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LICENSING OF THE EXTENDED OPERATION OF 4 UNITS OF PAKS NPP

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OUTLINE

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- Hungarian nuclear power programme and the high level legal framework
- Short historical overview of PSRs and the lifetime extension in Hungary
- Requirements for lifetime extension
- Implementation of the lifetime extension licensing process
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- Conclusions



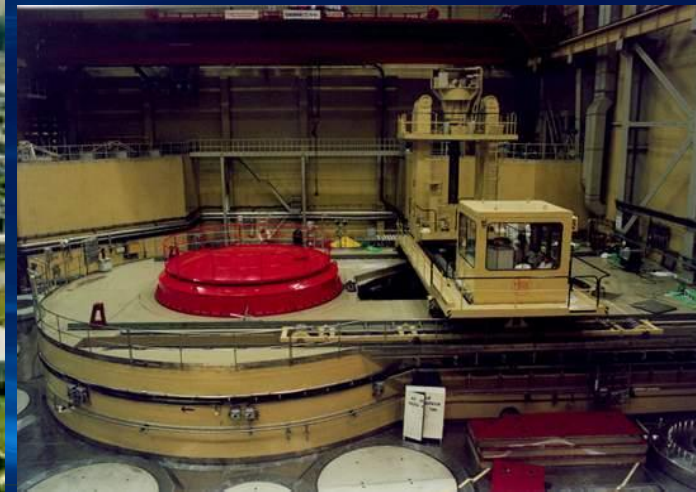
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Hungarian nuclear power programme and the high level legal framework (1)

4 operating units of the NPP Paks

VVER 440/213 type (output with self-consumption 500
MWe/unit)





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Hungarian nuclear power programme and the high level legal framework (2)

OPERATING UNITS (incomplete historic overview)

- Beginning of operation of the units (parallel connection):
1982, 1984, 1986 and 1987 (originally 440 MWe gross)
- Complete re-evaluation of safety to western standards and associated safety upgrade modifications
Basis: Soviet propositions, AGNES project, IAEA Extra-budgetary program)
- Modernisation of the reactor protection system
Full diversification of protection signals, digitalisation
- Power uprate



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Hungarian nuclear power programme and the high level legal framework (3)

OPERATING UNITS (incomplete historic overview) – cont.

- Partial introduction of the operational part of ASME BPV Code
- Lifetime extension of the units (ongoing)
- Extension of the intervals between refuelling from 12 to 15 months (in parallel with lifetime extension)

NEWBUILD PROGRAMME

- Preparatory activities

Environmental license is granted (although under appeal), license is granted for site survey and characterisation and this work is completed, based on what the site-licence application was submitted last week



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Hungarian nuclear power programme and the high level legal framework (4)

HIGH LEVEL LEGAL FRAMEWORK

- Act on atomic energy:

First: 1980, new: 1996 modified many times

The new act lists the main licensing steps, license for extended operation is included first time in modification which is in force from November 2005

- Safety regulations:

- At the time of the old act: in a ministerial decree and its annexes
- At the time of the new act: in a governmental decree and its annexes



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Hungarian nuclear power programme and the high level legal framework (5)

HIGH LEVEL LEGAL FRAMEWORK – cont.

- Most important annexes – Regulations for our topic:
 - Regulation No. 1: Nuclear safety authority procedures for nuclear facilities
 - Regulation No. 4: - Operation of nuclear power plants



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Short historical overview of PSRs and the lifetime extension in Hungary (1)

PSRs

- It was first introduced in 1993 by an addition to the old time (1979) nuclear safety ministerial decree, no details were in safety regulations

It required to execute a comprehensive nuclear **safety-technical** review within 12 years after beginning of operation and based on it to renew the nuclear safety-technical license, what was a prerequisite and underlying license of the operational license

- In practice the first PSR was executed as a pilot for the small scale and simple training reactor



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PSRs – cont.

Short historical overview of PSRs and the lifetime extension in Hungary (2)

- In case of the NPP first PSR was implemented in 1996,
- On the basis of the new act the former requirements were overruled:
 - PSRs every 10 years (but for installations operating more than 9 years within 3 years from entering into force), based on it second time the PSR was in 2008
 - explicit permission to review simultaneously all similar units on the same site
 - Nuclear safety-technical license abolished, new operational license to be issued



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Short historical overview of PSRs and the lifetime extension in Hungary (3)

Regulations on lifetime extension

- Although in general licenses may be issued on definite or indefinite time, NPP operational licenses were issued only for 30 years, based on the original technical design documentation of the reactor pressure vessel
- First the regulations required to submit a request to issue a lifetime extension licence in principle, at least 5 years before expiration of the original license, so then a two step licensing process was foreseen (as for licensing of modifications at that time)



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Short historical overview of PSRs and the lifetime extension in Hungary (4)

Regulations on lifetime extension

- First internal decision on lifetime extension of the NPP management was adopted in January of 2001, and the competent authority (HAEA) informed about it
- A common operator – authority programme was initiated to elaborate the necessary regulatory Framework

A PAKSI ATOMERŐMŰ ÉLETTARTAMÁNAK HOSSZABBÍTÁSA

megvalósíthatósági tanulmány

„...anyám könnyű álmot ígér...”



Dr. Katona Tamás, Rátkai Sándor
Paksi Atomerőmű Rt.

2001. április



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Short historical overview of PSRs and the lifetime extension in Hungary (5)

Regulations on lifetime extension – cont.

- As the most known and advanced the US NRC's practice was taken as example
- In 2005 the former two step licensing was substituted by one step procedure, but - additionally minimum 4 years before it - submitting to the authority a comprehensive program on preparations was prescribed for review and approval

The change was due to lack of enough time before the expiration of operational license of unit No. 1 and as well as the approval procedure is more simple than a separate first step licensing

- Guidelines were elaborated to help implementation of regulations



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Requirements for lifetime extension (1)

- If the requirements are met a new operation license is issued
- Scope of licensing review includes
 - SSCs having any safety function
 - SSCs not classified to safety classes, but failure of which may preclude to perform safety function of other SSCs
 - SSCs included into the scope by specific decision of the authority



Requirements for lifetime extension (2)

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- Licensing of lifetime extension is based on basic principles:
 - Safe operation shall be maintained continuously at the time of preparation and after licensing of lifetime extension adhering to regulations and authority decisions, what means that *all arising problems shall be dealt with in the framework of the actual operating license*
 - Even at the time of extended operation safety reserves of SSCs considered in safety evaluations shall not be lowered any time referencing the short time before ceasing of operation



Requirements for lifetime extension (3)

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- Basic principles of lifetime extension – cont.
 - Activities related to maintaining technical condition as defined in Regulation 4 part 4.6 shall be initiated and continuously exercised at the time of validity of original operating license and their effectivity shall be continuously controlled and evaluated
 - Based on the previous principle justification of possibility to extend the lifetime is basically limited to justification of appropriateness of passive long life components
 - Safety upgrade measures stemming from the up-to-date international requirements shall be defined within the PSR, according to that rules



Requirements for lifetime extension (4)

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- The programme of lifetime extension
 - May be submitted for one, or more units simultaneously, but minimum 20 years of operational experience shall be taken into account (at least for the oldest unit)
 - The programme shall state the intended duration of extended operation
 - Content is based on the requirements of the new license request, it shall justify that with implementation all criteria of the existing operating licence will be met up to the end of extended operation, the criteria already met shall be explained with references, as well as activities and time schedule to meet further criteria



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Requirements for lifetime extension (5)

- The programme of lifetime extension – cont.
 - Modifications required for lifetime extension shall be implemented during original operation according to separate licensing and rules related to other modifications
- Licensing of lifetime extension
 - Request for licensing shall be submitted individually for each unit and a new operation license shall be granted
 - Extended operation is possible as long as the authority formulated in the license, but not longer as foreseen and substantiated in the licensing documentation



Requirements for lifetime extension (6)

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- Licensing of lifetime extension – cont.
- Required content of the documentation:
 - General data of the operator and facility
 - Methodology of definition of SSCs included in the scope of lifetime extension and the results
 - Comprehensive review of the ageing management of passive long life components
 - Handling of TLAs
 - Necessary modification of FSAR
 - Necessary modification of OLCs
 - Necessary modification of other license basis documents



Requirements for lifetime extension (7)

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- Required content of the documentation – cont.:
 - Necessary modification of other documents on which the license is based
 - Justification that the programme was implemented, and based on the work for all foreseen future operation
 - The unit is in condition suitable safe operation, long term technical and administrative conditions are in place
 - Resources required for maintenance of nuclear safety in long term are in possession of the operator
 - Substantiated by analyses intended duration of operation



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Implementation of the lifetime extension licensing process (1)

- LTE programme was submitted to HAEA in November of 2008 and the regulatory decision was issued in June 2009
It was approved, but several prescriptions were added (on modification of scope and time schedule, regular reporting of implementation, etc.)
- Licensing request for unit No. 1 was submitted in December 2011 and the new licence issued in December 2012
- Extended operation license for unit No. 2 was submitted in fall 2013 and the license issued in 2014



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Implementation of the lifetime extension licensing process (2)

- License submission for unit No. 3 is dated December 2015 and the new license is expected this year
- In case of unit No. 4 the licensing procedure will be implemented next year, as the units operation licence will expire in 2017



Preliminary comparison of scope and requirements related to PSR and LTE (1)

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Requirements related to the PSR and its scope	Requirements to the lifetime extension preparatory programme and to its content	Requirements to the licensing of lifetime extension and to content of its documentation
May be executed for one unit or more similar units on the same site	May be prepared and executed for one unit or more similar units on the same site	Individual licensing for each unit



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Preliminary comparison of scope and requirements related to PSR and LTE (2)

Review of the complete design as documented in the FSAR	Not relevant	Not relevant
Review of the site characteristics and of capacity to withstand the external hazards	Not required	Not required
Review of condition of all SSCs	Only list of all SSCs falling into scope of lifetime extension licensing	Only list of all SSCs falling into scope of lifetime extension licensing



Preliminary comparison of scope and requirements related to PSR and LTE (3)

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Review of the complete ageing management programme	Comprehensive review of ageing management of passive components only having long lifetime	Comprehensive review of ageing management of passive components only having long lifetime
All safety analyses have to be reviewed for actuality and adequacy in light of new international experience	Handling of TLAs only	Handling of TLAs only
Not necessary	Necessary modifications to FSAR	Necessary modifications to FSAR



Preliminary comparison of scope and requirements related to PSR and LTE (4)

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Not needed	Necessary modifications to OLCs (if any)	Necessary modifications to OLCs (if any)
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Preliminary comparison of scope and requirements related to PSR and LTE (5)

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Complete review of the environmental classification programme and classified condition of SSCs

(On ageing management see above)

Severe accident management in general

Emergency preparedness in general

Only modification of other documents on which the operation licence is based (Program for maintaining the technical condition of SSCs, Accident management procedures, Severe accident management guidelines, Emergency preparedness and response plan)

Only modification of other documents on which the operation licence is based (Program for maintaining the technical condition of SSCs, Accident management procedures, Severe accident management guidelines, Emergency preparedness and response plan)



Preliminary comparison of scope and requirements related to PSR and LTE (6)

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<p>Organisation, human factor, management system and safety culture</p> <p>Procedures in general</p>	<p>Not relevant</p>	<p>Only justification that the LTE preparatory programme was executed, and based on it for the whole planned duration of LTE</p> <ul style="list-style-type: none">- the unit is in condition allowing safe operation and all necessary technical and administrative conditions are assured- the operating organisation has all resources to maintain nuclear safety in long term
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Preliminary comparison of scope and requirements related to PSR and LTE (7)

Not relevant	Planned duration of the LTE	Planned duration of the LTE
Review of decommissioning issues	Not required	Not required
Review of safety performance indicators	Not required	Not required
Analysis of the hazard factors	No specific analysis is required	No specific analysis is required
Evaluation and feedback of relevant new scientific and technical results as well as of operational experience	Not required	Not required



Preliminary comparison of scope and requirements related to PSR and LTE (8)

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Utilisation of experience and research results of similar nuclear installations	Not required	Not required
Radiation protection of personnel and public, radiation load of environment in general	Not required	Not required
Comprehensive evaluation of safety summarizing results of the whole scope and based on it justification, that the safety level is adequate at least until the next PSR	Not relevant	Not relevant



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Conclusions

- A relatively unique licensing framework is elaborated and implemented in Hungary for licensing of lifetime extension of NPP units, which is based mainly on US practice, notwithstanding the use of PSRs in regulatory oversight as well
- The process has its advantages and drawbacks as well
- The system is working and for the remaining unit there is no reason to change
- In long run it is worthwhile to formulate experience for possible future uses



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***THANK YOU FOR YOUR
ATTENTION!***