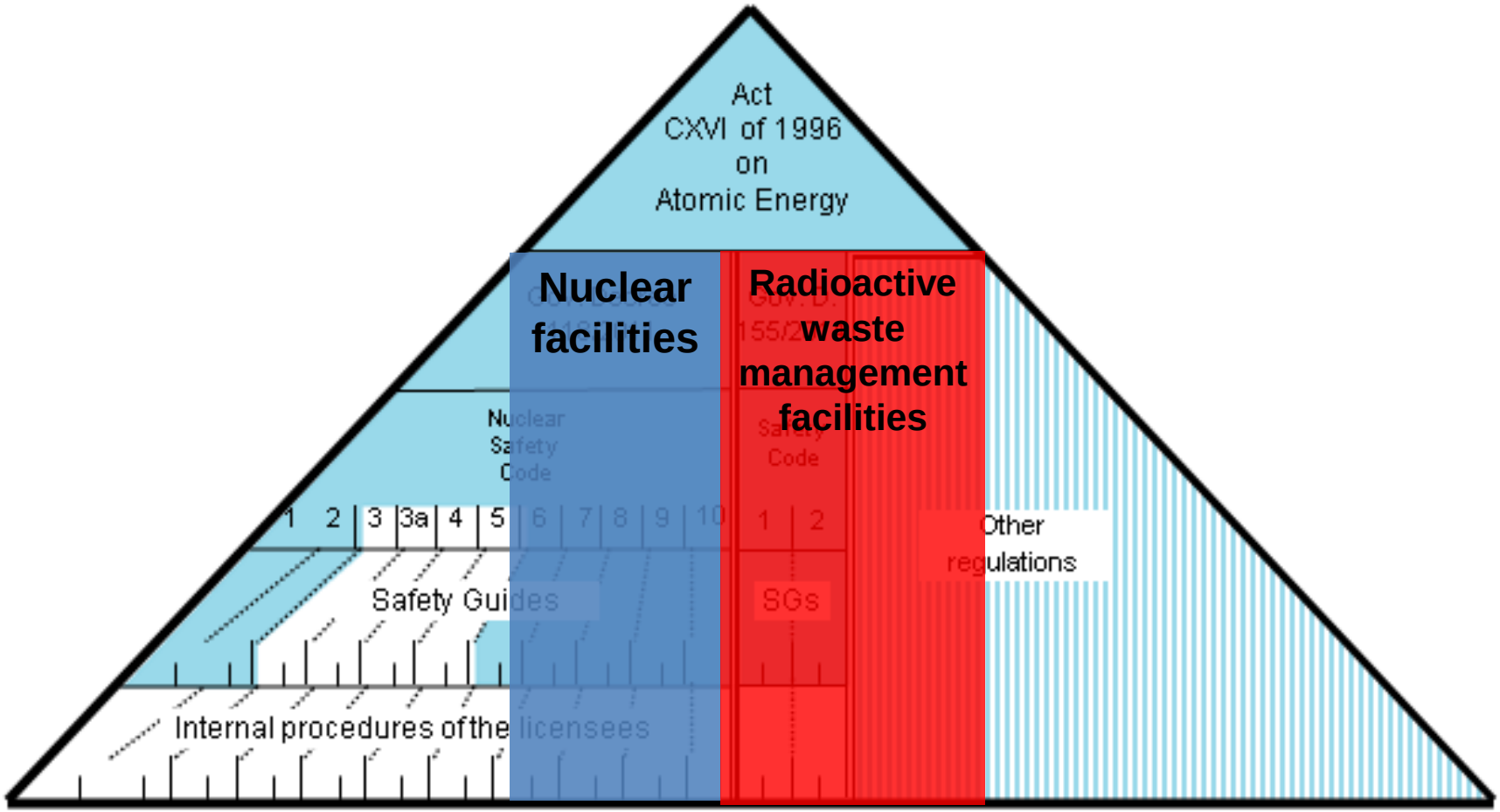
According to the recent (March 2018) amendment of the Govt. decree 487/2015. (XII. 30.)

Draft version of a new government decree *on the safety requirements of the repositories of very low level radioactive waste and the related regulatory activities*

Major amendments of the Act on Atomic Energy

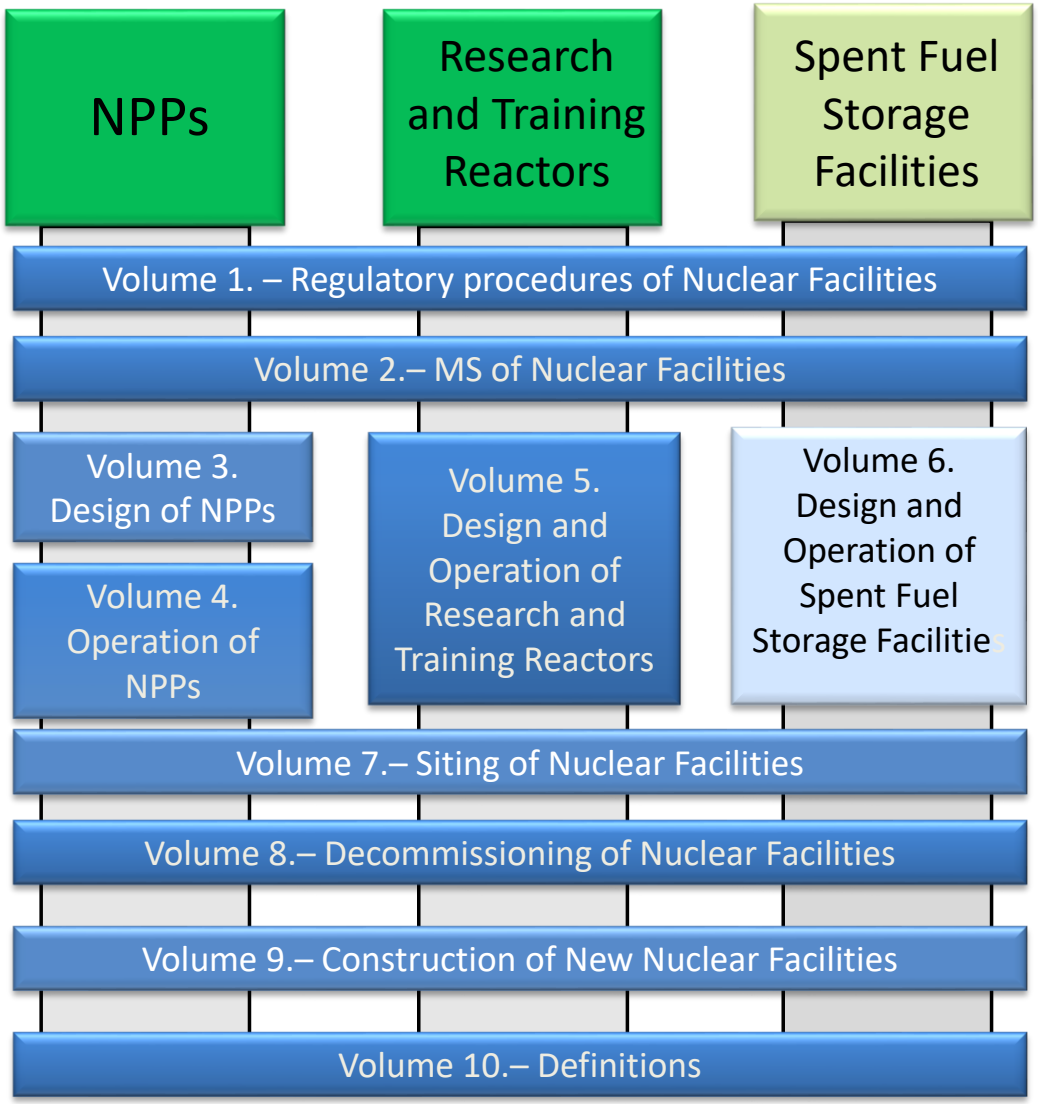
- Requiring public hearings for all major (facility level) licensing procedure
  - E.g. siting, construction, operation, decommissioning
- Determination of clients for regulatory procedures
  - Owners of real estates within safety zone
- HAEA independence (considering IRRS results)
  - Improving salaries
  - HAEA DG to decide on certain bonus
  - Nuclear oversight fee shall be used to cover HAEA costs

Legal framework



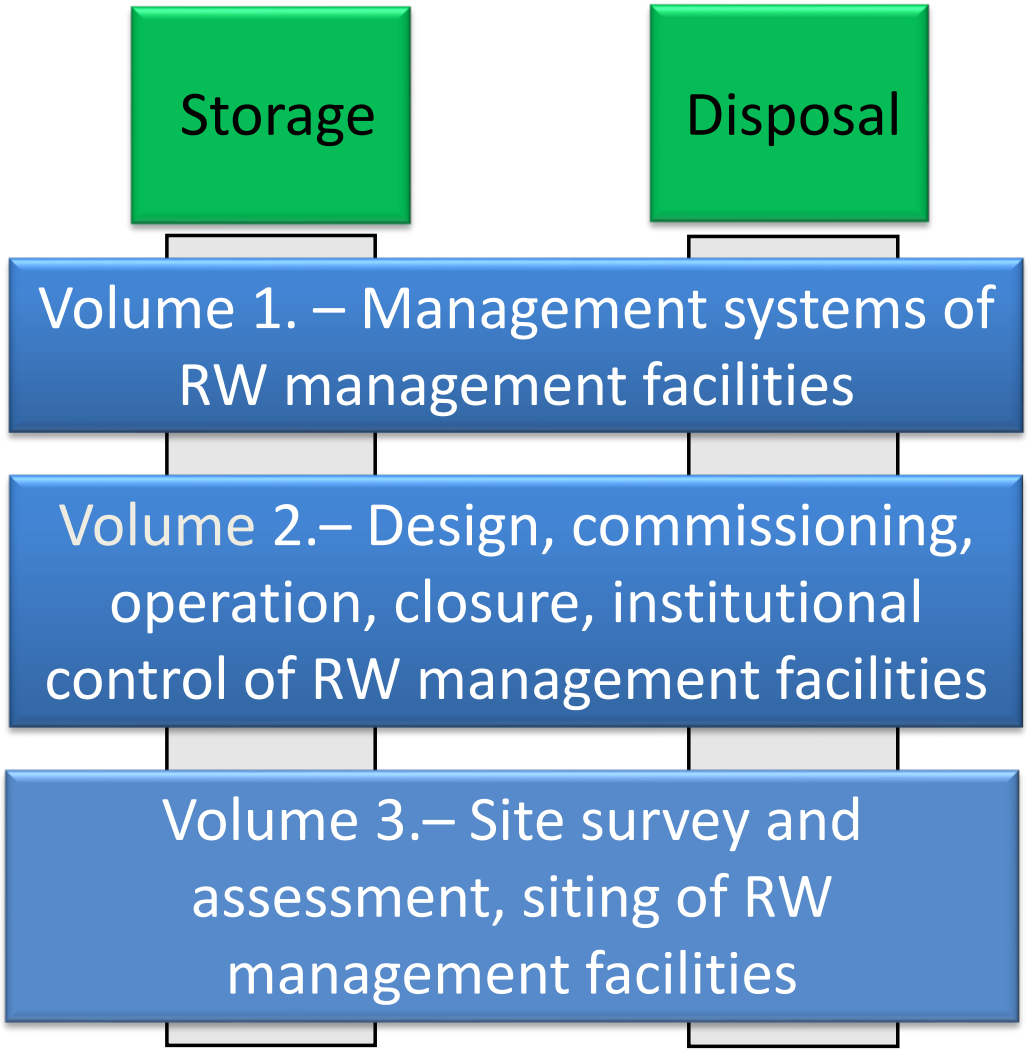
Regulations for Nuclear Facilities

- Act CXVI of 1996 on Atomic Energy
- **Government Decree No. 118/2011. (VII. 11.)**
  - on the nuclear safety requirements of nuclear facilities and related regulatory activities
- **Annexes**
  Nuclear Safety Code
- Guidelines



Regulations for RW Management Facilities

- Act CXVI of 1996 on Atomic Energy
- **Government Decree**
  No. 155/2014. (VI. 30.)
  – on the safety requirements of interim storage and final disposal facilities of radioactive waste and the related regulatory activities
- **Annexes**
  Safety Code
- Guidelines



Human Resource Development

The number of HAEA staff

Dec. 2013	Dec. 2016	May 2018
80	**164**	**178**

According to *Govt. decree 1850/2014. (XII. 30.)* the number of employees at HAEA has been increased

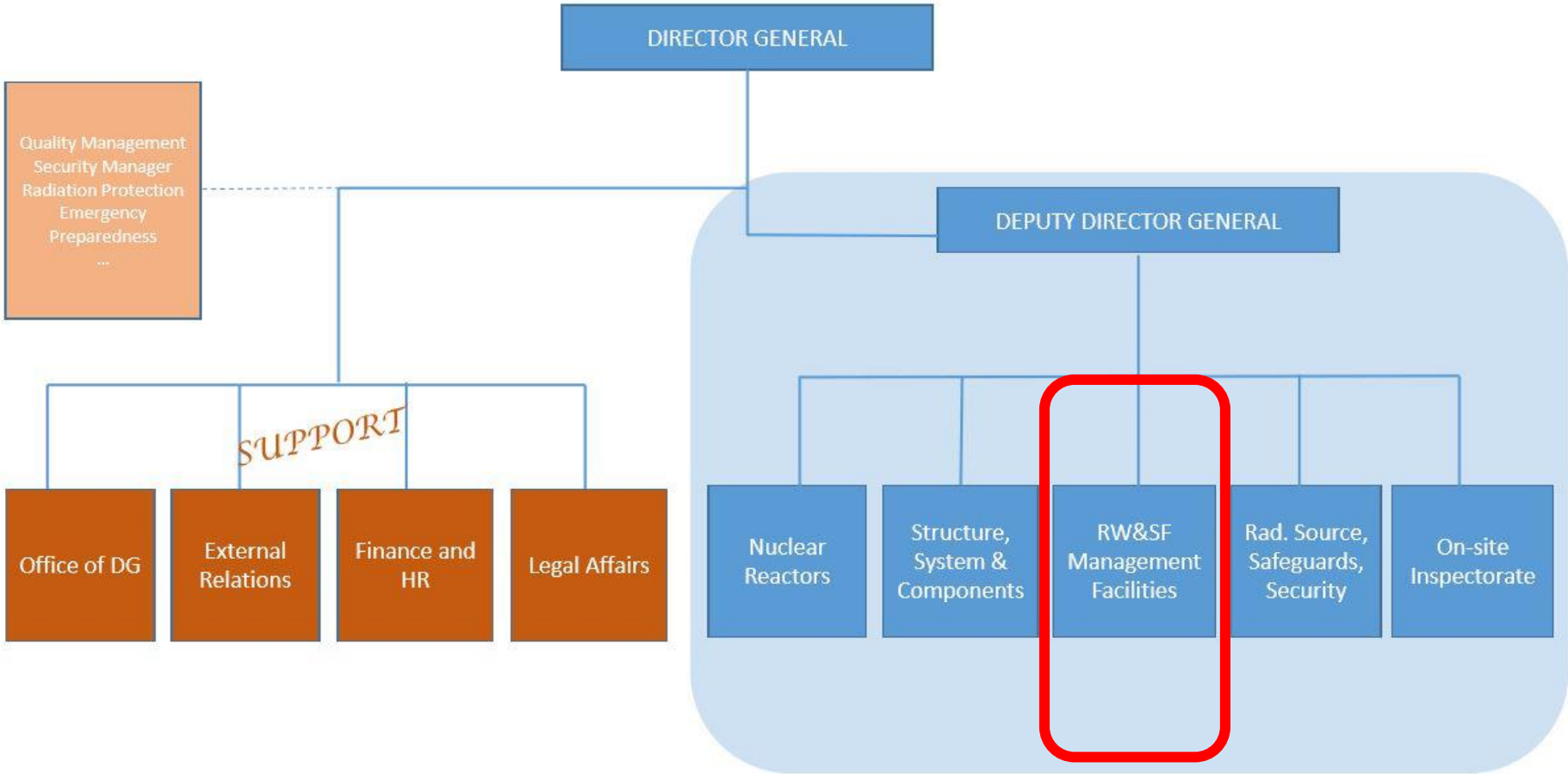
- 76 new members (from 1 January 2015),
- additional 10 newcomers (from 1 July 2015)

Main aims of the extension

- to ensure the licensing activities of the new units
- to provide sufficient human resource
  - for oversight of repositories (from 1 July 2014)
  - for radiation safety (from 1 Jan 2016)

Intensive professional training program has been implemented

Reorganization of HAEA



Regulatory oversight of the spent fuel storage facility

Spent Fuel Interim Storage Facility

- Modular vault dry storage facility planned for 50 years of storage
- Exclusively for SFs from the Paks NPP
- Entered into operation in 1997 with 3 vaults
- Capacity
  - Stage 1 & 2: 16 vaults with 450 tubes each
  - Stage 3: vaults 17-20 with 527 tubes each
  - Stage 4: vaults 21-24 with 527 tubes each
  - Stage 5: vaults 25-28 with 703 tubes each
- Stored SF assemblies
  - 8077 by 2014
  - 8347 by 2015
  - 8707 by 2016
  - 9007 by 2017
  - 9157 in May 2018

(Acceptance is limited to 500/year)

Current state of SFISF

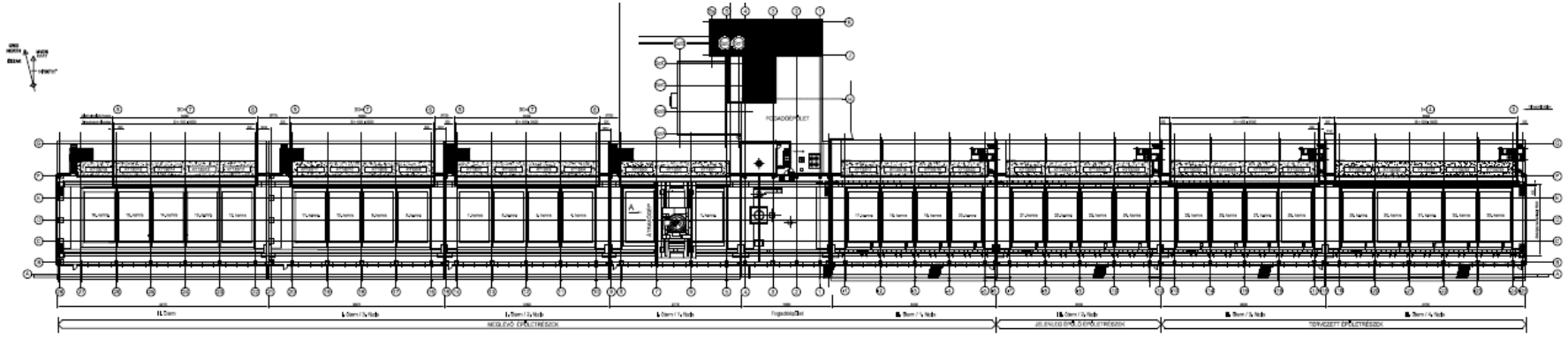
Planned facility contains 8 modules (1 module = 3-5 vaults)

-5 operating modules (1-20 vaults)

-1 module constructed, under commissioning (21-24 vaults)

-1 module building permit (25-28 vaults)

-1 additional module planned (29-33 vaults)



12-16	8-11	4-7	1-3	main	17-20	21-24	25-28	29-33
2007	2003	2000	1997	1997	2012	2018		

The major regulatory oversight activities

‘Facility-level’ licences

4th stage of the extension (including vaults 21-24)

- 2013 - BUILDING permit (vaults 21-24)
- 2014 - MANUFACTURING licences (vaults 21-24)
- 2017 - COMMISSIONING licence (vaults 21-24)
  - Public hearing was held on 14th September 2017
- 2018 – OPERATIONAL licence (vaults 1-24) /expected/

5th stage of the extension (including vaults 25-28)

- 2016 - BUILDING permit (vaults 25-28)
- 2018-2019 - MANUFACTURING licences (vaults 25-28) /expected/

The major regulatory oversight activities (2)

Construction

- 2015 - Construction licence (renewal): vaults 21-33
- 2016 - Modification of construction licence (25-33 vaults)
  - The improvement of storage efficiency of the future 25-33 vaults are based on a new concept
  - Validity of license 15th December 2033
  - Public hearing was held on 5th October 2016

Periodic Safety Review

- November 2017 - PSR report submitted to the HAEA (review is ongoing)

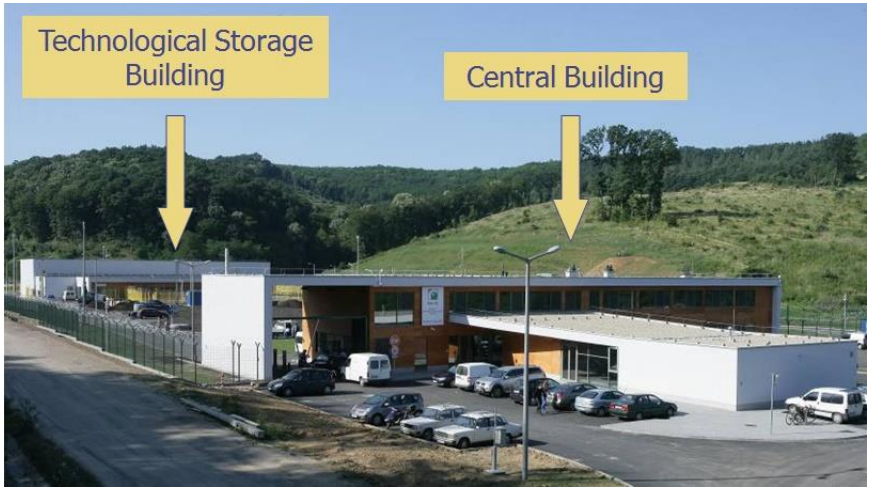
On-site Regulatory Inspections
Construction and Manufacturing Activities

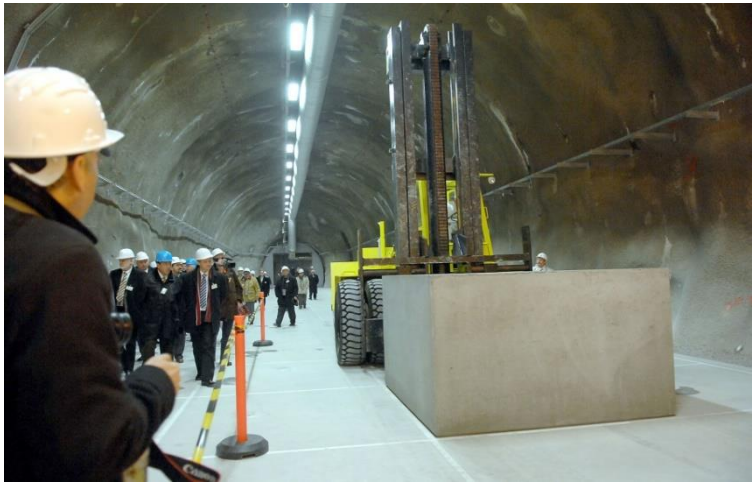
Regulatory oversight of the radioactive waste management facilities

Main regulatory activities

- **Issuing new operational licences for both repositories**
  - National Radioactive Waste Repository (NRWR) - Bátaapáti (geological disposal for LLW/ILW from the NPP)
  - Radioactive Waste Treatment and Disposal Facility (RWTDF) - Püspökszilágy (typical near-surface facility with concrete vaults for institutional LLW/ILW)
- **Conducting the first Periodic Safety Review (PSR) of RWTDF**
  - according to the 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

NRWR – Bátaapáti (1)





NRWR – Bátaapáti (2)

Former licence

Surface facility, I-K1 chamber

Expired in Sept 2017

New licence

+ I-K2 chamber

Licence was issued **5 Sept 2017**

Valid until **31 Dec 2061**

Subject of the following PSRs

RWTDF – Püspökszilágy (1)

RWTDF – Püspökszilágy (2)

Former licences

Disposal

Storage

Processing

New licence

Unified operational licence

Licence was issued ***9 August 2017***

Valid until ***31 December 2067***

Subject of the following PSRs

PSR of RWTDF - Püspökszilágy (1)

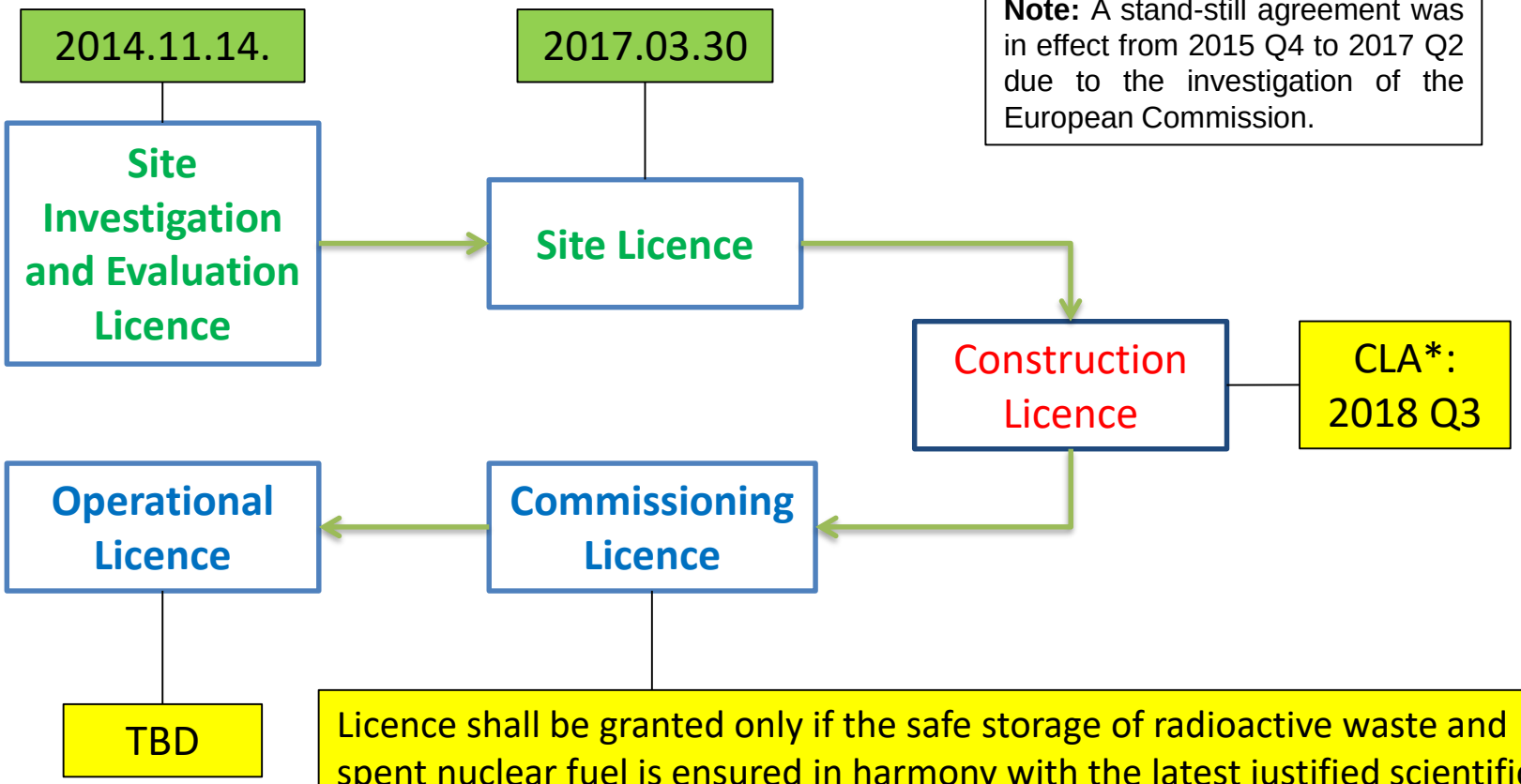
- Act on Atomic Energy
  - Periodic Safety Review to provide a full-scale analysis and assessment of the risk and fulfillment of safety requirements, considering operational experiences and new knowledge
- Gov. Decree 155/2014
  - every 10 years
  - HAEA shall conclude the resolution of the first PSR by Dec 15, 2017 in RWTDF
  - PSR report to HAEA 1 year prior to the conclusion;
  - areas to be reviewed, aspects of the review, actions to be taken if non-compliances are revealed
- Regulatory guide T0.4. (Periodic safety review of the RWTDF)
  - Details of the review and report

PSR of RWTDF - Püspökszilágy (2)

- Milestones:
  - 15th of Dec, 2016: PURAM submitted the PSRR to HAEA
  - 21th of Dec, 2017: HAEA's resolution concluding the PSR
- First PSR in RW management facility in Hungary
  - learning process for all of us
  - Very time and resource consuming process
- Action Plan
  - 87 non-compliances, 27 are relevant to safety
    → HAEA prescribed corrective actions
- Benchmarking should be continuous activity
  - good practices, WENRA SRLs and IAEA requirements/guides

Other Issues in Focus

New NPP Units (No. 5-6) Licensing Milestones



Note: A stand-still agreement was in effect from 2015 Q4 to 2017 Q2 due to the investigation of the European Commission.

* = Submission of the Construction License Application, Licensee's estimation

Licence shall be granted only if the safe storage of radioactive waste and spent nuclear fuel is ensured in harmony with the latest justified scientific results and international expectations and experiences.
In the case of nuclear power plant the compliance with this requirement shall be demonstrated together with the submittal of the commissioning licence application.

IRRS mission in Hungary

May 2015 full scope mission

- Results
  - Recommendation: 32
  - Suggestion: 10
  - Good Practices: 6
- Action Plan has been completed based on the mission results (2015)
  - 23 tasks are completed out of 35 HAEA tasks

September 2018 follow-up mission

- Preparatory meeting – February 2018

Fukushima Experiences – SFISF

- In the frame of the regulatory integrated inspection the licensee was required to assess the lessons learned from the Fukushima event concerning the SFISF in order to define safety enhancement actions if necessary.
- The assessment report of the licensee was submitted in 2016, and after the regulatory assessment process the HAEA approved it in November 2017.
- The site characteristics were re-evaluated in a safety assessment to determine their possible extreme values and the impact of these extreme values on the barriers.

Fukushima Experiences – Nuclear Facilities

Two low-risk weaknesses were pointed out, when electromagnetic interference can affect on I&C components.

- mobile phones usage close to opened electrical enclosures,
- welding transformers used by the maintenance work.

An Action plan has been implemented, licensee modified Operational Limits and Conditions.

- limited usage of mobile phones during maintenance,
- only EMC certified welding machines allowed,
- manipulating of fuel prohibited while welding carried out.

Post-Fukushima safety assessments demonstrate that

- The design basis was set properly, and the facility possesses appropriate safety margins beyond the design basis.
- The results of the investigations had no impact on the emergency response plan.

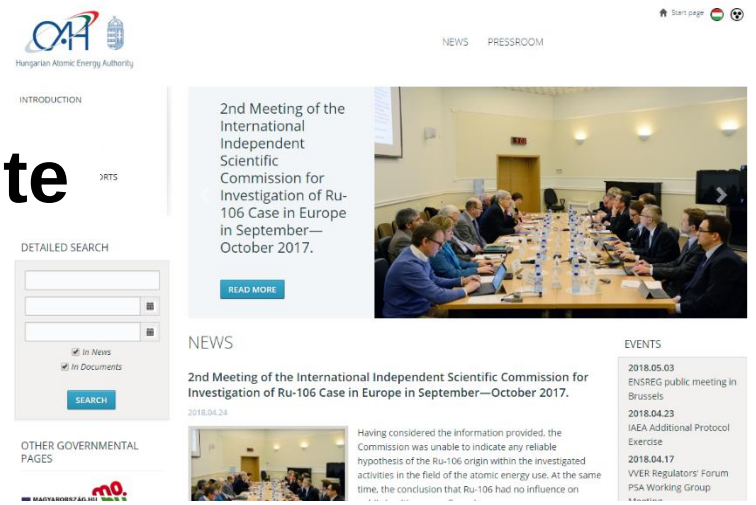
Ensuring transparency and openness

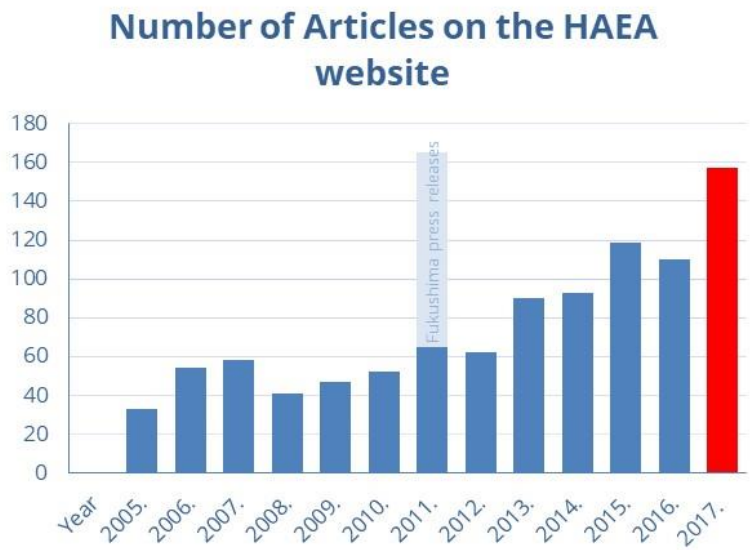
HAEA communication activities

Transparency and communication

Continuously updated website

- Wide range of documents are available
  - Annual reports, national reports (JC, CNS), bulletins, legal framework, guidelines, policies, event calendar
  - Annual plan for regulatory inspections
- 150 news/year





Transparency and communication (2)

Public involvement in licensing process

- From 2013 the Act on Atomic Energy prescribes that in all facility level licensing procedure the HAEA shall arrange public hearings to ensure transparency and openness

10 Public hearings (2015 - 2017)
5 in connection with SF and RW management facilities

- 2 SFISF – in Paks,
- 1 NRWR – in Bátaapáti,
- 2 RWTDF – in Püspökszilágy

From 2017 draft version of the guidelines are published on the website for public opinion

Summary

Challenges

SFISF - Extension of the facility, implement the new storage approach for new vaults (movement of SFs inside the facility)

NRWR - Extension of the facility

RWTDF - Continuation of safety enhancement programme, preparation for large scale waste retrieval

Siting for DGR - Continuation of siting programme, narrowing down the current investigation area (from 87 km^2 to ~ 10 km^2)

Remediation - Enlargement of the water treatment plant in order to manage the volume of mine water that will be increased after the complete flooding of certain underground mining openings in the former uranium mine.

New NPP units - Step-by-step integration into the Hungarian SF and RW management

Good practice/performance

Paks NPP

- The first and only VVER-440 with longer (15-month) operating cycle, resulting lower volume of RW and SF.

SFISF

-Taking advantage on SF having been stored/cooled for decades in SFISF, the arrangement of storage tubes in the future modules can be denser than earlier (XXL).

-Post-Fukushima safety assessment was carried out.

NRWR

-Optimization of the WHOLE waste management for NPP LILW (introducing new liquid waste treatment, cementation technology at NPP, new /compact/ waste packages, new chamber geometry, revision of engineered barriers) resulting in a more efficient and economical disposal without jeopardizing high level of safety.

We hope that our 6th National Report and the written answers to the 64 questions Hungary received, as well as our presentation today convinced the Review Meeting about our strong commitment to fulfil Hungary's obligations under the Joint Convention.

THANK YOU FOR YOUR ATTENTION!

Overview matrix (1)

	Long-term Management Policy	Funding of Liabilities	Current Practices / Facilities	Planned Facilities
Spent Fuel	a) Deep geological disposal of SF from the Paks NPP (reference scenario is direct disposal, but no decision on the back-end yet)	a) SF from the Paks NPP: CNFF (payment from the Paks NPP during its operation)	a) SF of the Paks NPP: Storage in the SFISF (Paks)	Future HLW/SF repository (Mecsek Hills)
	b) Repatriation of SF from research reactors	b) SF of research reactors: State Budget, (when cost arise)	b) SF of research reactors: Repatriation/Storage on-site	
Nuclear Fuel Cycle Waste	Intermediate depth disposal in the NRWR (Bátaapáti)/ Deep geological disposal	CNFF (payment from the Paks NPP)	Storage on-site and in the surface facility of NRWR	NRWR further chambers are constructed in parallel with the operation/ Future HLW/SF repository (Mecsek Hills)
			Disposal in the underground chambers of NRWR	
Non-power Waste	Near surface disposal in the RWTDF (Püspökszilágy)/ Deep geological disposal	CNFF (Fee paid by the licensees)	Disposal and storage in the RWTDF (Püspökszilágy)	RWTDF (free capacity is being gained during the safety upgrading program)/ Future HLW/SF repository (Mecsek Hills)

Overview matrix (2)

	Long-term Management Policy	Funding of Liabilities	Current Practices / Facilities	Planned Facilities
Decommissioning Liabilities	Intermediate depth disposal in the NRWR (Bátaapáti)/ Near surface disposal in the RWTDF (Püspökszilágy)/ Deep geological disposal	CNFF (payment from the Paks NPP during its operation/ State Budget, when cost arises)		NRWR further chambers are being constructed in parallel with the operation/ RWTDF (free capacity gained during the safety upgrading program)/ Future HLW/SF repository (Mecsek Hills)
Disused Sealed Sources	Near surface disposal in the RWTDF (Püspökszilágy)/ Deep geological disposal	CNFF (Fee paid by the licensees)	Disposal (of short-lived sources) and storage (of long-lived) in the RWTDF (Püspökszilágy)	RWTDF(free capacity gained during the safety upgrading program)/ Future HLW/SF repository (Mecsek Hills)

5th REVIEW MEETING - CHALLENGES

1.Possible site for future HLW/SF repository identified in the Mecsek region – need to narrow down area of the repository for SNF and HLW. (**still a challenge (SC)**)

2.Need to increase storage capacity for SF based on life-extension for Paks NPP. (**SC**)

3.National Radioactive Waste Repository at Bátaapáti – capacity challenge, large volume of VLLW (21,000m^3) – required to esablish disposal route for this waste class. (**SC** and **ongoing**)

4.Remediation activities of the former uranium mine – enlargement of the water management system needed and mine water treatment plant required due to flooding of the underground mining openings. (**SC**)

5.Nuclear Regulator (HAEA) resources – training and achieving timely competence. (**ongoing, completed**)

6.National strategy on the back-end of the fuel cycle should be developed. (**SC**)

7. Retrieval of long-lived radioactive sources from existing disposal facilities due to concerns related to long-term safety. (**SC**)

5th REVIEW MEETING - SUGGESTIONS

1. Finalize the National Programme under the EU Directive. (**completed**)

2. Further efforts needed in development of the integrated regulatory system. (**completed**)

3. Establish resource strategy linked to the expanding nuclear programme. (**ongoing, completed**)

4. Review Safety of SF and RW management facilities in light of Fukushima accident. (**completed**)

5. Finalize the evaluation of the compliance of existing repositories with legal requirements and identify safety improvements with action plans. (**completed**)

6. Complete IAEA recommendations for the remediation of the former uranium mine. (**ongoing**)