THE USE OF PESTEL ANALYSIS IN DEVELOPMENT OF THE ROMANIAN GEOLOGICAL REPOSITORY

Veronica ANDREI[1], Ilie PRISECARU[2]

In accordance with the provisions of the Council Directive 2011/70/EURATOM, a major component of the future Romanian radioactive waste management program should be geological disposal of high level and long-lived low and intermediate level waste. The management of risks associated with the program for the National Geological Repository (NGR) is a complex task but recommended by authors to be used from the elaboration stage, since these risks could affect the program development. The objective of this paper is to use the PESTEL analysis as a tool for identification of important risks that might jeopardize the proper and reliable development of NGR program.

Keywords: PESTEL analysis, risk analysis, radioactive waste, geological disposal

1. Introduction

In respect of Council Directive 2011/70/EURATOM requirements Romania as EU Member State should elaborate the national program for spent fuel and radioactive waste management. First reporting to EC on programs and their time schedules is established for August 23, 2015.

In the spirit of the Directive, the current national strategy for disposal of radioactive waste indicates that a National Geological Repository (NGR) dedicated to spent nuclear fuel generated by Cernavoda Nuclear Power Plant (NPP) should be commissioned in 2055. According to recent international tendencies, the NGR should also be considered to accommodate long-lived low and intermediate level radioactive waste generated in Romania.

No doubts, there is an extensive international experience on elaboration of geological repository programs based on decision making process. But even if some lessons can be learnt from other countries' experiences with developed geological disposal programs, on one hand many of those programs were initiated more than 20 years ago and on another hand there are differences between the Romanian context and that of these countries.

[1] Eng., Romanian Association for Nuclear Energy, Romania
[2] Prof., Power Plant Engineering Faculty, University POLITEHNICA of Bucharest, Romania

The objective of this paper is to study the use of the PESTEL analysis (P - Political, E -Economical, S -Social, T -Technical, E -Environmental, L -Legal) in the initiation of the NGR program, and resulted in a realistic inventory of important issues that might involve risks associated with the program from this stage.

This PESTEL analysis [1] is a first approach of the field and consists of an audit of the national context allowing in principal the identification of those issues induced by the "luggage" of national specificity with potential impact on program development. The analysis is based on targeted information from several international standards, studies and reports and a comprehensive information from formal and public documents related to the development of the project of a geological repository in Romania.

2. Timeline profile of the geological repository project

The timeline scheme recommended by International Atomic Energy Agency standards (IAEA) [2] for development of a geological repository as presented in Figure 1 clearly indicates a complex project with long time duration. Considering current evolution the plans for such projects intended for needs of the national nuclear power programs this duration is estimated to an average of 60-80 years till the closure of the repository. The processes of site investigations and characterization and site licensing have taken more 25 years for Swedish and Finland projects, which have already issued siting licenses for their planned geological repositories.

In Romania, on-map and desktop studies for identification of a potential host rock for a geological disposal repository have been initiated since 1995[3]. Based on all preliminary investigations and international experience a deep geological repository strategy [3] was elaborated by Romanian experts supported by IAEA experts in 2008. The planning started with 2009 and commissioning was considered to take place in 2055.

In the PESTEL analysis presented in this paper, the impact of the national context on the development of the NGR program was considered from initiation of the project till the time when Regulatory Body would issue the decision of construction. Over this point the influences of the national context on geological repository program were considered totally unrealistic. Today's elaboration of the NGR program should practically rely on the international experience for the activities of the stages lasting from construction to post-closure.

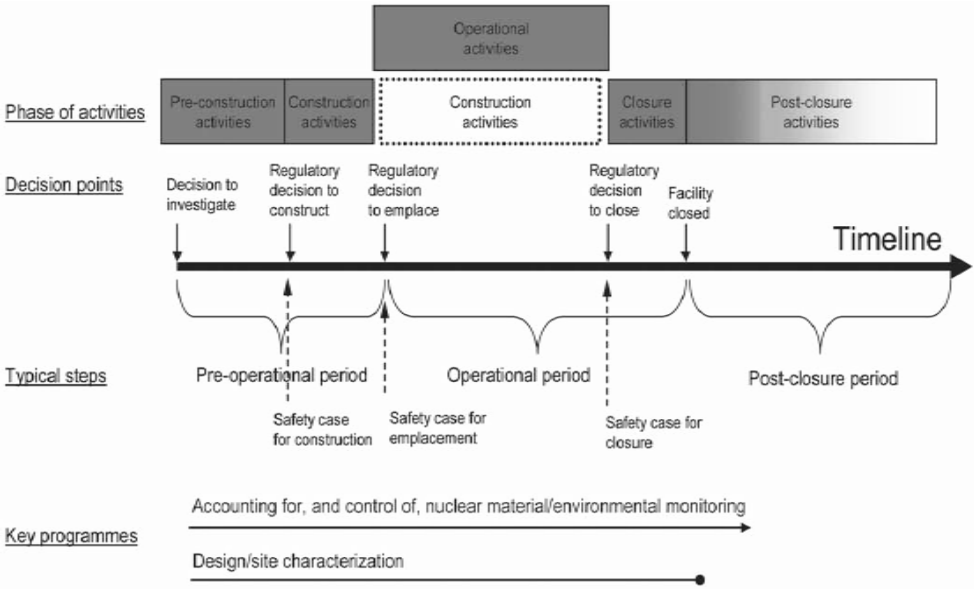

Fig. 1. Timeline scheme for development of a geological repository (source: [2])

3. The process adopted in the PESTEL analysis

The PESTEL analysis has identified the external factors that would have an impact on the organizational environment within which the NGR program should be developed. This analysis is not limited to identifying risks since it is important to identify many other things for which radioactive waste disposal developer does not have control on them, but they should be understood.

By law, Nuclear Agency and for Radioactive Waste - ANDR acting under authority of Ministry of Economy is the organization responsible for disposal of radioactive waste in Romania. In this paper there were not considered any internal risks within the environment of the current ANDR organization in relation with any external factors identified in the PESTEL analysis. The reason was that we assumed that the NGR program will be elaborated after the organizational structure having this responsibility will be established and empowered by ANDR and its supervisory Ministry.

The process adopted in this PESTEL analysis is similar to those adopted in other analysis [4] and has integrated the actions which are further presented.

The starting point is based on the fact that the authors have experience and good knowledge of the general environment in which the radioactive waste disposal will be developed in Romania.

For performing the analysis a comprehensive set of references has been studied relying on the collection and segregation of representative data and

information related to the institutional development of the field of geological disposal of radioactive waste.

- For each factor of the PESTEL analysis there were identified aspects characterizing current national environment for initiating the NGR program.
- Accent has been put on screening issues that are outside or beyond the control of a single organization having main responsibilities in disposal of radioactive waste in Romania (i.e. ANDR) by law.
- Broadly implications of each issue that might evolve in a certain risk for developing the NGR program have been identified.

The analysis was focused to identify the issues rather than trying to resolve them, as it was approached in similar research on uncertainty in project planning [5,6]. The authors put the accent on more practical reasons, on those issues having relative significant importance to the process of developing the NGR program and considered more likely to occur. In Figure 2 there are listed the aspects questioned and discussed for each factor of this PESTEL analysis. These aspects mainly resulted from a knowledgeable and attentive combination of the following:

- Screening the PESTEL analyses factors recommended for development of large projects/business that can be appreciated similar with the project of a geological repository;
- Observation of a PEST analysis made for US nuclear industry;
- Taking into account applicable questions and answers from the questionnaire on geological disposal issued under IAEA GEOSAF II project [7];
- Observation of state-of-art in geological disposal planning at international level by using international standards and reports published by IAEA, OECD/NEA or EC;
- Overview of the lessons learned/issues specific to the development of new built nuclear projects (e.g. lessons learned from EIA process for Cernavoda Units 3&4, environmental and safety licensing of Dry Spent Fuel Interim Storage Facility –DICA).

POLITICAL	**ECONOMICAL**
- Political parties' opinions	- Interest rates
- Radioactive waste disposal strategy	- Inflation
- Financing of national radioactive waste disposal strategy	- Economical growth
	- Exchange rate

- Roles of institutions involved in radioactive waste management - International Atomic Energy Agency and European Commission - Taxes	- Level of accumulated financial resources and financing mechanisms for their increases
SOCIAL	**TECHNOLOGICAL**
- Decision and responsibility - Organizational legitimacy - Public participation - Nuclear industry's liaison with public - Antinuclear NGOs	- Status of radioactive waste geological disposal - Preliminary phase in geological disposal repository program - Medium term strategy for nuclear spent fuel and long-lived radioactive waste
ENVIRONMENTAL	**LEGAL**
- Approach for SEA and EIA - processes - Environmental licensing procedure	- Specific regulations in nuclear field - Licensing/Approval of repository siting - Environmental Agreement - Correlation between legislative requirements preceding approval of siting in Parliament

Fig.2.PESTEL Analysis in support of the elaboration process for a geological disposal program in Romania

In the Table 1 there are presented the issues resulted from this PESTEL analysis representing current main external factors having impact on the environment of the organizational structure developing the NGR program.

3. Follow-up to PESTEL analysis

As mentioned in the section 2 of this paper, this PESTEL analysis was made for those issues with relative significant importance in developing the NGR program and their implications considered likely to occur or many of them already happened. Observing implications of all issues indentified in this PESTEL analysis, some of them appear to induce high risks in developing the NGR program.

Table 1

Issues resulted from PESTEL analysis and likely to develop significant risks in NGR program if not addressed

POLITICAL	ECONOMICAL	SOCIAL
- Political decision on continuation of nuclear power program at Cernavoda NPP should be substantiated. - It is not clear if the revision of the national energy strategy announced by Government	- The funds collected from actual operational Cernavoda NPP units are kept in deposits at State Treasury in Ro lei with a low interest	- Decision and responsibility on developing and implementing a geological disposal program are concentrated at Government and State authorities levels. - There is no experience on public involvement in the decision

will include capacity for a new NPP. - There is a need to correlate environmental objectives including terms of the national energy strategy with objectives from national strategy/program for spent nuclear fuel and radioactive disposal. - National research strategy for 2014-2020 should include objectives that allow building national research and development capacity in deep geological disposal of radioactive waste, particularly in disciplines which are complementary to the actual national expertise in the nuclear field. - Final State responsibility required by Directive should be substantiated by clarifying the destination of the future NGR and the financing mechanism of the NGR program, including financing supported by State on behalf of waste generated other than NPP waste	annual rate of 2%. - During the period 2007-2013, the evolution of inflation and interest rate globally affected the financial resources collected for radioactive waste disposal. - The tax of 2 Euro/MWh currently paid by Cernavoda NPP for radioactive waste disposal has been calculated using net present value method and a real increase annual rate 2% in Euro. Hence, management of funds needs legal revision. - Traditional national experience has indicated that foreign imported component has been important part of the complex project.	making process for projects with a long time horizon and needing extensive research-development to be confirmed such as the NGR project is (see today's confusions registered in the debates of shale gas explorations/exploitations). - Good knowledge and understanding of experience gained in the European research projects referring to public involvement in the decision making process could help but it still is difficult to concentrate Romanian stakeholders' attention to subjects beyond actual needs. - The State needs to adopt an early clear approach how the contributions of host communities and the region where the NGR project will be developed will be recognized and made it transparent. - Very different and fluctuant interests of political forces, involved organizations or NGOs affect the elaboration of the NGR program. Hence, strategy for stakeholders approach should be very early available at Government level.

Table 1(cont'd)

TEHNIC	ENVIRONMENTAL	LEGAL
- Romania has a large number of potential host rocks for geological disposal and this situation makes difficult the decision where to start research since selection of areas that can accommodate a research underground laboratory and the geological repository itself is difficult and expensive even for a single rock.	- In Romania there is no experience in Strategic Environmental Assessment or Environmental Impact Assessment processes for a radioactive waste repository. - There are no environmental, particularly safety requirements for the content of the environmental analysis in support of SEA. - Environmental requirements	- Presently, there are no any specific regulations in the field of geological disposal in Romania. - The present legal requirement (Ordinance No. 7/2003 modified and approved by Law 57/2006) that siting of radioactive waste disposal facilities is approved by law (by Parliament) on

- The Romanian Geological Repository Strategy (2009-2055) has to be updated since its first task which had as objective to define the general framework of developing the NGR did not start yet and many external factors affecting it have changed since then. - Foreign expertise can help with how to build the NGR program but for national specific aspects many of them treated in this PESTEL analysis understanding of things, identification of problems and their solving are very difficult to come from outside. - An inventory of the technical aspects that has to be addressed in order to define initial basis for starting the NGR program is needed for ensuring that the program could realistically start.	have to be correlated and integrated with other requirements mainly those introduced by the Nuclear Regulatory Authority-CNCAN for the different stages of licensing. This is deemed necessary in the case of the Environmental Impact Study in support of the Environmental Permit. - Today knowledge on state-of-art in the geological disposal at international level belongs only to CNCAN. - Level of requirements on technical and safety data necessary for environmental analysis should be early available. Hence, collaboration between Central Environmental Authority-Ministry of Environment and Sustainable Development (MMSD) and CNCAN is deemed needed.	the basis of National Strategy for developing the nuclear field and licenses issued by the Regulatory Body. But: - The first step in environmental licensing is SEA procedure and there is no legal requirement for a license issued by CNCAN in this stage. - By law, the environmental permit based on EIA procedure issued by MMSD is prerequisite for siting license which is the first license issued by CNCAN. - In time difference between SEA procedure and EIA procedure might be 10-15 years. - National strategy on nuclear field has no legal requirement for updating.

Since in this PESTEL analysis the majority of identified issues are strong threats for the developer of the NGR program, the following steps might be further recommended:

- Solutions to solve high and medium risks should be identified very early in the elaboration of the NGR program and,
- Solutions to address as much as possible all issues identified as threats should be considered.

Results of this PESTEL analysis as well as further risk analysis can significantly contribute to elaboration of a sustainable NGR program.

The PESTEL analysis might be repeated once that the management of the developer organization would appreciate that external factors are significantly modified.

4. Conclusion

This paper presented the results of using for the first time a PESTEL analysis in Romanian geological disposal of radioactive as a tool for identification of those issues induced by the national specificity and which might evolve in significant risks for developing the NGR program. This PESTEL analysis may be further used as input for risk analysis and may contribute to elaboration of a sustainable NGR program in accordance with new provisions of Council Directive 2011/70/EURATOM.

R E F E R E N C E S

[1]. *Veronica Andrei, I. Prisecaru,* Analiza PESTEL in depozitarea geologica a deseurilor radioactive (working report), Universitatea Politehnica Bucuresti - Facultatea de Energetica, September 2013.

[2]. IAEA Safety Standards Series No. SSG-14, Geological Disposal Facilities For Radioactive Waste, Specific Safety Guide, 2011.

[3]. *Maria Radu, A. Panait, G. Bararіu*-SITON, *G. Negut*-ANDRAD, The impact of the nuclear program development in Romania of the national radwastes management strategy, Revista Energia Nucleara, vol. 23, nr.3-4/2011.

[4]. www.free management e-books, PESTLE Analysis-Strategy Skills, 2013.

[5]. *Vahid Khodakarami, Norman Fenton, Martin Neil*- Queen Mary University of London, Project Planning: Improved approach incorporating uncertainty, EURAM Annual Conference, TUM Business School, Germany, 2005

[6]. *Chris Chapman, Stephen Ward,* Managing Project Risk and Uncertainty: A Constructively Simple Approach to Decision Making, , ISBN: 978-0-470-84790-9, 514 pages, August 2002

[7]. IAEA, GEOSAF, The International Intercomparison and Harmonisation Project on Demonstrating the Safety of Geological Disposal, Working Material, 2011.