



**President of the Board of Directors
Alexandru Sandulescu**

NOTE

Regarding the approval by the Extraordinary Meeting of Shareholders of the Strategy and the Plan for the refurbishment of Cernavoda NPP's Unit 1 for extending its lifetime

1. Preamble

Each nuclear unit has a design basis lifetime but the effective life period depends on the manner in which the NPP is operated. The capacity factor has one of the most significant influences on the effective lifetime of a nuclear unit, because a level of the capacity factor higher than the one taken into consideration by the designer leads to the reduction of the operational lifetime of the unit due to rapid physical ageing of the main equipment and components.

Given the major costs for constructing a new nuclear unit of which the construction costs have a significant share, one alternative for the owner/operator of such an installation is to develop a refurbishment project, in order to extend the lifetime of the installation. The main advantage of such an option is that, at the end of the refurbishment process, the investor is in the possession of a new unit usable for another life cycle, at costs estimated around 30-40% of those needed for the construction of a new similar capacity. The proposed strategy takes into consideration the necessary steps for the refurbishment and recommissioning of Unit 1, with the following objectives related to achieving the main performance indicators:

- Lifetime extended with another 25-30 years, at the average capacity factor of 90%;*
- Planned outages at a period of minimum 2 years and with an average duration of 30 days;*
- Renewal, at every ten years, of the Unit operation license*

2. Presentation

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In the case of CANDU technology, the critical element for the lifetime of the unit are the fuel channels, for which the designed lifetime is approximately 30 years, for a capacity factor of 80%. The capacity factor of the unit has one of the most significant influences on the effective lifetime of the fuel channels because in the case of exceeding the designed values, it leads to the reduction of the operational lifetime of the unit due to rapid physical ageing of the main equipment and components. In the actual case of Unit 1 (U1) the current capacity factor is over 90%, calculated since in service, which determines a reduction of the effective lifetime from 30 years to about 26 years, which will be reached by the unit in 2022.

Given the complexity of the activities involved in the refurbishment process, a minimum preparation period of 10-12 years before the effective refurbishment outage is required. This period is estimated based on the available external experience as well as on the evaluation of the necessary time to prepare activities that have to be carried out before shutting down the unit for starting of the refurbishment. It is worth mentioning that such refurbishment projects were carried out at similar units to Cernavoda NPP Unit 2 and were developed successfully in the case of Point Lepreau – Canada and Wolsung 1 – Korea, which represents a practical validation of the feasibility of such a project.

Moreover, important costs (tens of millions of Euros) are associated to these required preparatory activities, since the initial phase, mainly for the elaboration of technical studies for evaluating the status of the major equipments and structures, nuclear safety studies and radioprotection evaluations, environment evaluations, etc, cumulated with the development of large scale preparatory logistics and infrastructure activities, that have to be started 5 years in advance of the actual shut down of the unit for refurbishment.

3. Activities related to the refurbishment of Unit 1 developed up to present by SNN

Up to present, SNN, through its Cernavoda NPP branch, carried out a series of activities related to the project, as follows: in 2010, Cernavoda NPP elaborated the document „The extension of the lifetime of Cernavoda NPP Unit 1”, on the basis of which the preliminary agreement for starting of the project was granted by the Board of Directors of SNN SA (through Resolution no. 7/2010). Since the Fukushima accident in March 2011, the priorities and resource allocations of SNN SA were reconsidered and directed, mainly, towards the completion of the „stress tests” and the urgent start of the works for the implementation of the improvements resulted from the stress tests.

Thus, the refurbishment of U1 was put on hold in order to allow the allocation of necessary resources for these improvement works on the operating units. However, discussions regarding the refurbishment project were restarted in November 2011, when the management of Cernavoda NPP performed a reevaluation of the strategy and approach from the point of view of the project’s status and the perspectives of developing the project by establishing simultaneously the necessity to restart the process for the set up of an experience exchange mission in order to determine the most appropriate manner to start and develop the project, based on the experience of other nuclear power plants, either in full refurbishment process or in advanced stages of preparation for refurbishment.

This pragmatic approach was necessary, given the fact that by using information from the experience of other nuclear power plants, inherent errors in developing such a project can be avoided (Point Lepreau NPP). Cernavoda NPP branch asked for the endorsement of the Technical, Economical and Scientific Council (CTES) of SNN SA dated 17 October 2013, regarding the schedule for the preparation of the refurbishment of U1 as well as the future strategy, in order to obtain the approval in principle of the statutory bodies of SNN; the strategy proposes a two step approach, namely: (i) the approval in principle by SNN SA statutory bodies of a preliminary scope which will endorse the contracting and execution of estimated expenses of around 80 million lei, associated to the elaboration of technical and economical and nuclear safety studies, authorization documentation and performing activities related to obtaining the permits, agreements and authorizations required by the current legislation, which have to be started by the summer of 2014; as well as (ii) outline of the project's scope, based on the studies mentioned at point (i) above, regarding the preparatory phase as well as the actual implementation phase; in fact, the outline of the project's scope (objective) will be defined through the elaboration of the Feasibility Study, that will establish the necessary budget, execution schedule, constraints, risks and vulnerabilities, contingency measures and all the other resources required for the successful development of the project. Eventually, the member of CTES endorsed the proposed strategy, noticing, at the same time, that the documentation presented for approval contains elements that are characteristic to a prefeasibility study, thus the elaboration of such a study is no longer necessary. Moreover, in accordance with the provisions of "GD 28/2008 regarding the approval of the frame content of the technical and economical documentation for public investments, as well as the structure and methodology for the elaboration of the general cost estimate for investment objectives and intervention works", the preparation of a prefeasibility study is mandatory only for the projects which are under the approval competence of the Government, which is not the case for the refurbishment project.

Taking into consideration the international experience up to present, from which it results that the main contact for fuel channels and feeders replacement has to be concluded approximately 5 years in advance of U1 disconnection from the grid, the schedule of the project (attached to this Note) imposes the intensification of preparatory activities, which should begin in January 2014. These preparatory activities refer, mainly, to the elaboration of the technical and economical and nuclear safety studies and of the authorization documentation as well as to obtaining the permits, agreements and authorizations required by the current legislation, estimated at approximately 80 million lei, according to Appendix 1.

Also based on international experience, it is estimated that the costs of the project are situated between 1,2 – 1,5 billion Euros, mentioning that a value closer to the real cost of the project will be estimated once the feasibility study is completed, study which will be as well subjected to the approval of SNN SA statutory bodies, in order to take the final decision regarding the refurbishment of Cernavoda NPP Unit 1.

4. Proposals submitted to the approval of the *Extraordinary General Meeting of Shareholders*

In addition to the aforesaid, as well as:

- (i) The fact that SNN SA Board of Directors approved, through the resolution no. 68/21.11.2013, the strategy and the plan for the refurbishment of Cernavoda NPP Unit for extending its lifetime,
- (ii) The fact that SNN SA Board of Directors approved, through the resolution no. 68/21.11.2013, the engagement and execution of the technical and economical and nuclear safety studies, of the authorization documentation necessary for outlining the final scope (objective) of the Project, presented for information in Appendix 1 to the current Note, with an estimated budget of 80 million lei,
- (iii) The fact that the refurbishment of Cernavoda NPP Unit 1 for extending its lifetime, represents a strategic investment for SNN SA, the value of which represents about a half of the accounting value of the Company's assets,
- (iv) The fact that the decision regarding the undertaking of this project has a major impact on other modernization works and investments that have to be performed during the outages prior to the refurbishment, as well as, in a larger organizational framework, on the economical results and image of the company,
- (v) The fact that, as regards to the estimated costs of the refurbishment project (1,2 – 1,5 bn. Euro), the shareholders of the company have to express their agreement for conducting the necessary studies for this investment,
- (vi) The fact that, in accordance with art 13, paragraph 5, letter k) and m), the Extraordinary General Meeting of Shareholders approves the conclusion of legal documents regarding the company, documents which exceed in value half of the accounting value of the company and in the case of the refurbishment strategy, the cost of the entire project requires the approval of the EGMS in order to be implemented and also the approval of any other documents subjected to the EGMS,

we ask to the **Extraordinary General Meeting of Shareholders for**

the approval of the strategy and the plan for the refurbishment of Cernavoda NPP Unit 1, for extending its lifetime, as well as for the engagement and execution of the technical and economical and nuclear safety studies and of the authorization documentation necessary for the outline of the final scope (objective) of the Project, presented for information in Appendix 1 of the current Note, with an estimated budget of 80 million lei.

Appendix to the current Note:

Appendix 1: List of necessary studies for the first preparation phase of the refurbishment;

Appendix 2: U1 Refurbishment/Retubing (RFR) Project Level 1 Schedule.

7.0 The list of necessary studies for the first preparatory phase of the retubing/refurbishment

No.	Name	Implementation period
1	The extension of the lifetime of Cernavoda NPP Unit 1 with 25 years in addition to its designed lifetime (Feasibility study)	2015-2017
2	Elaboration of studies on „The evaluation of the lifetime” for each type of power transformer from Cernavoda NPP U0 and U1 with the exception of power evacuation transformers (including the initial evaluation of the conditions of the transformers)	2014-2015
3	Life assessment study for Fuel Channels U1	2013-2015 and 2018
4	Life assessment study for Reactor Building U1	2014 and 2018
5	Life assessment study for feeders U1	2013-2014 and 2018
6	Life assessment evaluation & life extension detailed planning document for Cernavoda NPP U1, turbine, generator and auxiliaries systems	2012-2013
7	Evaluation services for the lifetime of Cernavoda NPP U1 heat exchangers	2012-2013
8	Nuclear safety assessment services for the update of the PSA Level 1 and PSA Level 3	2014
9	Update services for the Final Nuclear Safety Report of Cernavoda NPP Unit 1	2012-2013
10	Environmental studies necessary for obtaining the permits, agreements and environment authorizations for the refurbishment of U1	2014-2018

11	Other support documentation for authorization/approval required by the authorities during the process and unexpected ones	2014-2018
Total value		~ 80.000.000 lei