

FUTURE OF NUCLEAR ENERGY IN HUNGARY

Prepared by Dr. János Gadó
KFKI Atomic Energy Research Institute, Budapest
Bratislava, May 5-6, 2004

Contents

- o The present situation
- o Energy policy
- o Lifetime extension
- o New nuclear units
- o Consequences for R&D
- o Conclusions

The present situation - 1

- Ø Paks NPP: 4 VVER-440/V-213 units of 460 MW power
- Ø Units were put into operation between 1982 and 1987
- Ø Excellent operational record until about 1998
- Ø Several warning signals (safety culture)
- Ø SG deco ® increased crud deposition at Units 1, 2 and 3
- ® FA cleaning ® severe incident in April 2003 at Unit 2
- Ø Unit 2 will come back to operation in summer 2004
- Ø Removal of the damaged FA and cleaning tank in 2005
- Ø Psychological situation is still not completely balanced

The present situation - 2

- ∅ Design safety is on the European level
- ∅ No problems were indicated during EU membership negotiations, except design basis capability of the V-213 containment, that was proven later to be satisfactory by EREC experiments
- ∅ DBA and PSA studies show acceptability
- ∅ Symptom-oriented EOP was introduced
- ∅ Renewed NRC-style FSAR is under preparation

The present situation - 3

Low and medium level waste:

- ∅ old repository is not at the disposal of Paks NPP
- ∅ site of the new repository is selected
- ∅ political decision is still missing

Spent fuel and high level waste:

- ∅ interim dry storage facility for spent fuel (min. 50 ys) is in operation
- ∅ investigation of final repository site was suspended

Energy policy - 1

- o Energy policy is under renewal
- o Electric energy production increases (2002/1980: 1,29), proportion of import decreases
- o Nuclear energy provides (2002) 40% of production and 35,1% of consumption
- o Between 1993 and 2000 GDP increased by 28%, while the energy consumption decreased by 2%
- o Contribution of gas became higher than the EU average
- o Reconstruction of plants cannot be delayed beyond 2010

Energy policy - 2

- Ø In any reliable forecast the contribution of nuclear energy remains unchanged even on the long run
- Ø Lifetime extension of Paks NPP remains an invariable element of any variant of the new energy policy
- Ø The changing role of the state (government) is under discussion (privatized plants, liberalized energy market + the safety of energy supply)

Lifetime extension - 1

Ageing problems are treated in an extensive manner

- Ø source identification
- Ø selection of vulnerable systems and components
- Ø ageing monitoring program
- Ø lifetime extension options are investigated, cost/benefit analysis

Solution of radioactive waste management is a pre-requisite of lifetime extension

Lifetime extension - 2

Additional subjects:

- ∅ renewal of FSAR
- ∅ risk informed maintenance
- ∅ Design Extension Conditions, mitigative AM
- ∅ power upgrading (up to 108% thermal power @ 500 MWe)
- ∅ fuel modernization

A long and complicated licensing procedure is expected

New nuclear units

- Ø At present new nuclear units are not planned in Hungary
- Ø Legal conditions are similar to average EU conditions
- Ø Public acceptance of Paks NPP is relatively good, in spite of the severe incident of 2003
- Ø Public acceptance of a new nuclear unit is not really known
- Ø Political parties are strongly divided in any matter
- Ø New nuclear units may substitute fossile plants to be decommissioned and/or later the Paks units
- Ø Decision should be made between 2010 and 2020

Consequences for R&D - 1

- Ø Participation in the re-start of Unit 2 (2004)
- Ø Participation in liquidating the consequences of the severe incident (2004-2005)
- Ø Lifetime extension and related problems initialize plenty of projects for the next 5 years, but: they are not really attractive for ambitious young researchers

Conclusion:

R&D should concentrate of the new generation of nuclear power plants and the related fuel cycles

Consequences for R&D - 2

New elements on the international scene:

- Ø Hungary ® EU ® GEN-IV International Forum (GIF)
- Ø FP 6 and FP 7 nuclear fission projects will be strongly influenced by the participation of EU in GIF

We intend to increase our efforts on organizing Hungarian participation in GIF in order to provide

- Ø the necessary expertise whenever it is needed by the energy policy
- Ø attractive R&D projects for young people

Conclusions

- ∅ The current problems of Paks NPP will be solved soon
- ∅ Paks lifetime extension should become an invariable element of the energy policy alternatives
- ∅ A political decision is needed to solve the waste management problems
- ∅ Decision on new nuclear units can be scheduled for 2010-2020
- ∅ In order to provide the necessary scientific-engineering background for the decision, R&D efforts should concentrate on GIF-related ideas