

LEI activities as ETSON Consortium member in EC project

After the Fukushima Daiichi Nuclear Accident in 2011, activities to strengthen the nuclear safety worldwide have been initiated further. At the EU level, the Council Directive 2009/71/Euratom establishing the Community framework for the nuclear safety of nuclear installations was amended by the Council Directive 2014/87/Euratom of 8 July 2014. In particular, via Articles 8a to 8c, the nuclear safety objective for nuclear installations (8a), requirements for the implementation of the nuclear safety objective for nuclear installations (8b) and requirements for the initial assessment and periodic safety reviews (8c) have been announced. The updated safety objective turns to prevent accidents and mitigate the consequences in such a way that both early and large releases will be minimized or practically avoided. While for new build nuclear reactors the safety objective applies directly and it shall be considered already in the plant design, for existing nuclear reactors the renewed safety objective serves as a reference to identify potential safety improvements. To achieve the nuclear safety objective, the implementation of a defence-in-depth concept as well as improving safety culture are required. The regulatory authority has to have an assess to the achievement of such objective before issuing a construction or operating licence. Reassessment of the safety by a decennial periodic safety review(s) must be performed for the existing plants. A harmonized implementation of three Articles from 8a to 8c requires a common technical understanding of certain key terms applied in the Council Directive. In particular, the under-

standing of the terms ‘preventing’, ‘avoiding’, ‘early releases’, ‘large releases’, and the identification of ‘reasonably practicable’ safety improvements require further explanation and guidance.

The European Commission (EC) is promoting and facilitating an ambitious implementation of these requirements nowadays. Following the invitation to tender for the EC project ‘Analysis to Support Implementation in Practice of Articles 8a–8c of Directive 2014/87/Euratom’ in late 2017, LEI with other ETSON partners created the Consortium, submitted an offer and won two-year tender for this work. The aim of this study was to support the Member States (MS) to achieve a consistent practical implementation of the provisions set out in the new Directive 2014/87/Euratom. The scope of the activities was restricted to a set of nuclear installations, i.e. nuclear power plants and research reactors with a thermal power above 1 MW_{th}. This project was implemented by ten participating Technical Safety Organisations (TSOs) of the ETSON network, namely Belgian TSO (Bel V), Centrum výzkumu Řež (CVR), Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH, Jozef Stefan Institute (IJS), Institut de Radioprotection et de Sûreté Nucléaire (IRSN), Lithuanian Energy Institute (LEI), Hungarian Academy of Sciences Centre for Energy Research (MTA EK), Institute for Nuclear Research Pitesti of Technologies for Nuclear Energy (RATEN ICN), Technical Research Centre of Finland Ltd (VTT) and Nuclear Power Plant Research Institute (VUJE), under EC Contract No. ENER/17/NUCL/S12.769200. GRS has the role of the Consortium leader.

The project was structured in four Tasks:

- Task 1: Review and assessment of international and European guidance documents.
- Task 2: Assessment of approaches and methodologies set in place at national levels for the implementation of the EU safety directive.
- Task 3: Performing a detailed study on the safety upgrades in existing reactors performed in selected MS.
- Task 4: Organisation of two workshops.

Taking part and support in Tasks 1 and 2, LEI had lead the activities conducted under Task 4.

The available and the most important documents representing the common international and European consensus of the competent regulatory bodies of MS were reviewed and assessed within this project if these documents provide sufficient information to support the MS to implement the provisions of Articles 8a–c. The documents published by the Western European Nuclear Regulators Association (WENRA) and its Reactor Harmonization Working Group (RHWG), the European Utility Requirements (EUR), international high-level recommendations published by the International Nuclear Safety Advisory Group (INSAG) and the other most relevant IAEA safety standards representing the global consensus with respect to nuclear safety, were considered under Task 1. Based on the identified gaps the recommendations were proposed to harmonize the application of the approaches and a common understanding of the definitions of terms in Europe.

Under Task 2, the national practice in the EU MS was analysed by performing a technical survey that was distributed to the selected MS with NPPs and/or research reactors being to be build, under construction or in operation. A feedback to the survey from 11 MS respondents was received. The suggestions with an aim to provide a formal-

ized framework in order to facilitate further exchanges between the MS on the topics of Articles 8a–c were proposed. Those suggestions were presented to WENRA and widely discussed during the final project workshop.

The detailed studies on safety improvements for 6 selected MS, that have been selected to cover a broad range of reactor designs (western design PWRs, Russian type reactors, as well as CANDU design) and boundary conditions in the countries (operating NPPs, new build projects, large fleet, phase-out), were performed under Task 3 by the Consortium experts, and consulted with the national regulatory authorities.

The project activities were performed in two phases with workshops organized at EC premises, in Luxemburg, under Task 4 shortly before the end of each phase. During the workshops the findings of the project with various stakeholders, like representatives from national regulators, industry, international organisations as well as representatives from the society, were shared. The focus during discussions was laid on the identification of similarities and differences with the objective to achieve a better mutual understanding of national practices and to identify topics, where further activities may be necessary. The results of these discussions were considered by the project team and reflected in the final project report.

In early 2020, the project was successfully completed. Based on the results of the studies and analyses performed and the discussions proceeded during the workshops, 7 suggestions in total were prepared for future activities to support the MS in implementing Articles 8a–c of the Directive 2014/87/Euratom in practice and to enhance the mutual understanding of different approaches observed in the MS to fulfil the obligations of Articles 8a–c on a technical level.

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