mvm paksi atomerőmű

THE PRESENT STATUS OF THE PEACEFUL USE OF NUCLEAR POWER IN HUNGARY

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Advisor to CEO

Former State Secretary for Energy Affairs

IENE-ROEC: "*The Nuclear Option for SE Europe*„ - Bucharest, Romania, *2015.05.06.*

PAKS-1 – THE PAST AND PRESENT

Facts about MVM Paks Nuclear Power Plant

The only nuclear power plant of Hungary is a state owned company;

The four pressurized units of VVER-440 type, connected to the grid since 1982 and 1987;

The operation is reliable and safe;

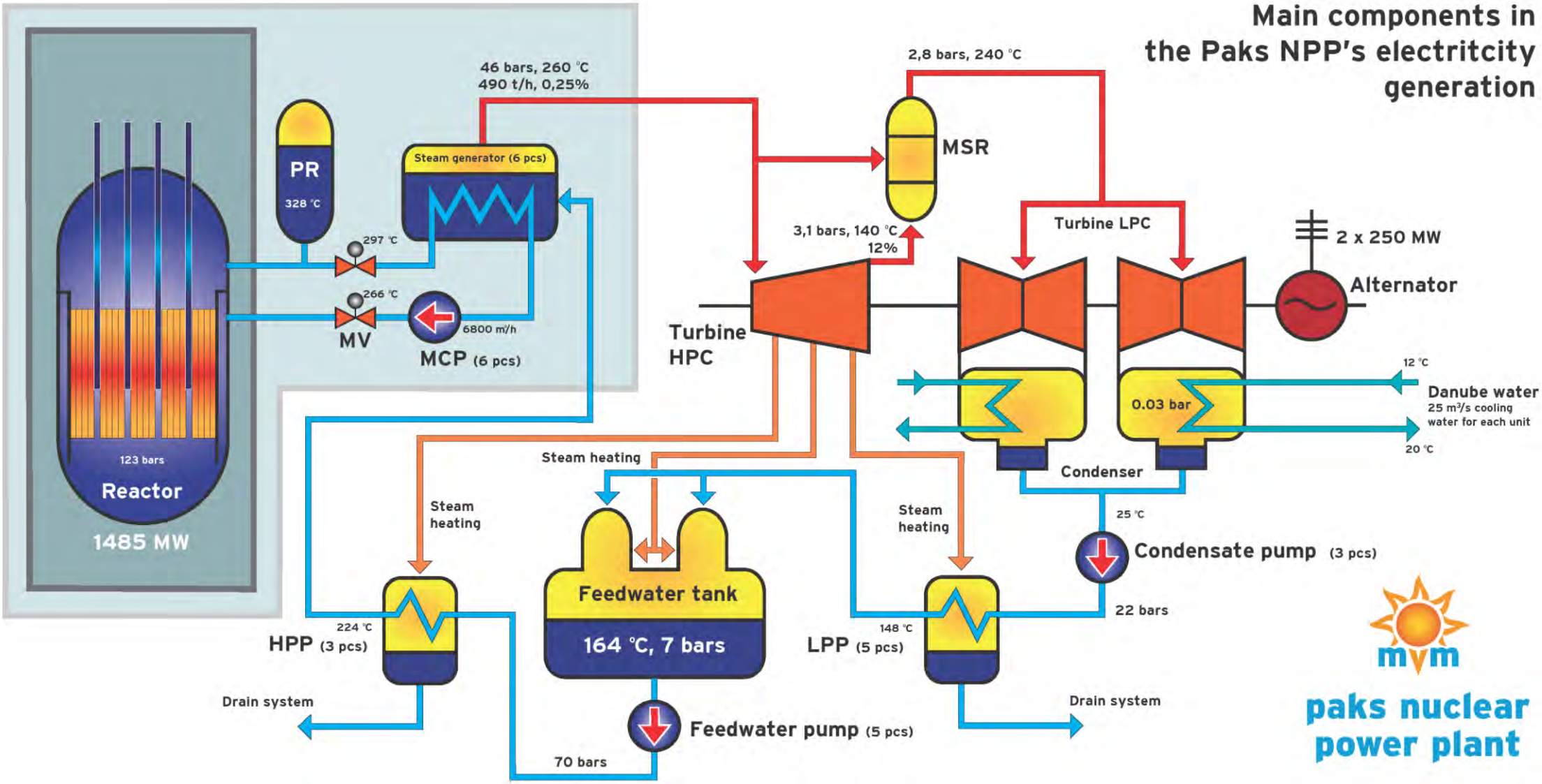
As a results of modernisation, the power output has been increased to 2000MW by 2009.

Safety has been guaranteed by:

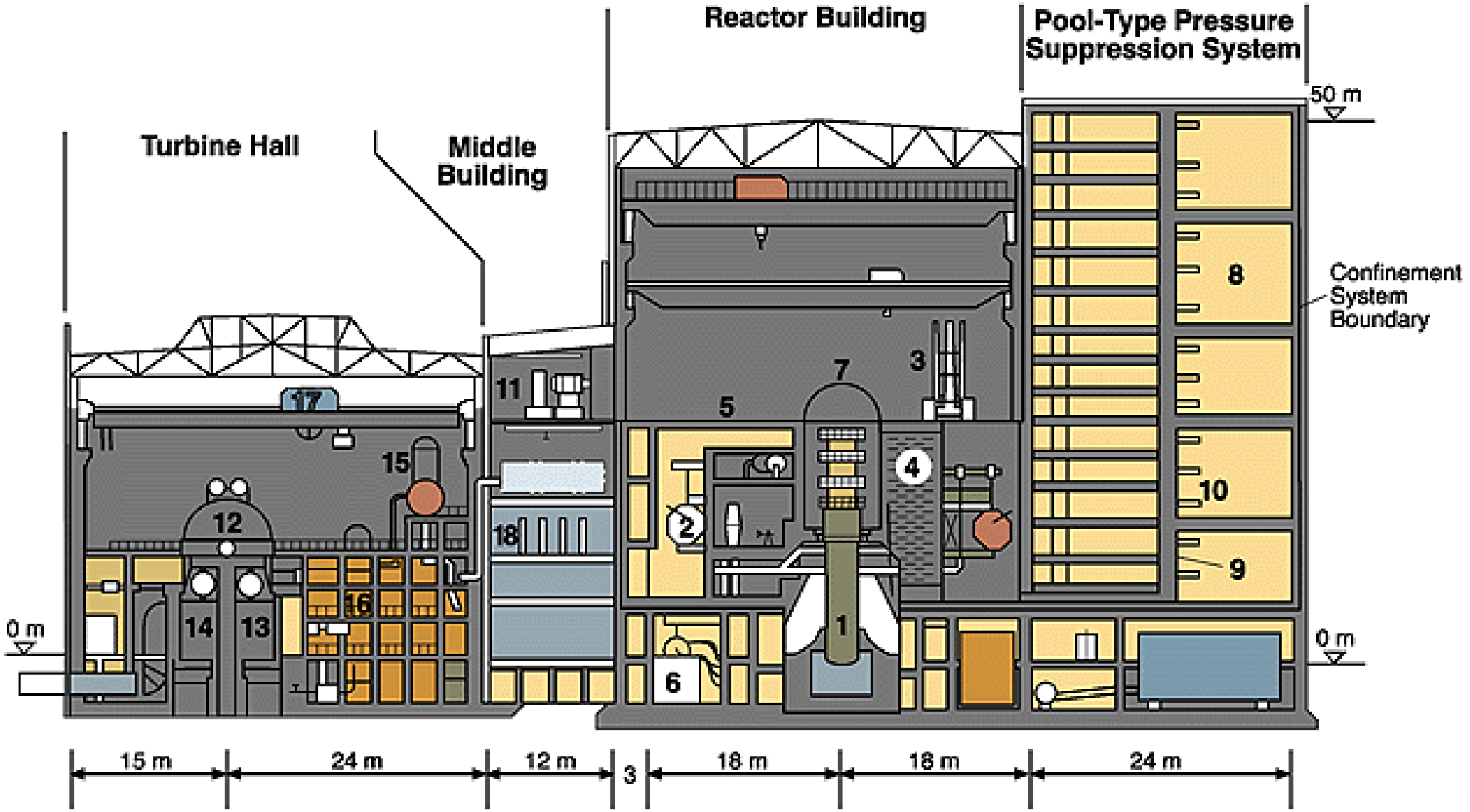
- highly skilled, committed, and safety conscious professionals;
- continuous development and Safety Enhancement;
- reconstruction projects launched to replace the ageing components of the plant.

The technical condition of the power plant and the planned measures allow the extension of the 30-year design service life by 20 years.

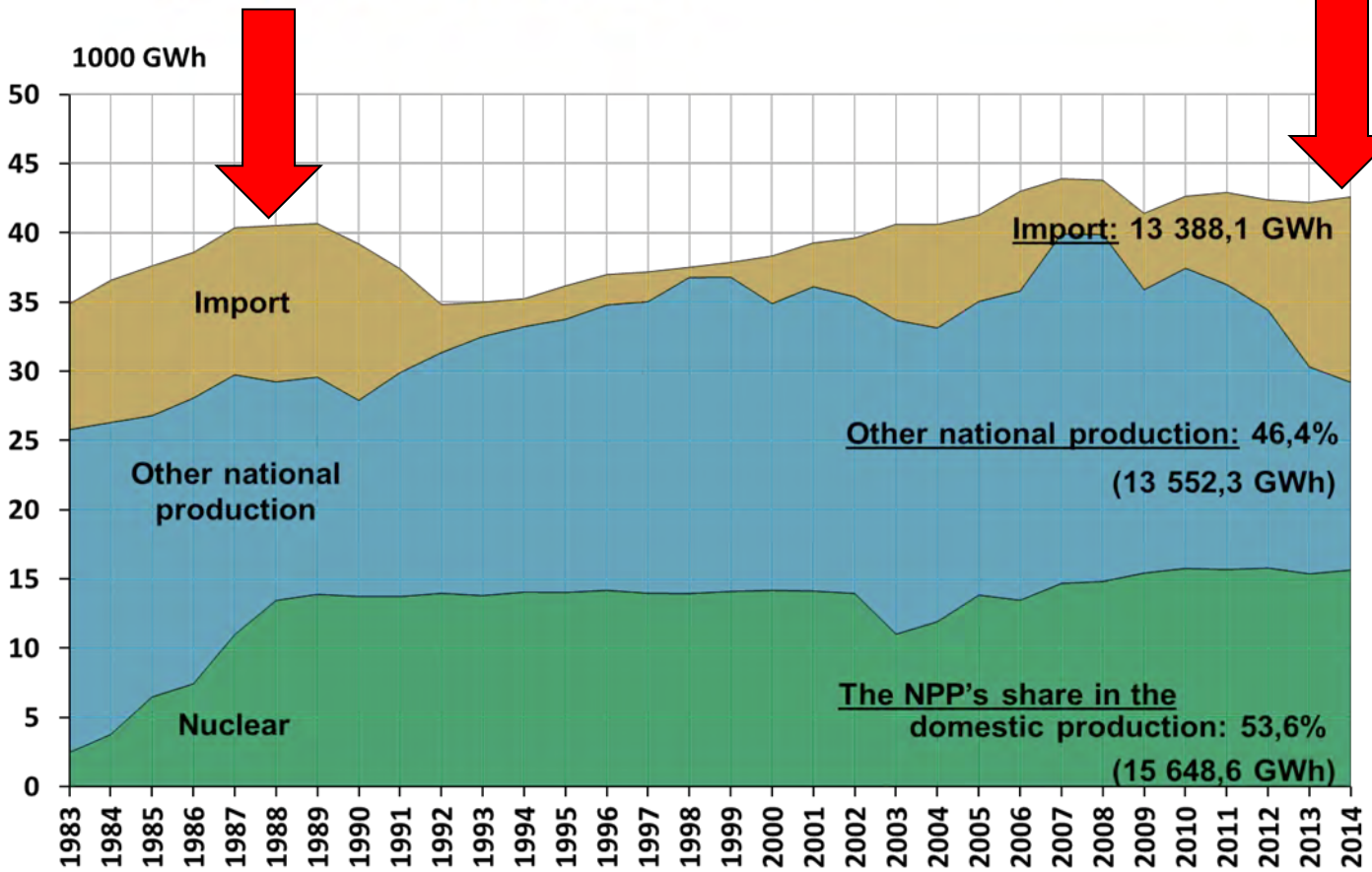
Operation of the Nuclear Power Plant

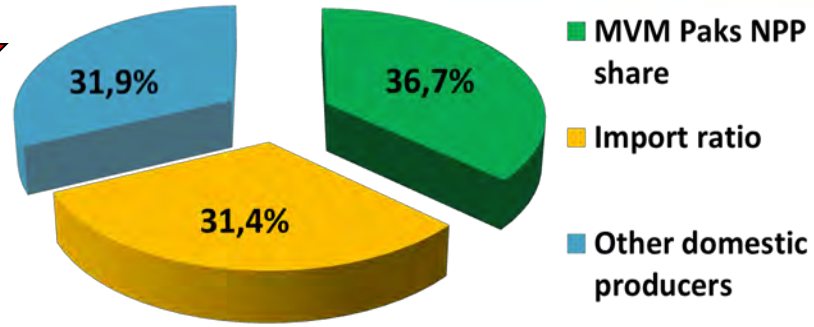


VVER-440/213 type Power Plant Unit

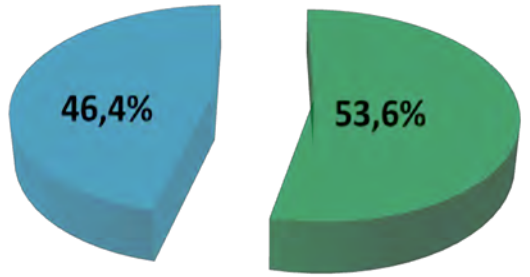


Domestic Electricity Production (1983-2014)





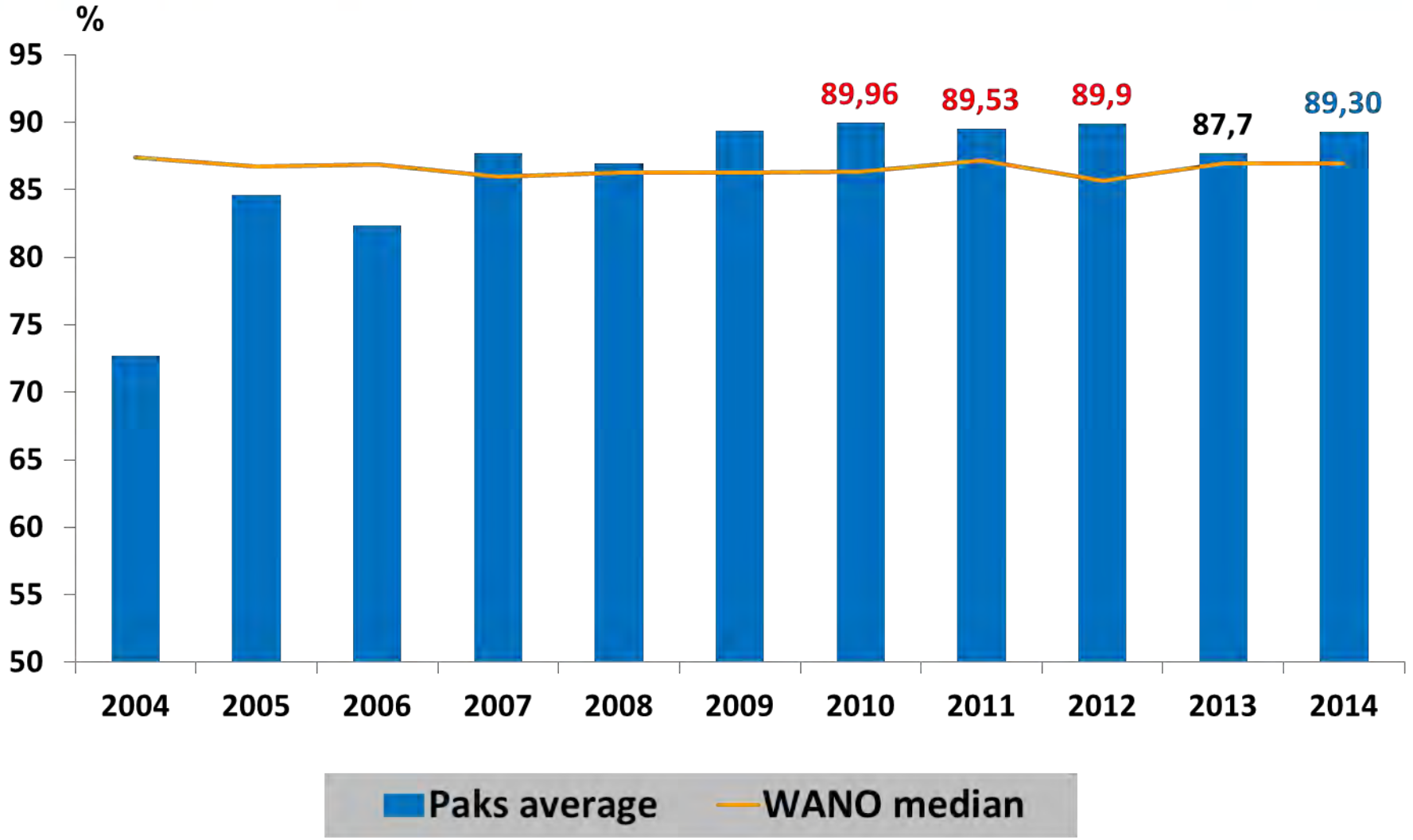
Gross domestic **consumption** 42 589 GWh



Gross domestic **production** 29 200,9 GWh

414,6 TWh electric power has been produced by MVM Paks Nuclear Power Plant since the date of the first connection of Unit 1 to the grid

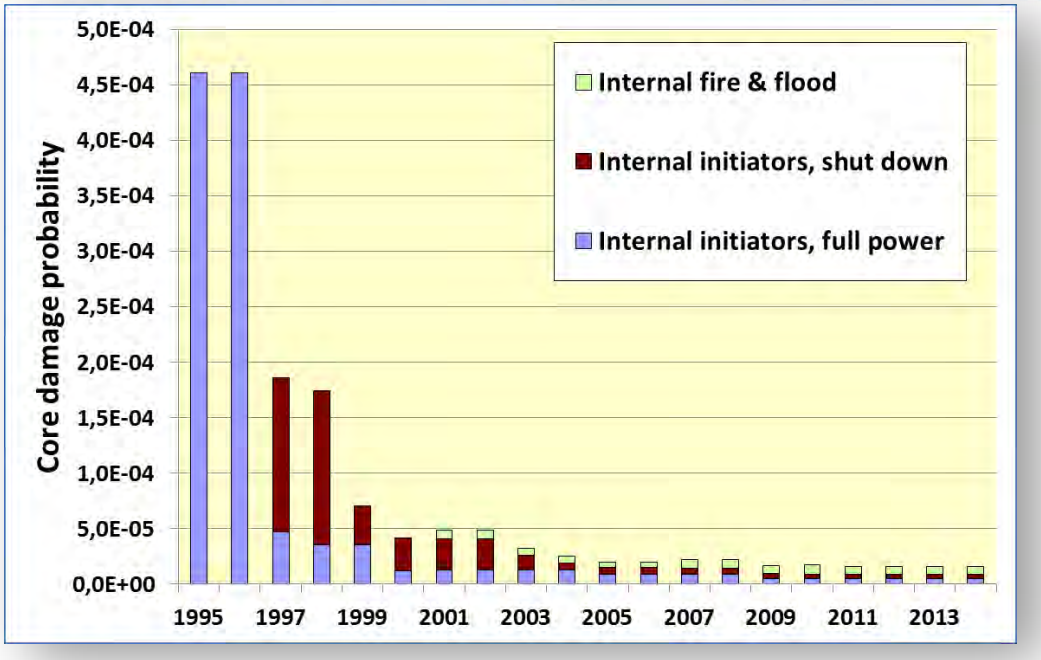
Load Factor (2004-2014)



WANO (**W**orld **A**ssociation of **N**uclear **O**perators)

Continuous safety enhancement

The enhancement of the safety of the nuclear power plant was initiated as early as before the commissioning of Unit 4 in 1986.



1991 – 1994 AGNES report

1996 – 2002 Safety Enhancement Measures

1998 – 2003 PRISE steam-generator blow-down

2002 – 2014 Severe accident management (SBK)

- ✓ Installation of passive autocatalytic hydrogen recombiners in the confinement
- ✓ Reinforcement of the cooling pond's cooling circuit pipe-lines and installation of quick isolation valves
- ✓ Flooding of the reactor shaft, external cooling of the RPV
- ✓ Independent electric power supply to the pressurizer safety valves
- ✓ Installation of new severe accident monitoring devices

Targeted Safety Review

The degree of protection of the power plant, **against the key events studied has proven good:**

- As a result of the previously implemented reinforcement measures, the power plant has been **adequately protected against the potential impacts of seismic events.**
- The assumed highest **flood level is not expected to exceed the backfill level** of the power plant.
- **Appropriate engineering tools are available** for the power plant to safely manage the effects potentially caused by **extreme low water level of the Danube.**
- The facility **has been prepared to supplement** any possible loss of the external power supply.

Additional engineering tools are available to increase the safety reserves and to enhance the degree of protection of the nuclear power plant against events which may occur with extremely low probability but may result in significant loads.

Safety Reviews

Internal Safety Reviews:

Periodical Safety Reviews

Updating the Final Safety Assessment Report (FSAR)

Ver . 5 FSAR, 23/03/ 2010

External Safety Reviews:

Some 20 international reviews were implemented, including:

1988 – First **OSART** Mission

1991 – OSART Follow-up Visit

1992 – First **WANO** Peer Review

1995 – WANO Follow-up Review

2001 – Second OSART Mission

2005 – OSART Follow-up Visit

2005 – Second WANO Peer Review

2008 – WANO Follow-up Review

2012 – Third WANO Peer Review

***2014 – WANO* Follow-up Review**

2013 – First **IPPAS** Mission

2014 – Third OSART Mission

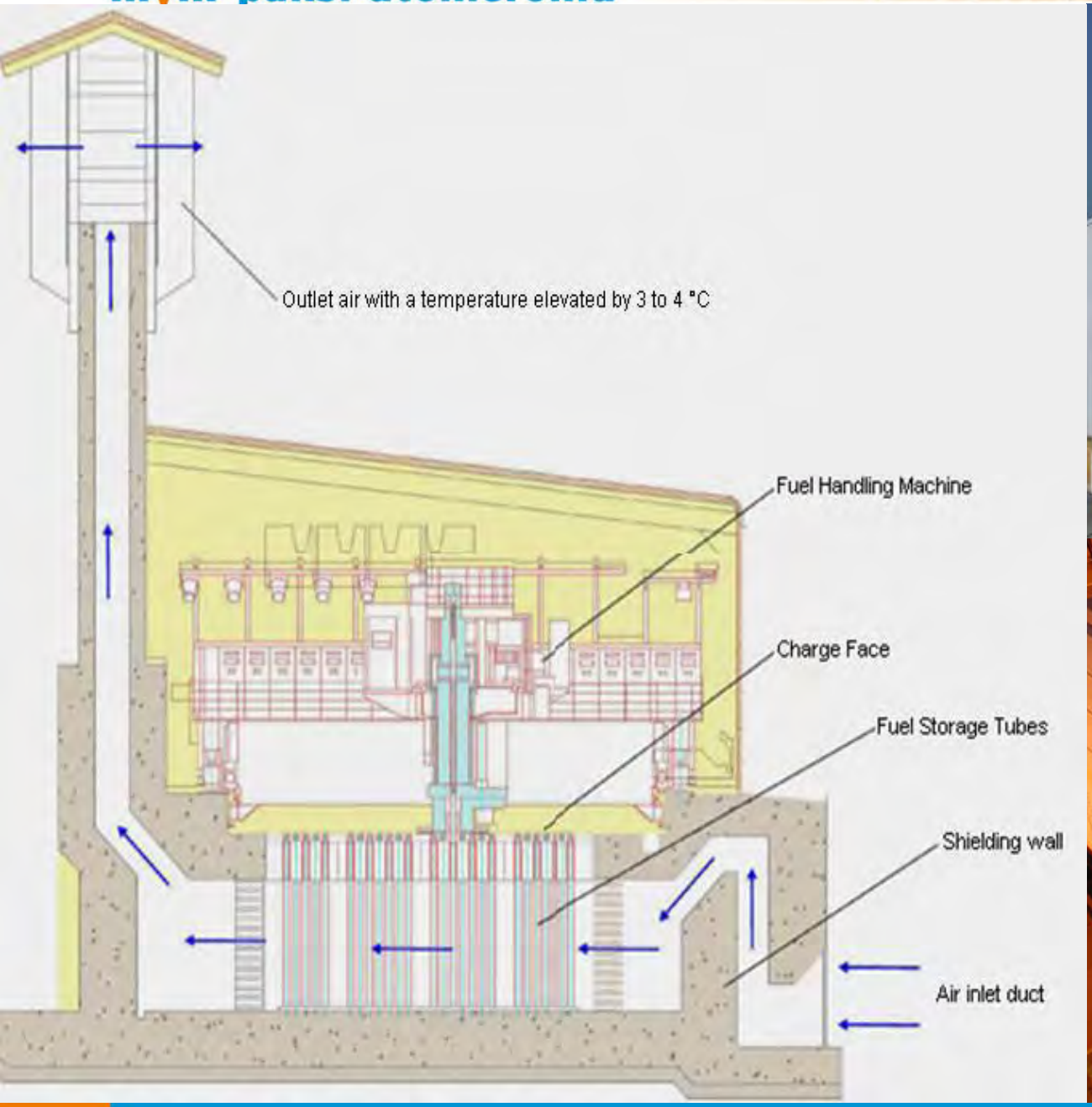
IAEA International Atomic Energy Agency *Atoms For Peace*

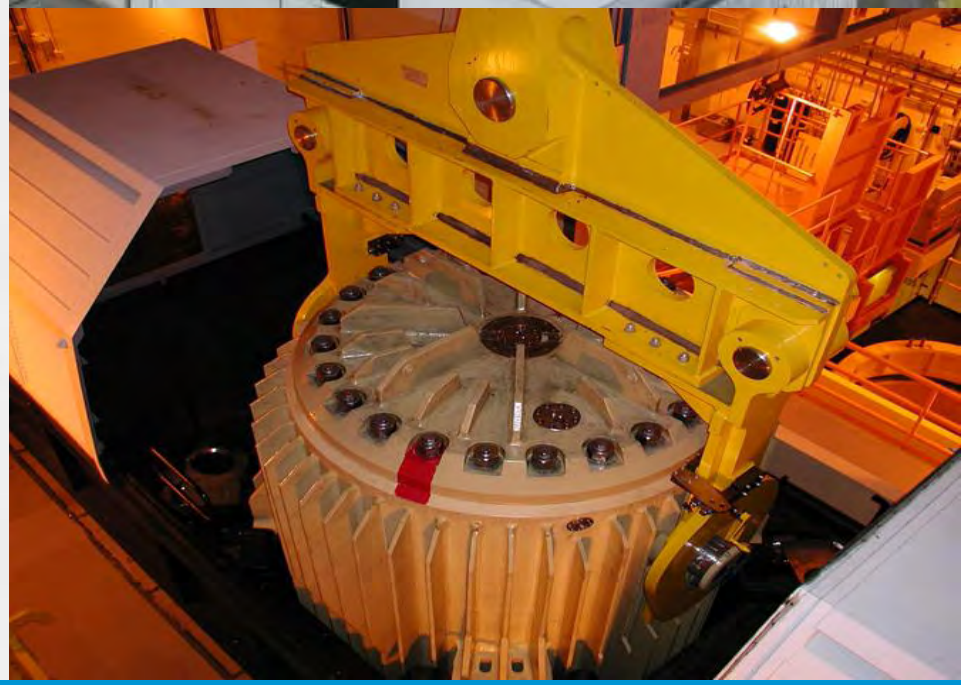
W A N O

Training system of MVM Paks NPP

- A powerful, self supplying training system and infrastructure;
- Corporate training organization;
- Complex training infrastructure:
  - Maintenance training facility;
  - Full-scope simulator;
- Continues improvement of training environment
- A significant system of relations with universities and scientific institutes;
- Good international relationships (IAEA);

Interim Spent Fuel Store (ISFS)





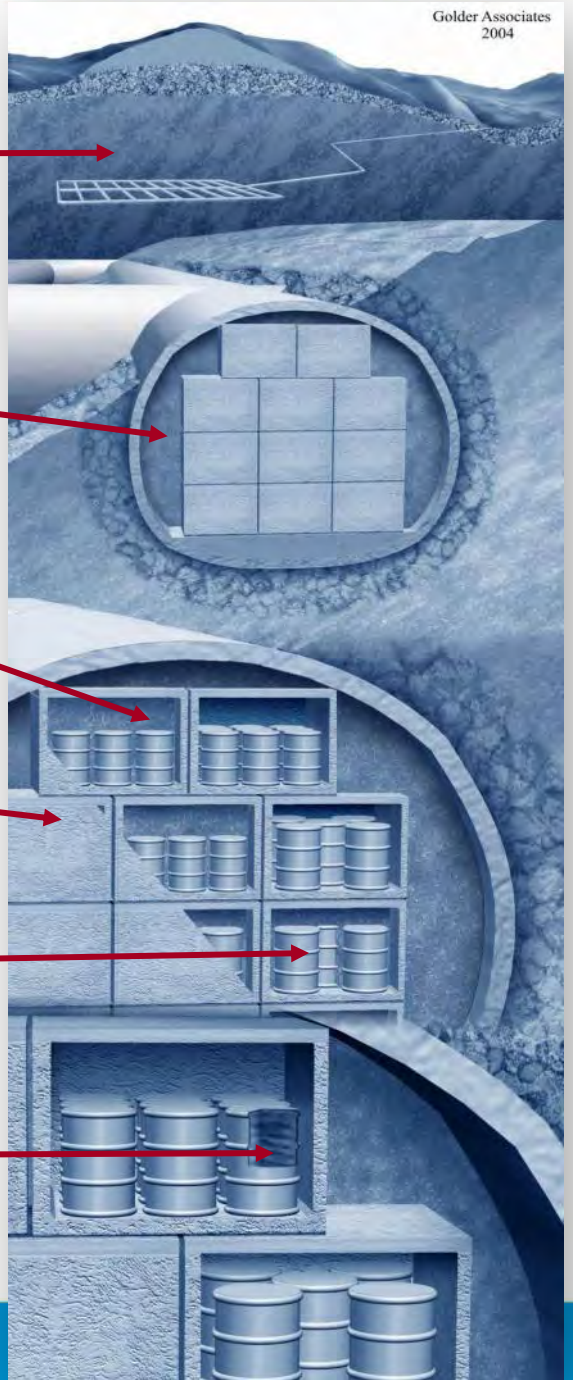
Radiological Impacts – Wastes

- The wastes generated within the controlled zone of the nuclear power plant shall be considered radioactive waste unless otherwise stated upon the results of their qualification. Due to the small quantity of the contained radioactive materials below the limit value, a part of these wastes are qualified as non-radioactive waste.

- These wastes can be processed or disposed of as specified in the authority regulations. The contributory radiation exposure to the population from such wastes is less than 10 μSv/y.

Physical barriers used for the waste disposal

- The host rock is granite
- Backfilling in the disposal vault
- Filling material in the container
- Reinforced concrete container
- Packaging is carbon steel drum
- Waste form



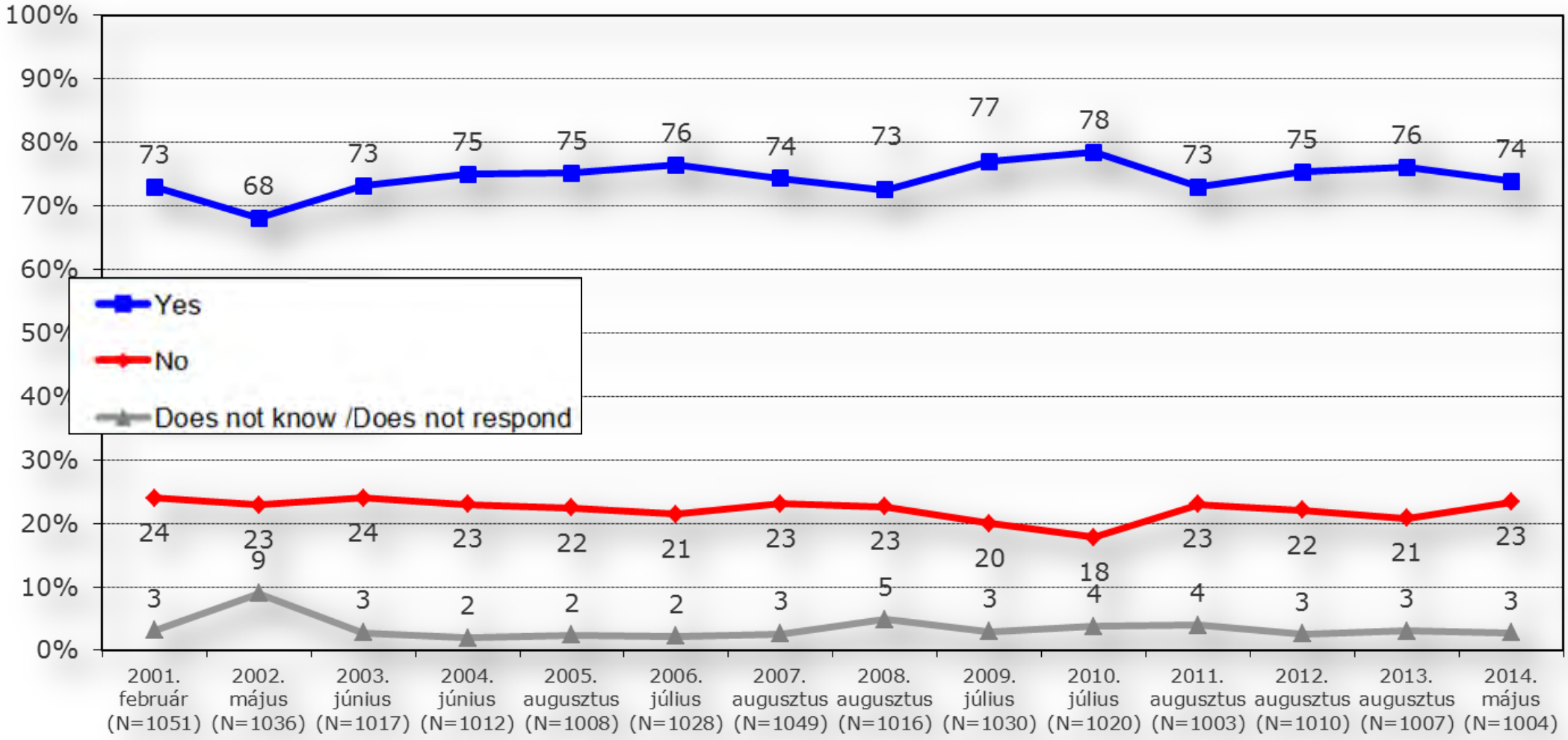
Operation Licence Renewal

- The feasibility study of the Licence Renewal commenced in 2000.
- The start of preparations for the License Renewal was approved by 96.6 % of the Parliament Representatives on 21 November 2005.
- Hungarian Atomic Energy Authority (HAEA) evaluated the study report and ordered the implementation of the Execution Program in 2009.
- Our work was supported by National and International independent expert reviews.
- The licence for extended operation of Unit 1 for additional 20 years was issued by the Hungarian Atomic Energy Authority in December 2012.
- The license for extended operation of Unit 2 was issued by HAEA in November 2014.

	Start up of the unit	30-year life time	**50-year** life time
Unit 1	14/12/1982	2012	**2032**
Unit 2	26/08/1984	2014	**2034**
Unit 3	15/09/1986	2016	**2036**
Unit 4	09/08/1987	2017	**2037**

Public Acceptance

Do you accept that a nuclear power plant operates in Hungary?



Strategic objectives

„Our vision, in addition to giving prime priority to the safety, is to maximize the electric energy production for the longest possible period in a technically substantiated manner and at an optimum cost level.”

Maintaining and improving the safety

Maximising the production

Maintaining the nuclear based production on long term

Optimising the cost of production

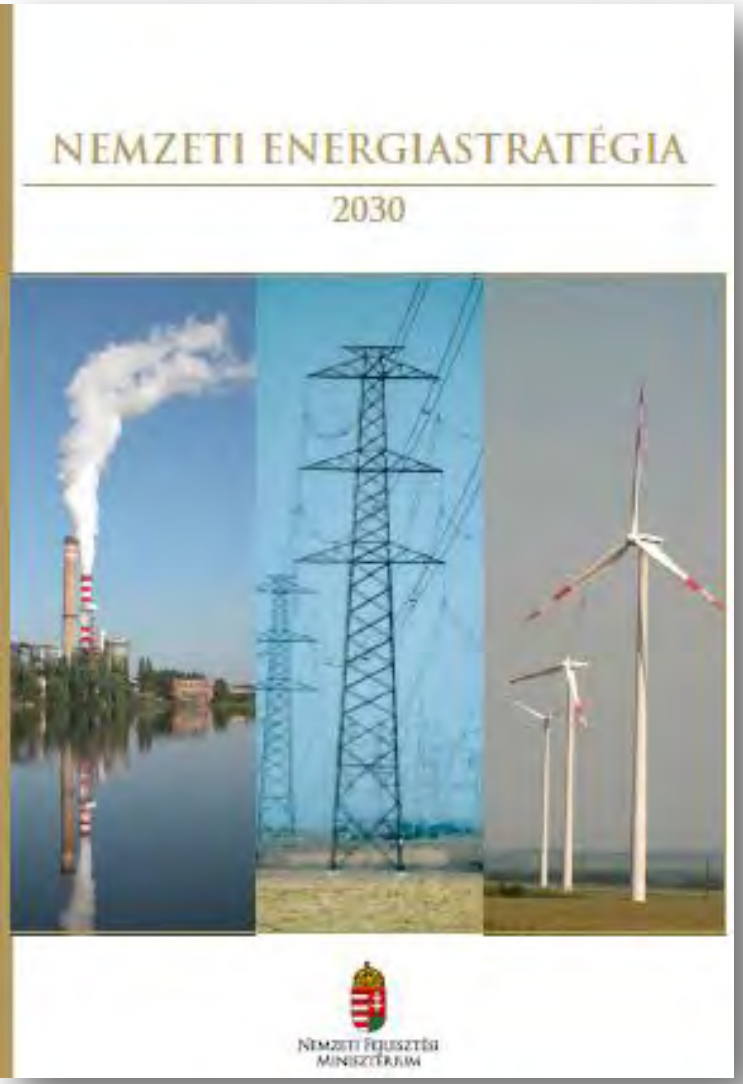
PAKS-2 – THE FUTURE

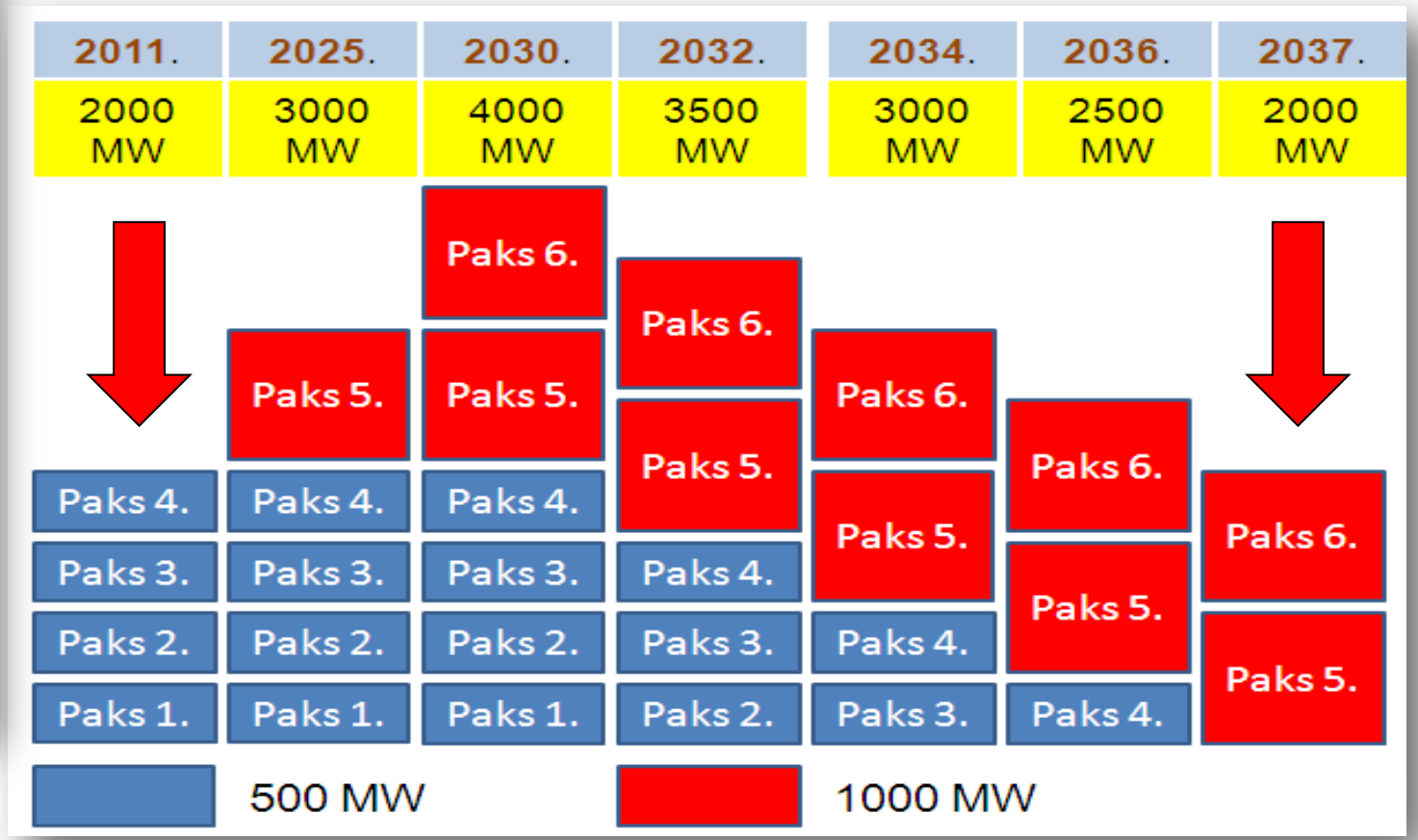
Extension of the Nuclear Power Plant

The Hungarian Parliament granted a **principal licence** for the start of preparations for the construction of the new Units *(30/03/2009)*

A project company, called **MVM Paks II Nuclear Power Plant Development Ltd** was established by MVM Ltd for the extension of Paks Nuclear Power Plant (*03/08/2012*)

A **cooperation agreement (IGA)** on the peaceful use of nuclear energy was signed by Russia and Hungary, which includes the construction of two new nuclear units *(14/01/2014)*


NEMZETI ENERGIASTRATÉGIA
2030
NEMZETI FEJLESZTÉSI MINISZTÉRIUM


2011.
2025.
2030.
2032.
2034.
2036.
2037.
2000 MW
3000 MW
4000 MW
3500 MW
3000 MW
2500 MW
2000 MW
Paks 6.
Paks 5.
Paks 4.
Paks 3.
Paks 2.
Paks 1.
500 MW
1000 MW

Extension of the Nuclear Power Plant

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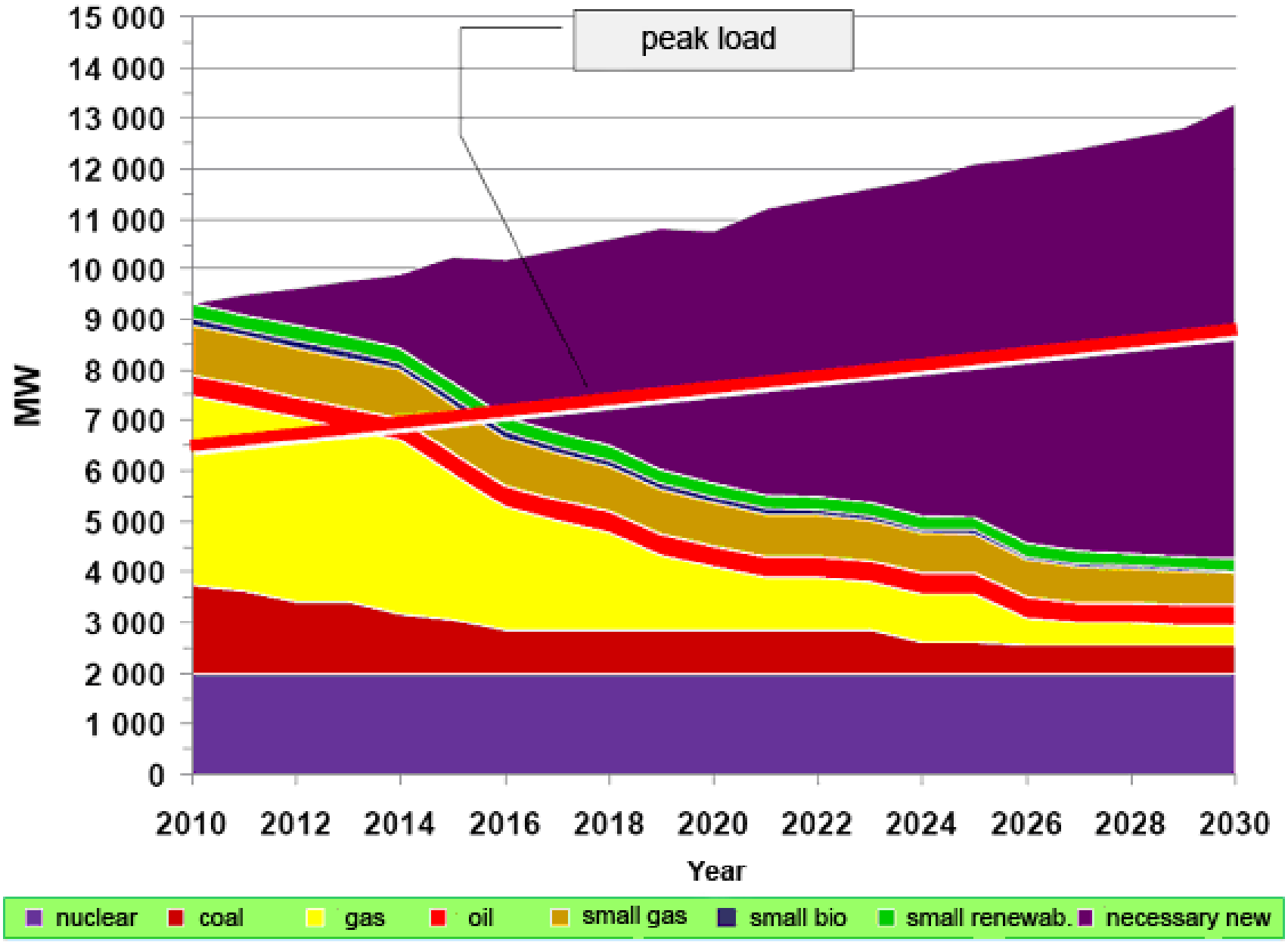

Extension of the Nuclear Power Plant

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Extension of the Nuclear Power Plant

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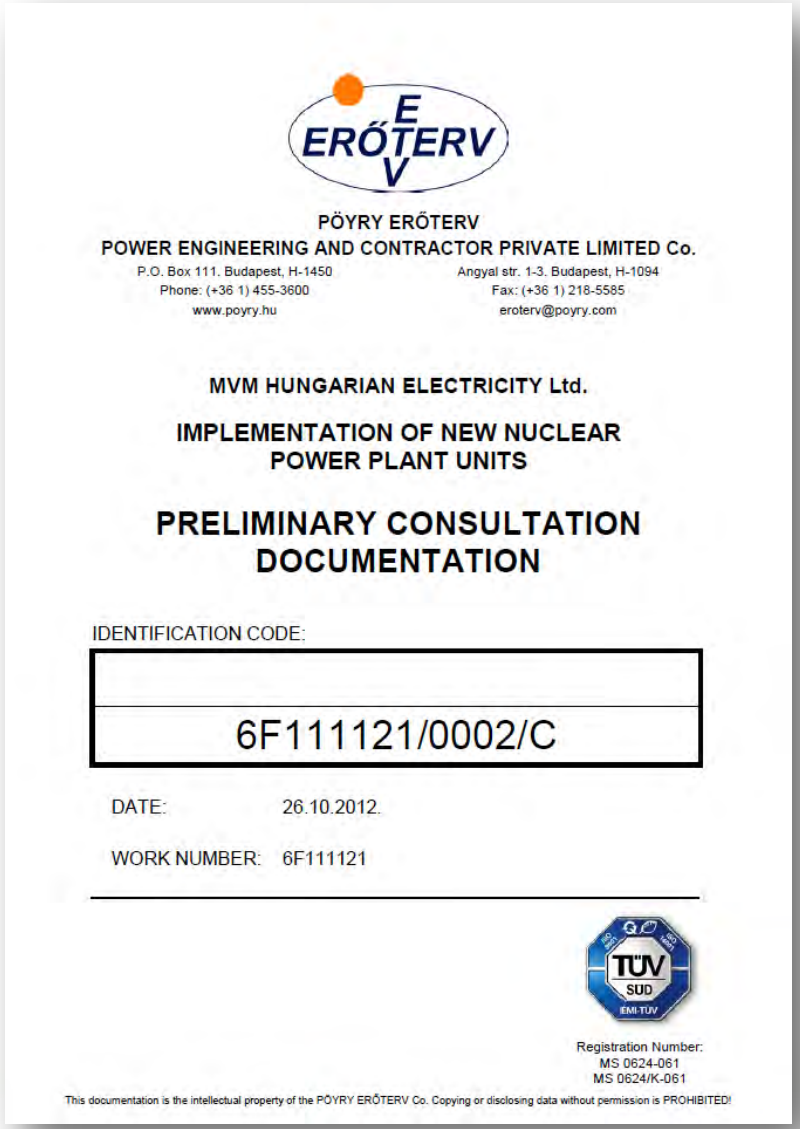
EIS + Public Hearings underway

http://www.mvmpaks2.hu/hu/Dokumentumtarolo/EKD-ENG.pdf



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IMPLEMENTATION OF NEW NUCLEAR POWER PLANT UNITS

PRELIMINARY CONSULTATION DOCUMENTATION

IDENTIFICATION CODE:

6F111121/0002/C

DATE: 26.10.2012.

WORK NUMBER: 6F111121

Registration Number:
MS 0624-061
MS 0624/K-061

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EIS + Public Hearings underway

1**. Introduction**
(The planned activity and the project, Licensing, Reasons of the implementation of new units, Domestic electricity demand forecast, Power generation alternatives, etc.)

2. **Characteristics of the site, the nuclear energy generation technology and the variations of the planned new units taken into consideration**
(Description of the site: Location, Infrastructure, spatial plans, Gen-3 PWR technology description, Global nuclear energy generation, Current radwaste management, Interim Spent Fuel Storage, Safety zones, Basic technical data, planned cooling system, Additional facilities, International references, Construction technology, Transportation, Environmental protection facilities, Data uncertainty)

3. **Description of the environmental impacts**
(General description of the geographical environment; Radioactivity of the environment; Air quality; Regional and local climate-meteorological characteristics; Surface waters; Subsurface waters; Soil, geological agent; Wildlife and living communities; Environmental noise and vibration; Wastes; Built environment, socio-economic impacts; Landscape and land use)

EIS + Public Hearings underway

4. Boundary of impact areas for variations considered
(Impact areas of the radiological impacts; Impact areas of the conventional environmental impacts; Summarized impact area and settlements within it)

5. Environmental impacts related to decommissioning of new unit variations considered
(Process and aim of abandonment, decommissioning of nuclear power plant; Decommissioning strategy to be used when decommissioning the new nuclear power plant units; Environmental impacts of decommissioning; Financing, costs of the decommissioning activity)

6. Assessment of possible trans-boundary impacts

7. Summary

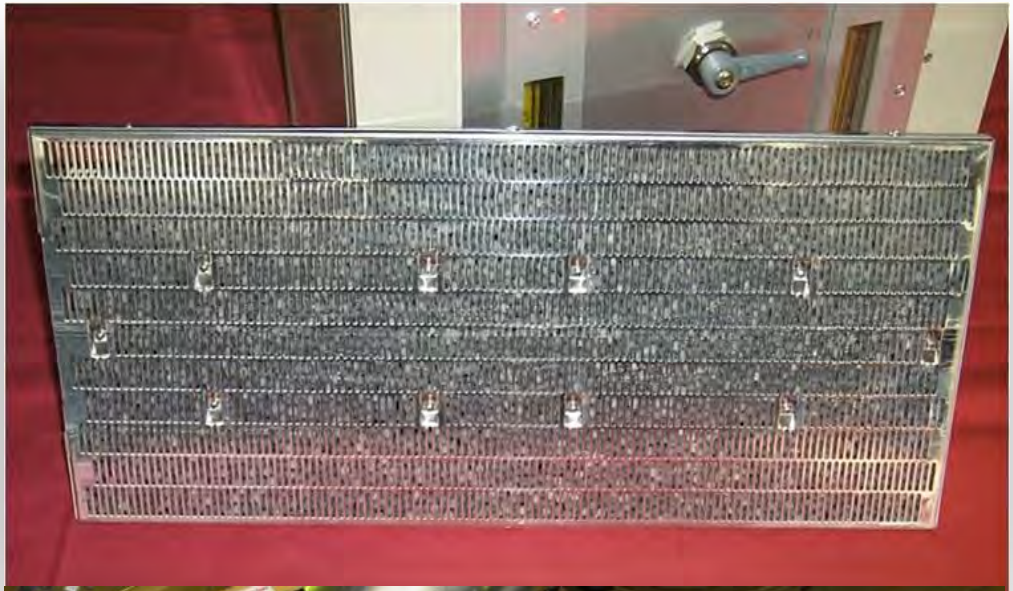
Reference list
List of tables
List of figures;
Appendix;

THANK YOU FOR YOUR ATTENTION!

Seismic Reinforcements

Qualification and reinforcement	Installation
High energy pipelines and items of the primary equipment	250 reinforcements
Reinforcement of the main building halls (reactor hall, turbine hall)	1360 t of steel structures
Support structures (reactor building, bubble tower)	300 t of steel structures
Other pipelines and structures of the primary system	760 reinforcements
Reinforcement of turbine hall steel support structures and pipelines and items of the secondary equipment classified into safety class	160 t of steel structures 1500 reinforcements

Hydrogen Recombiners Installation



Hydrogen is a „by-product” of severe accidents, which is generated by reaction of zirconium and water steam, i.e. the fuel clad material and the cooling water.

Installation of 60 passive catalytic hydrogen re-combiners in the containment area, at 30 locations for each Unit.