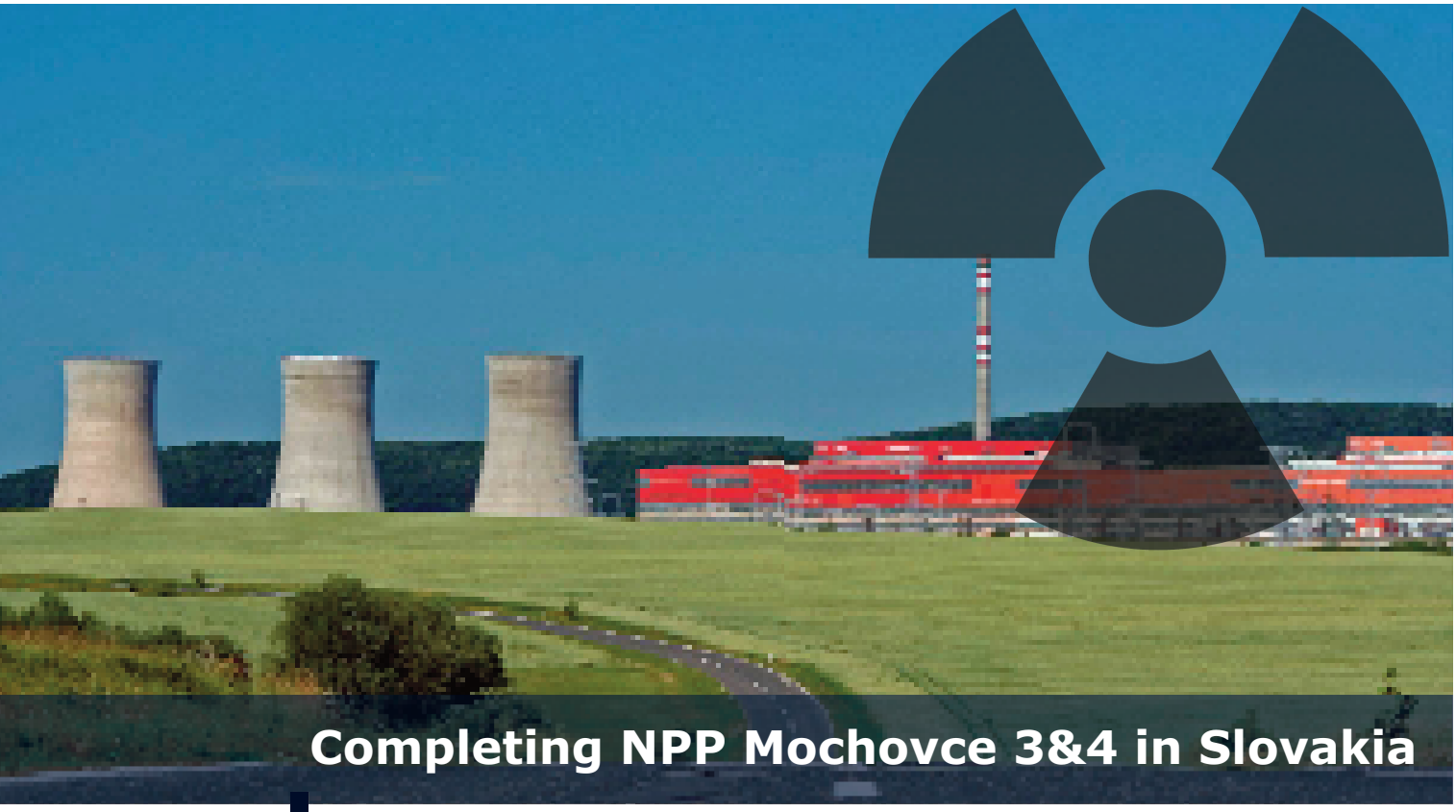


Completing NPP Mochovce 3&4 in Slovakia

Reactors from the 70’s for the 21st Century

The Italian-Slovak utility Enel/SE and the Slovak government are completing the Mochovce units 3 and 4. When it comes to nuclear safety of these VVER 440/V213 units, there is conflicting information as to which standard is to be reached!

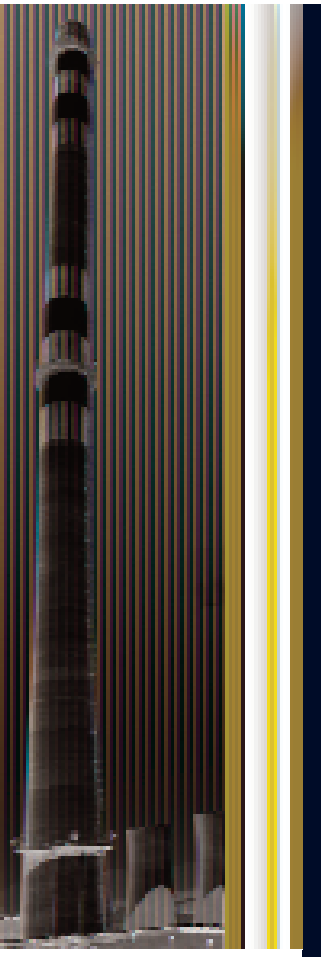
In November 2007 Mr. Conti, CEO of Enel, stated that Mochovce, which his company intends to build in Slovakia, will be a »Generation III« reactor. However, experts agree that this is technically impossible. The Slovak Nuclear Authority UJD stated in 2004: Due to the already existing building structures at Mochovce 3 and 4, it is not possible to reach a nuclear safety level of new nuclear units [UJD 2004].

The EU Commission shares this view:
»In this regard, even though the project shows compliance with the current national regulations of the Slovak Republic as well as international recommendations, the Commission based its assessment on the best practice available and recommended a set of additional measures. This is due to the fact that the VVER 440/V213 reactors proposed by the investor do not have 'full containment' structure which is used in the most recent construction of nuclear power plants planned or under way in Europe.« [EC 2008].

DEFICITS OF VVER 440/V213 COMPARED TO CURRENT SAFETY REQUIREMENTS

Next we look at what a VVER 440/V213 stands for and where the differences lie compared to reactors under construction in 2010. Units 3 and 4 of NPP Mochovce should meet at least the safety standard of a modern Pressurized Water Reactor (Sizewell B or EdF's N4 reactors). Since 2001, terrorism is acknowledged as a serious risk for NPPs, and nuclear power plants have to withstand a crash of a large airplane as well as the impact of missiles.

Mochovce, a VVER 440/V213, is a Soviet Generation II reactor, designed in the period 1970 -1980. »The general basis for the design corresponds to the former Soviet standards« [NEI 1991]. Some improvements compared to the original Russian design had been implemented at Mochovce units 1 and 2, when they started operating 1998/1999 respectively.
The safety level Mochovce will meet depends on: (1) how much safety the operator Enel/SE will pay for, and (2) whether an upgrade is possible.



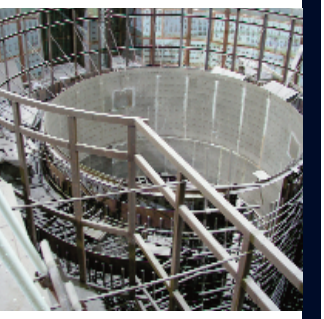
CRUCIAL SAFETY ISSUES

The extent of structural improvements when completing Mochovce 3/4 is limited because in 1993, when construction was stopped, already 70% of civil construction was completed and 30% of the equipment had been supplied: the reactor vessel, steam generators, pressurizer, safety system tanks and major turbine parts (partially installed) have been mothballed and are stored at the plant.

- The structural limitations mainly concern the confinement structures and the possibility of physical separation of safety systems.
- Neither the reactor building nor the bubble condenser are resistant against external events (air plane crash or missile).
- The lack of segregation of high energy pipe lines: feed water and steam pipes are parallel on the 14,7 m level (connection between reactor and turbine hall). Therefore, the loss of both at the same time cannot be excluded (e.g. caused by an earthquake, pipe whip), which would make the cooling of the reactor almost impossible.
- Mochovce does not have a containment, only a confinement with a bubble condenser to limit the pressure from large pipe ruptures. The tests showed the functioning of the bubble condenser for design basis accidents and some severe accidents, but not all. However, most second generation PWRs have full pressure containments and Generation III reactors will have improved (double wall) containment structures and they will provide options to catch and cool the reactor core in case of reactor pressure vessel failure.
- Seismic design has to be proven in relation to the earthquake risk at the site. Seismic design is a week point of all VVER 440/213 units. Moreover, seismic evaluation and seismic design have evolved fundamentally in recent years. It is unclear whether Mochovce 3 and 4 can meet the latest seismic design standards of the IAEA [IAEA 2002].

CONCLUSIONS

The construction license of 1986, which is the base for the plan to finalize Mochovce 3/4, concerns a design status which includes all the deficiencies listed above. This is likely to result in a safety standard lower than Mochovce 1/2. The general basis for the design corresponds to the former Soviet standards but there is a list of improvements that are implemented in Mochovce NPP 1/2 compared to the original Russian design. Planned lifetime of Mochovce 3/4 is 40 years and start of operation is expected in 2012/13. A NPP that will run until 2050 must fully meet today's latest safety standards. From a precautionary perspective, a new NPP should use best available technology and not equipment and technology from the 1970's, where also improvement is limited due to finished civil structures and old equipment. At Mochovce 1/2 (1998/99) several improvements were implemented [VUJE 2001]. If all these changes are included in the completion project of Mochovce 3/4, the plant design would be very different from the one which received the construction permit in 1986. In 2008 the Ministry of the Environment announced that an EIA will have to be completed – not before start of construction, only before the operational permit is given. This stands in contradiction to EU EIA directive and the Aarhus Convention, because if the EIA would point out negative impacts, it would be too late to undertake major changes in the project. Also changes in technology would not be possible any more. On June 11 2009, however, ENEL/SE signed the contracts for the completion with Skoda, Atomstrojexport, Enseco and other suppliers. At this time the EIA was in the scoping phase, the EIA report not released yet. Public participation in Slovakia and the neighbouring countries which notified (e.g. Austria, Hungary) has not even started; without awaiting the Aarhus Compliance Committees response to the NGO complaint of non-compliance with the Aarhus Convention, the Slovak authorities completed the EIA in May 2010. Still open are the safety questions and major design solutions.



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