

RELEASE OF SITES AND BUILDINGS IN HUNGARY



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HUNGARIAN NUCLEAR SITES

4 NPP's units in Paks ~2000 MW

- + Life time extension for 20 years
- + Final shut down 2032-2037 → safety enclosure 50 years → decom. will 2082-2104
- + Planned enlarge 2 x 1000 MW

2 Research Reactors in Budapest

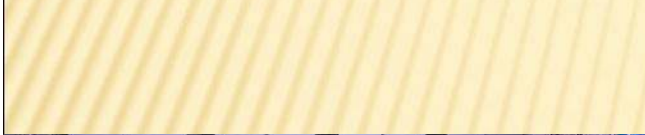
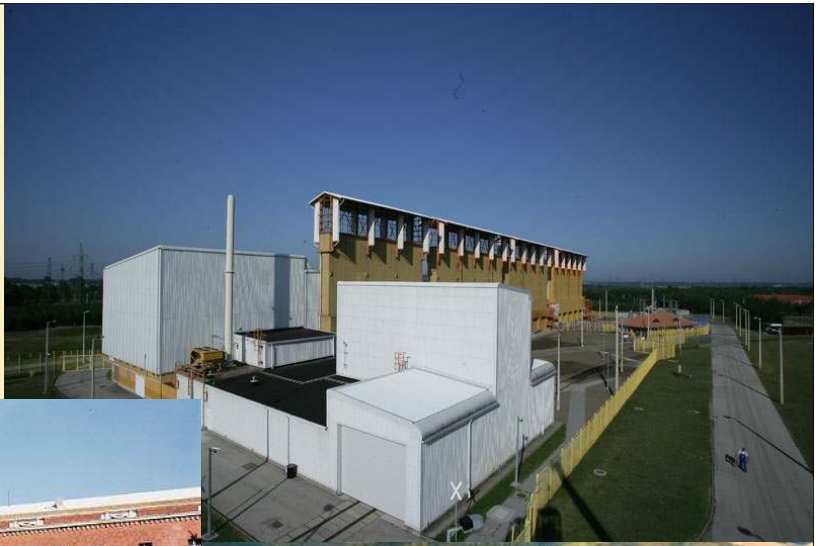
- + WWR-SM10 → 10 MW /1959 – 2023, renewed/
- + BUTE → 100 kW /1971 – 2027, Hungarian developed/

Interim spent fuel storage in Paks

- + Storage capacity enlarging continuously → decom. will 2082-2104
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2 Radioactive waste repositories /low- and medium level/

- + Near surface repository near Budapest
- + Geological repository near Paks
- + High level RW storage will 2047-2067 /planned phase/



LEGISLATION, MAIN ACTS AND MINISTERIAL DECREES 1

- Act on Atomic Energy No. CXVI (1996)
 - Section 38. (1) A licence for the application of atomic energy shall be granted only if the safe storage, i.e. interim storage or final disposal, of the radioactive waste and spent fuel generated can be assured in accordance with the most recent certified results of science, international expectations, as well as experience.
 - Section 40. As the solution of such matters is in the national interest, the performance of tasks related to the final disposal of radioactive waste, as well as to the interim storage and final disposal of spent fuel, and to the decommissioning of a nuclear facility shall be the responsibility of an organisation designated by the Government.
- Minister of Health Decree No. 16/2000 on the execution of certain provisions of Act on Atomic Energy associated with radiation protection
- Minister of Health Decree No. 47/2003 on certain issues of interim storage and final disposal of Radioactive Wastes

LEGISLATION, MAIN ACTS AND MINISTERIAL DECREES 2

- Minister of Health Decree No. 16/2000 on the execution of certain provisions of Act on Atomic Energy associated with radiation protection

Section 23 (Clearance from regulatory control)

(1) On the request of the licensee the resolution about the clearance from the regulatory control is issued by the Office of CMOS. The licensee attaches to the request an estimate of the doses originating from the use, re-use, re-utilisation of the substance or its handling as non-radioactive waste, as well as an analysis concluding that the clearance is the optimum solution.

(2) Substances containing radionuclides can be released from regulatory control if

- a) the projected annual individual dose originating from its re-use, re-utilisation or it's handling as non-radioactive waste does not exceed 30 μ Sv effective dose, and
- b) the analysis proves that the clearance is the optimum solution.

(3) In its resolution the Office of CMOS may imply conditions concerning the use, re-use, and reutilisation of the substance or its handling as non-radioactive waste.

(4) For the communication of the decision as per Subsection (2) the rules of Section 22, Subsection (1) shall be applied.

(5) For radionuclide containing substances released from the regulatory control the further provisions of this Decree need not be applied.

- Minister of Health Decree No. 47/2003 on certain issues of interim storage and final disposal of Radioactive Wastes

WASTE SORTING

RW category	Compared to activity concentration
Low level activity	$\sum \frac{AK_i}{MEAK_i} \leq 10^3$
Medium level activity	$\sum \frac{AK_i}{MEAK_i} = 10^3 - 10^6$
High level activity	$\sum \frac{AK_i}{MEAK_i} > 10^6$

Remark: AK_i – unit i activity concentration [Bq/g], $MEAK_i$ – unit i exemption activity concentration [Bq/g]

WASTE INVENTORY 1

Near surface repository

- + 10-20 m³/year from RRs, Hospitals and Laboratories
- + 2-3000 pc used radiation sources (⁶⁰Co, ¹⁹²Ir)
- + BRR ~10 drums/year
- + BRR decommissioning ~430 m³ (in 2025-2026)

Interim spent fuel storage

- + 1989-1998 transported back to Russian Federation
2331 pc fuel assemblies
- + Storage capacity 7200 pc → continuously enlarging
- + 6067 pc spent fuels in 2009

WASTE INVENTORY 2

Geological repository

- + Liquid rad. wastes → evaporate to concentrated „boric acid content”
 - × Quantity: 250 m³/year, Σ 7400 m³ (30 years)
- + Ion-exchange resin
 - × Quantity: 5 m³/year, Σ 335 m³ (30 years)
- + Solid rad. wastes
 - × Volume reduction → reduction factor „5”
 - × Quantity: 850 drums/year, Σ 2900 m³ (30 years)
 - × NPP's decommissioning 17.900 m³ → HLRW ~410 m³

<http://www.rhk.hu/en/our-premises/nrwr/waste-inventory/>

<http://www.rhk.hu/en/our-premises/rwtdf/>

WASTES RELEASE

Research reactors

- + Collect by selected (active or inactive)
- + Control measuring the inactive wastes (gamma dose rate and contamination „background”)
- + Final disposal the communal waste deposit

Interim spent fuel storage

Waste release according to Minister of Health Decree No. 16/2000

Control measuring:

- + Gamma dose rate in drums geometry 16 isotopes (^{60}Co , ^{137}Cs , ^{59}Fe)
- + Alfa- and beta isotopes determination with scaling-factors (^3H , ^{14}C , ^{55}Fe)
- + Smear sampling for the bigger wastes

Wastes quantity: 4 m³/year; final disposal the communal waste deposit

WASTE RELEASE IN PAKS NPP'S (2009)

Waste release according to Minister of Health Decree No. 16/2000

Control measuring:

- + Gamma dose rate in drums geometry 16 isotopes (^{60}Co , ^{137}Cs , ^{59}Fe)
- + Alfa- and beta isotopes determination with scaling-factors (^3H , ^{14}C , ^{55}Fe)
- + Smear sampling for the bigger wastes

Waste handling

Kind of waste	Disposal manner	Waste quantity/year	Waste limit/year
Textil, protective clothes, heat isolation materials	Communal waste deposit (old mine; cover with soil)	11,8 tons /34%/	35 tons
Chemicals, accumulators, active carbon, oil	Accumulator recycling and waste burning factory	6,3 tons /42%/	15 tons
Metal scrap	Metal factory (melting)	99,5 tons /99,5%/	100 tons
Communal waste, plastic, glass,	Communal waste deposit in Paks	50 tons /11%/	460 tons
Paper	Paper factory	4,4 tons /73%/	6 tons