



**mvm paks nuclear power plant**

# **Operator's view of nuclear TPL**

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# INTRODUCTION

- the only one nuclear power plant in Hungary
- belongs to the Hungarian Power Companies (MVM)
- designed in 70's, commissioned in 80's
- 4 × VVER-440 reactor units (500 MWe)
- designed lifetime 30 years + 20 years PLEX
- ~ 50% of domestic electricity generation
- the largest and cheapest source



- generation > 15 TWh / year
- load factor > 85% average
- production cost < € 35 / MWh
- turnover > € 600 million / year
- outage duration 160 days average
- refurbishments € 75 million / year
- staffing level 1 man / MWe





**Past and present**

- Nuclear TPL insurance is required by the Hungarian Atomic Law
- Hungary joined to the Vienna Convention
- Risks shared
  - by the government (200 M SDR per year) and
  - by the NPP (100+25 M SDR per year) = continuous insurance limit
- Insurance has been renewed in every year since 1998
- Insurer: Hungarian Nuclear Insurance Pool
- Acceptable level of yearly premiums, no considerable changes
- No nuclear TPL accidents in 30 years operation
- Low exposure of natural disasters
- **Operator's view: no reason for significant changes**



**...and further**

- Decisions and steps to be made by the government
- Led by Vienna Convention and opened to discuss EU initiatives
- Taking nuclear TPL is incontestable
- Reasonable insurance is inevitable
- Continuous safety enhancements is a strategic interest
- Maintaining the competitiveness and optimizing production costs have high priority goals
- **Operator's view: providing all rational technical and financial conditions for the safe electricity generation**



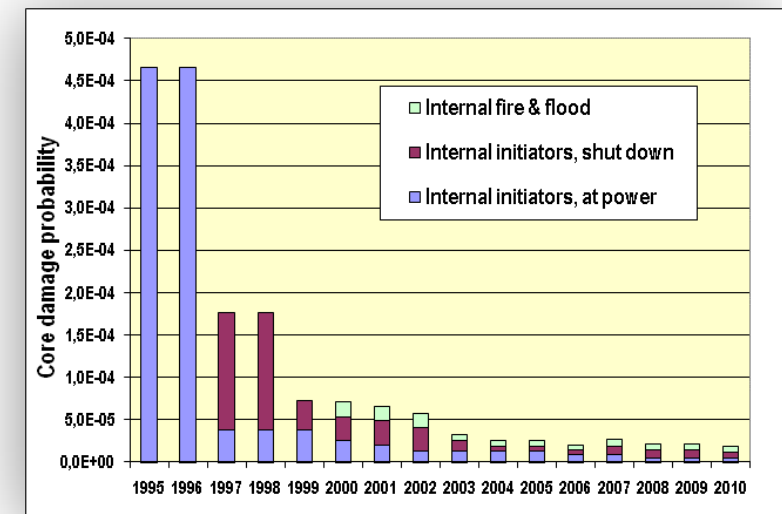
# RISK MANAGEMENT ON THE OTHER HAND - SAFETY ENHANCEMENT

$$\text{Risk} = \text{occurrence frequency [1/year]} * \text{consequence [€, km}^2, \text{etc.]}$$

*Prevention* *Mitigation*

## Safety Enhancement Measures

- Improvement of incident and accident mgmnt
- Increase of reliability of the safety systems
- Decrease of equipment overstrain
- Support of the operational personnel
- Review of the containment
- Improvement of seismic resistance
- Improvement of fire-safety





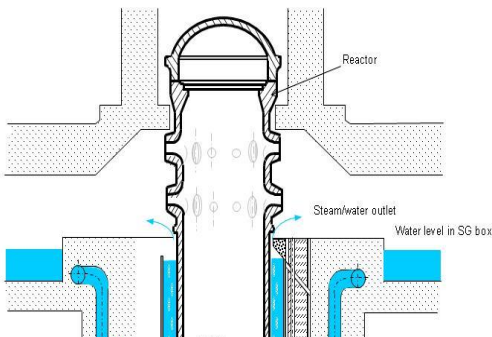


# RISK MANAGEMENT ON THE OTHER HAND - SAFETY ENHANCEMENT

## m m paks nuclear power plant

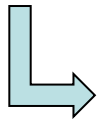
### Mitigation - Severe Accident Management & Emergency Response Plans

- Reactor cavity flooding and RPV external cooling (IVCR concept)
- Reinforcement of the Spent Fuel Pool cooling system
- Installation of passive catalytic H-recombiners into the CNTMT
- Installation of accident monitoring systems
- Provide autonomous power supply





## Targeted Safety Review – „stress-test”



## Extension to multi unit SAM

## Further possibilities to increase safety margins:

- Improvement of protection against natural phenomena
- Amendment of existing plant procedures and creation of new ones
- Provision of existing and alternative electrical power supplies
- Provision of existing and alternative cooling
- Mitigation of the consequences of MU severe accidents

**Execution is in progress....**



- **Nuclear safety has an overriding priority in our practice, the continuous safety improvement concept is applied, all reasonable preventive and mitigative actions are taken to minimise risk**
- **Adequate provisions are built in for the feedback to utilise experience of the industry and latest development of scientific results**
- **However, the overall risk to harm third party can not be excluded a reasonable insurance is inevitable, but no reason to change...**



**Thank you for your attention!**

