

# CHALLENGES FACED UNDER THE IAEA'S PROJECT GLOBAL STATUS OF DECOMMISSIONING

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Article received on October 20, 2021

Adapted from the Proceedings of the Third International Scientific and Practical Conference on the Environmental Protection and the Management of Radioactive Waste from Scientific and Industrial Centers, FSUE RADON, September 22–23, 2021.

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*The paper informs about the purpose and the milestones of the IAEA's project Global Status of Decommissioning launched in August 2019.*

**Keywords:** nuclear power plant, nuclear research reactor, nuclear fuel cycle facility, decommissioning, waste management technologies, radioactive waste.

## Purpose and task of the project

The IAEA Global Status of Decommissioning project (hereinafter referred to as the GSD) was launched in August 2019 based on consultative and technical meetings of the IAEA Secretariat and is currently ongoing. GSD is mainly seeking to describe the global status and trends in the decommissioning (DE) of nuclear and radiation hazardous facilities (NRHF) based on the data available on the current state and the assessment of likely developments in this area. Such information is currently not available in a consolidated form; therefore, the project should help to fill the existing gaps. The GSD project should result in an international summary report developed based on IAEA requirements (hereinafter referred to as the Report).

The resulting GSD Project Report should contribute to the following aspects:

- benchmarking, planning and decision-making;
- cooperation between IAEA Member States with similar challenges and opportunities;
- provide information necessary for subsequent analysis.

## Research area

The GSD project considers three types of nuclear facilities (NFs): nuclear power plants (NPP), research reactors and prototype reactors (RR&PR), nuclear fuel cycle enterprises (NFC), including those involved in nuclear fuel fabrication,

enrichment and processing, as well as disposal and storage of the resulting waste.

### Toolkit and organizational structure

A toolkit or form used to collect, organize and analyze information is a questionnaire developed in January 2020. This questionnaire presented in Excel format was developed by the project steering group for participating countries and contained questions and fields to be filled in providing opportunities for further processing and analysis of the data received. Responsible coordinators have been identified for all participating countries.

Structurally, the GSD working group involves:

- a steering group (SG), which at consultative meetings discusses and makes organizational and managerial decisions on all problematic issues associated with data collection and analysis, and also forms and distributes updated versions of the Report among the members of the working group;
- technical group (TG) engaging coordinators and specialists responsible for collection, analysis and submittal of information to the SG for consideration and discussion required for the development of the Reports.

### Project milestones

In the course of the project implementation, it became obvious that it was specifically focused on setting ambitious tasks associated with comprehensive analysis of the global state-of-art in the decommissioning. This focus was mainly due to the existing concerns regarding potential second wave of nuclear legacy formation due to the accumulated problems associated with the final stage of nuclear facilities' life cycle (FSLC). On the one hand, this required the collection of information on various decommissioning aspects not being limited only to engineering, organizational and managerial (data on the own personnel resources available for particular decommissioning activities, level of subcontractor engagement in the decommissioning, evaluation of decommissioning costs and relevant funding mechanisms) ones, but also requiring more complete contextual data. On the other hand, the attempt made on combining all types of nuclear facilities (NF) subject to decommissioning under a single study, including NPP, RR&RP and NFC facilities, the information about which was previously collected in different systems ( PRIS — Power Reactor Information System for NPPs [1], RRDB — Research Reactor Database for RR [2], INFCIS — Integrated Nuclear Fuel Cycle Information System for NFCF [3]) yielded certain methodological problems

showing the need for the harmonization of existing standards and approaches. For this reason, as early as at the initial data array required for the analytical work was formed, the acuteness of these problems was revealed, i. e., since organizations operating various nuclear facilities were selected as the main contractors (key stakeholders) and these were grouped according to the geographical principle (subcontinental macro-regions).

### Bottlenecks of the project

In early March 2021, based on the data collected from the questionnaires filled in by a number of nuclear developed countries the following results were achieved:

- only two countries have provided data on all available commercial nuclear facilities — Russia and Ukraine;
- virtually no information was provided by China and the US;
- some partial data was provided by France, Canada, Japan and South Korea.

As a result, the information provided did not allow for a comprehensive and in-depth analysis of the global situation in nuclear decommissioning, which was primarily due to the following aspects:

- data were requested from nuclear facility operators generally having limited perspective with their perception of the situation being local and commercial in its nature;
- in fact, only two parameters turned out to be available to provide a global picture: country/geographic region and type of facility/reactor.

To improve the quality of comprehensive analytics, it was proposed to cluster the nuclear decommissioning areas, thus, based on the available data, it would be possible to demonstrate the multidimensional nature of the Global Status and develop more detailed questionnaires for the next stage of research, including the analysis of nuclear decommissioning trends (Figure 1) [4].

In general, some obvious reasons can basically explain the difficulties in describing the Global status and trends in the field of nuclear decommissioning, in particular, different political setups in the countries. For example, only Russia and France (to a lesser extent Japan and South Korea) are facing actual problems in this area and are forced to change their points of view in a significant way: not to discuss the decommissioning of a particular nuclear facility, but rather to consider their entire set (for example, the entire fleet of nuclear power plants) and to address the challenge associated with the arrangement of nuclear decommissioning activities based on the rationale behind the management of

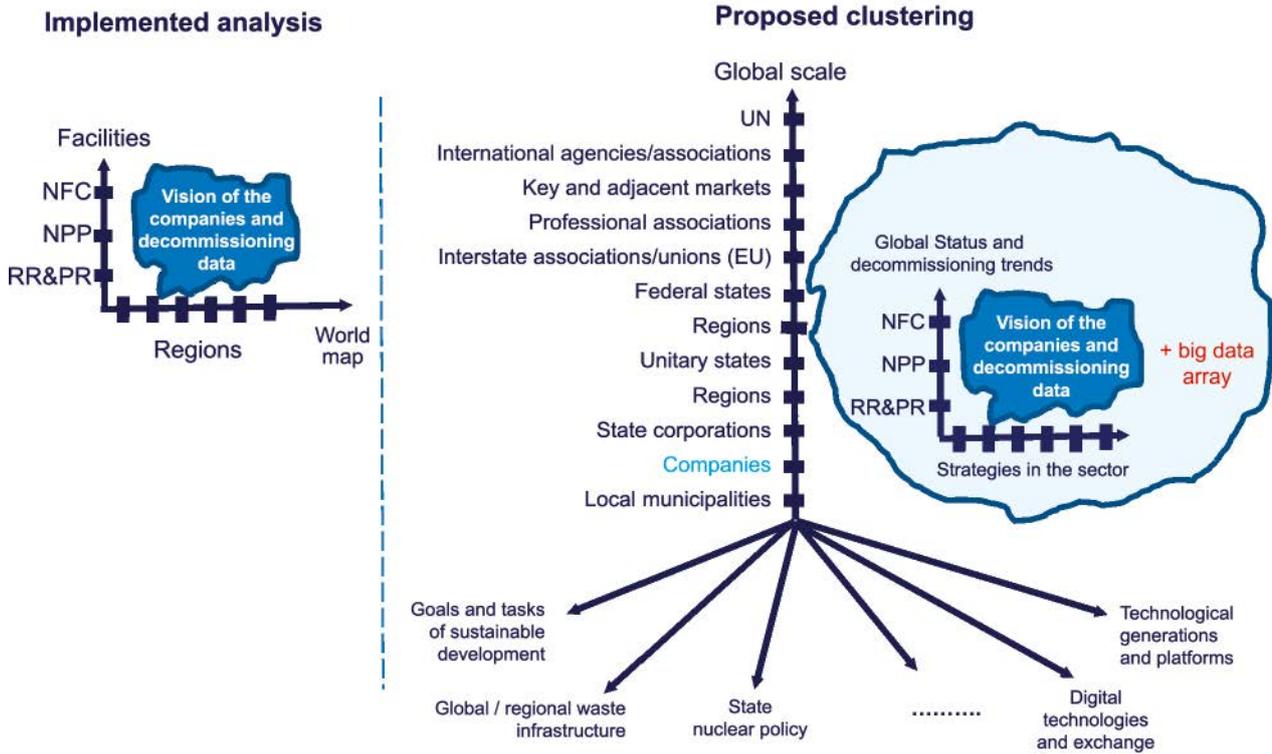


Figure 1. Expansion of a methodological approach to the analysis of the collected data

nuclear facilities' life cycle considered under their national projects (including nuclear legacy cleanup programs) [5], as well as to support countries using their own technological platforms. Therefore, it is important for Russia and France to demonstrate the competitiveness of nuclear power and to learn the maximum number of lessons from the nuclear decommissioning. At the same time, for Germany, where the nuclear power program has been shut down, it seems enough to benchmark the technologies and the cost of decommissioning as regards some individual types of facilities. In Italy, the shutdown of nuclear program was due to the outcomes of the 1987 referendum that followed the accident at the Chernobyl nuclear power plant in April 1986. Therefore, current nuclear decommissioning projects mostly depend on the funding aspects and not that much on the engineering challenges. In the USA, the difficulties accumulated in the field of SNF and RW management hinder mass decommissioning [6]. For China, this task is either not relevant at all yet, or the PRC government has imposed a strict veto on the dissemination of any information about the national nuclear program seeking to prevent leakage of data on their nuclear weapons potential. It is possible that the lack of information from these countries can be explained by such a variety of reasons.

All these numerous political aspects should be taken into account under the Project and to identify

the nuclear decommissioning trends. Moreover, this information does not require the completion of questionnaires at the company level.

To describe the Global status in nuclear decommissioning, it is not the data on nuclear facilities of the past generations that is that much important, but the data on advanced nuclear facilities, including, for example, small modular reactors. However, to date, such analytics is not provided for under the GSD project. Technological platforms are of great importance, but their role is also not accounted for at the moment. Grouping by subcontinental macro-regions not only provides no additional analytical information, but also introduces distortions into the overall picture of the Global Status. For example, considering a single decision-making center in the European Union, division of Europe into Western and Central & Eastern, currently does not make any sense for most countries of these two macro-regions.

Potential for the processing of information from open sources and the involvement of artificial intelligence in the collection and analysis of such data in nuclear decommissioning is considered of particular importance. Challenges faced while identifying the Global status and trends in nuclear decommissioning were not limited to the above reasons, and, therefore, we should continue to search for the ways that would address this problem.

The State Corporation Rosatom engaged in the development of a methodology for data collection and analysis that would provide a real-life and analytically concise global picture (status) in nuclear decommissioning believes that this work is an extremely important task both in terms of addressing the challenges at a national level and at global nuclear decommissioning and radioactive waste management markets. Engagement of JSC TVEL, a corporate integrator in nuclear decommissioning, in the development of approaches providing the identification of the Global status and trends in nuclear decommissioning is seeking to identify potential markets and types of services that could be provided.

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Ilyin V. A., Rakitskaya T. G., Komarov E. A. Challenges Faced under the IAEA's Project Global Status of Decommissioning. *Radioactive Waste*, 2021, no. 4 (17), pp. 109–113. DOI: 10.25283/2587-9707-2021-4-109-113. (In Russian).