2nd TOPICAL PEER REVIEW

NATIONAL ACTION PLAN ON FIRE PROTECTION AT NUCLEAR INSTALLATIONS

(Ukraine)

State Nuclear Regulatory Inspectorate of Ukraine

Kyiv

2026

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ABBREVIATIONS

AFI	–	National Areas for Improvement
ENSREG	–	European Nuclear Safety Regulators Group
IAEA	–	International Atomic Energy Agency
INSC	–	Instrument for Nuclear Safety Cooperation
NAcP	–	National Action Plan
NAR	–	National Assessment Report
NPP	–	Nuclear Power Plant
SAR	–	Safety Analysis Report
SNRIU	–	State Nuclear Regulatory Inspectorate of Ukraine
SSTC NRS	–	State Scientific and Technical Center for Nuclear and Radiation Safety of Ukraine
TPR	–	Topical Peer Reviews
WANO	–	World Association of Nuclear Operators
WENRA	–	West-European Nuclear Regulators Association

1. INTRODUCTION

According to Article 8e of Council Directive 2014/87/Euratom of 8 July 2014, amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations [1], Member States should undertake, on a coordinated basis, topical peer reviews (TPRs). The first topical peer review to start in 2017, and for subsequent topical peer reviews to take place at least every six years.

The purpose of TPRs is to provide a mechanism for EU Member States to jointly examine topics of importance to nuclear safety, to exchange experience and to identify opportunities to strengthen nuclear safety. The process also provides for participation, on a voluntary basis, of non-EU countries hosting nuclear installations.

In November 2020, at its 41st Plenary Meeting, ENSREG decided that the topic of the second Topical Peer Review (TPR II) would be “Fire Protection” and adopted the TPR overall process description.

The objectives and process description of TPR II were defined by the «TERMS OF REFERENCE FOR THE TOPICAL PEER REVIEW PROCESS ON FIRE PROTECTION», approved by ENSREG in March 2022 [2].

Taking into account the experience of participating in the first 1st TPR of Aging Management, as well as the invitation of ENSREG, Ukraine joined the TPR II on a voluntary basis as non-EU countries hosting nuclear installations.

The National Assessment Report (NAR) of Ukraine on fire protection has been developed according to the structure and contents defined by the WENRA Technical Specification for the National Assessment Reports [3].

NAR of Ukraine and NARs of other member states were peer-reviewed by TPR II expert. In general, more than 2600 questions and comments were made on the NARs.

Subsequently, in the fall of 2024, two workshops were organized to discuss the results of the self-assessments, the questions and comments on the NARs, the replies to the questions, as well as the findings from the experts with a view to identifying and discussing both generic and country-specific findings on fire protection.

The results of the peer-review and workshop are presented following ENSREG reports:

- European Nuclear Safety Regulators Group. ENSREG. 2nd Topical Peer Review Summary Report "Fire Protection". May 2025 [4], and
- European Nuclear Safety Regulators Group. ENSREG. 2nd Topical Peer Review – ‘Fire Protection’. Country Review Report. Ukraine. January 2025 [5].

The National Action Plan (NAcP) has an objective to ensure monitoring of the progress on a set of research results obtained from the topical peer review and is a document informing on further measures to eliminate challenges revealed upon the results of the topical peer review.

The NAcP was prepared following “Structure and contents of the National Action Plans (NAcP) responding to the country-specific and other findings of TPR II on Fire Protection at nuclear installations. As endorsed by ENSREG, 30/10/2025” [6].

To ensure the principles of openness and transparency in relation of nuclear safety, as well as collective and free discussion of the most important areas of its activity, the SNRIU presented and discussed the NAcP at an open meeting of the SNRIU Board, which took place on October 1, 2026.

Based on the results of the review and discussions, the SNRIU Board:

- Approved the NAcP without comments.
- Recommended that the SNRIU consider including relevant measures to improve national regulatory requirements regarding NPP fire hazard analysis into the SNRIU Rulemaking Activity Plan for 2027, taking into account the outcomes of the EC INSC Project U3.01/21 (UK/TS/59) "Further alignment of the regulatory system with the EU acquis".
- Recommended that JSC "NNEGC "Energoatom" ensure the implementation of measures for the development of sector-wide guideline on NPP fire hazard analysis and their implementation at all existing NPP of Ukraine within the timeframes specified by the NAcP.

2. Follow-up of findings from the peer review – national areas for improvement

This section of the NAcP is dedicated to the country-specific findings resulting from the peer review as reported in § 4 of the «European Nuclear Safety Regulators Group. ENSREG. 2nd Topical Peer Review – 'Fire Protection'. Country Review Report. Ukraine» [5].

The Ukrainian self-assessment did not reveal any weaknesses in the fire protection of the nuclear installations.

During the country review workshop, the findings identified during the peer review phase have been discussed. Based on these discussions as well as additional information presented by Ukraine after the country review workshop, the TPR II team concluded on the only one National Areas for Improvement (AFI) as well as one National Areas of Good Performance.

2.1 AFI (1) – All NPPs / A need to enhance fire hazard analysis by further development of deterministic analyses to specifically assess the potential consequences of fire events on the performance of the safety functions

The existing deterministic fire hazard analyses for Ukrainian NPPs have been performed with a limited scope and do not reflect the state of the art in such analyses. The main purpose of the existing deterministic fire hazard analyses of all NPPs in Ukraine is to support the development of the necessary parts of the Section "Probabilistic Safety Analysis" of the Safety Analysis Report (SAR) for identifying fire safety deficits, providing recommendations and proposing corrective measures for their elimination. There is a need for further development of the deterministic analysis in order to verify that safety functions are ensured and that redundant equipment performing the same safety function are not simultaneously impaired.

2.1.1 Identified actions and implementation progress

Addressing the identified finding requires a comprehensive approach to implementing appropriate measures, which includes improving regulatory framework for fire hazard analysis, developing a sector-wide guideline, and directly performing the analysis for all operating Ukrainian NPPs.

2.1.1.1 Improving regulatory framework

The main document establishing regulatory requirements for the safety of nuclear power plants in Ukraine is the General provision on nuclear power plants safety. The new revision of "General provision on nuclear power plants safety" [7] has been approved by SNRIU in March 2024 and is mandatory from 15 May 2024 this. When revising the General provision on nuclear power plants safety, the WENRA reference levels for existing reactors were taken into account, as well as the IAEA Requirements, in particular, such as SSR-2/1 (Rev. 1) "Safety of Nuclear Power Plants: Design" and SSR-2/2 (Rev. 1) "Safety of Nuclear Power Plants: Commissioning and Operation". But, the General provision on nuclear power plants safety establishes only general requirements regarding the need to perform fire hazard analysis using both deterministic and

probabilistic methods and modern methodology as part of a comprehensive demonstration of nuclear power plant safety.

There is still a need to revise and improve the existing specific regulatory framework with special focus on fire hazard analysis requirements (scope, methodologies, assumptions, etc.).

Within the framework of the European Commission project INSC U3.01/21 “CONTINUED ALIGNMENT OF THE UKRAINIAN REGULATORY REGIME WITH THE EU ACQUIS”, and with the advisory support of experts of leading European TSOs (BEL V and GRS), activities have been planned and are being implemented for the review and documentation of the Ukrainian national regulatory framework regarding consistency with relevant WENRA and IAEA Safety Standards in the field of fire protection at nuclear installations. Based on the results of these activities, a report is expected, containing a list of identified weaknesses or ambiguities, as well as recommendations for improving national regulatory requirements. The completion of this activity is scheduled by the end of 2026."

The results of this activity will be taken into account during the revision of regulatory requirements, in particular, the “Requirements for Safety Assessment of Nuclear Power Plants” and the “Requirements for the Structure and Content of the Safety Analysis Report for Nuclear Power Plants”. This activity is tentatively scheduled for completion in the first half of 2028. Detailed timeframes for the development and publication of the revised regulatory requirements will be defined in the SNRIU annual rulemaking plan, taking into account the recommendations regarding the scope and detail of the necessary improvements to the regulatory requirements.

2.1.1.2 Developing a sector-wide guideline

In parallel with the measures to improve the regulatory framework, the Operator of existing NPPs of Ukraine (JSC "NNEGC "Energoatom") has developed a roadmap for improving the sector-wide guideline for performing fire hazard analysis for Ukrainian NPPs, taking into account modern international requirements and best world practices.

The roadmap provides for:

- Establishment of a working group, which is to include leading experts in the field of safety analysis and fire protection of NPPs from the central office of JSC "NNEGC "Energoatom", the "Science and Technology Center" branch, existing NPPs, as well as the SNRIU and SSTC NRS as an observer. November 2026.
- Analysis by the working group of international requirements and best world practices regarding the performing and application of NPP fire hazard analysis, utilizing available international communication tools, such as WANO. July 2027.
- Development of the sector-wide guideline for NPP fire hazard analysis by the working group, and its review and approval by the SNRIU. End of 2029.

2.1.1.3 Performing the analysis for all operating Ukrainian NPPs

The direct implementation of the revised regulatory requirements and sector-wide guideline at all existing NPPs of Ukraine (Except Zaporizhzhya NPP) will be carried out according to a separate schedule agreed by SNRIU, but no later than the scheduled Periodic Safety Review of these NPP units.

Given that the Zaporizhzhya NPP is currently temporarily occupied by the russian federation, which makes impossible the adequate implementation of the measure by the legitimate operator, JSC "NNEGC "Energoatom", and full regulatory oversight of its implementation by the national regulatory authority (SNRIU), the implementation of the measure will be carried out under a separate schedule, after the ZNPP is returned under the management and control of Ukraine and measures to restore the safety of the Zaporizhzhya NPP nuclear installations are implemented.

A separate scope of work will be developed for the Zaporizhzhya NPP, including measures related to fire safety, taking into account the negative impact of the occupation of the Zaporizhzhya NPP by the russian federation military forces on the plant safety level and the condition of its equipment.

For new NPP, the specified requirements and sector-wide guideline will be applied during the licensing process of these NPPs, in case of a decision on new build.

The measures specified in Section 2.1.1 of this NAcP are also intended, as far as possible, to address at the national level the TPR II challenges identified in the TPR II Summary report [4], such as:

- Challenge 2: Development of guidelines to convert high-level objectives mentioned in the standards into detailed requirements for carrying out safety analyses, especially for some type of installations or conditions of operation» and
- Challenge 3: A need to consider new types of ignition sources (e.g. lithium-ion batteries).

2.1.2 Applicability to represented installations

The finding and identified actions specified in section 2.1 of this NAP are relevant to all existing Ukrainian NPPs.

3. Follow-up of other findings resulting from the self-assessment

The Ukrainian self-assessment did not reveal any weaknesses in the fire protection of the nuclear installations.

But, during the country review workshop, the findings identified during the peer review phase have been discussed. Based on these discussions as well as additional information presented by Ukraine after the country review workshop, the TPR II team concluded on the only one National Areas for Improvement.

Information regarding the National Area for Improvement and Identified actions as well as implementation progress are presented in Section 2 of this NAP.

But, at the time of the development of the NAR, a number of measures to improve fire safety directly at power Unit № 2 of the Rivne NPP had not been completed. In particular:

- Modernization of the Automatic Fire Alarm System for the Reactor Compartment, Turbine Hall, Deaerator Compartment, Electrical Equipment Rack and Special Building Premises
- Provision of the Main NPP Electricity Generation Circuit with Automatic Control Units for Power Oil-Filled Equipment.
- Provision of NPP Premises Containing Electrical and Electronic Equipment with Stationary Non-automatic Gas Fire-Extinguishing Units

The specified measures are implemented in accordance with the Comprehensive (Integrated) Safety Improvement Program for Nuclear Power Plants, approved by the Resolution of the Cabinet of Ministers of Ukraine of 7 December 2011, №1270 [8].

As of August 2026, the specified measures have been implemented and put into operation.

4. Overall conclusions

Participation in the European TPRs is very important for Ukraine, as it enables direct involvement in the process of exchanging experience and identifying opportunities to enhance nuclear safety in Europe. This, in turn, will contribute to elevating the safety level of Ukraine's nuclear facilities to align with the best European standards and practices.

The NAR of Ukrainian did not reveal any weaknesses in the fire protection of the nuclear installations.

But, during the country review workshop, the findings identified during the peer review phase have been discussed. Based on these discussions as well as additional information presented by Ukraine after the country review workshop, the TPR II team concluded on the only one AFI. The AFI concerns the need to enhance fire hazard analysis of NP.

Addressing the identified finding requires a comprehensive approach to implementing appropriate measures, which includes actions to improve the regulatory framework, as well as conduct a fire hazard analysis directly for Ukrainian NPPs.

The implementation of the planned measures will allow to:

- improve the regulatory framework for fire protection of nuclear installations, specifically regarding fire hazard analysis, with respect to modern international standards and best world practices
- deepen the fire hazard analysis of NPPs and, if necessary, develop measures aimed at improving fire safety, the implementation of which will increase the safety level of Ukrainian NPPs.

Also, the measures specified in Section 2.1.1 of this NAcP are also intended, as far as possible, to address at the national level the TPR II challenges identified in the TPR II Summary report [4].

5. REFERENCES

1. Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations.
2. TERMS OF REFERENCE FOR THE TOPICAL PEER REVIEW PROCESS ON FIRE PROTECTION», approved by ENSREG in March 2022.
3. Report, Topical Peer Review 2023 Fire Safety Technical Specification for the National Assessment Reports, Ad-hoc TPR II WG report to WENRA.
4. European Nuclear Safety Regulators Group. ENSREG. 2nd Topical Peer Review Summary Report "Fire Protection". May 2025.
5. European Nuclear Safety Regulators Group. ENSREG. 2nd Topical Peer Review – ‘Fire Protection’. Country Review Report. Ukraine. January 2025.
6. Structure and contents of the National Action Plans (NAcP) responding to the country-specific and other findings of TPR II on Fire Protection at nuclear installations [As endorsed by ENSREG, 30/10/2025].
7. NP 306.2.245-2024 General provision on nuclear power plants safety.
8. Comprehensive (Integrated) Safety Improvement Program for Nuclear Power Plants, approved by the Resolution of the Cabinet of Ministers of Ukraine of 7 December 2011, №1270.

ANNEX A - SUMMARY TABLE OF THE ACTIONS PLANNED/IMPLEMENTED

Section of NAcP	**Reference no of the finding**	**Installation type/name** (as relevant)	**Thematic**	**Finding**	**Action** (specify if planned/underway/completed)	**Deadline**	**Regulatory authority's comment on progress**
2	AFI 1	All NPP	FIRE SAFETY ANALYSES	A need to enhance fire hazard analysis by further development of deterministic analyses to specifically assess the potential consequences of fire events on the performance of the safety functions.	Improving regulatory framework on fire hazard analysis	2028	In progress. A review of the Ukrainian national regulatory framework regarding consistency with relevant WENRA and IAEA Safety Standards in the field of fire protection at nuclear installations and recommendations for its improvement are being developed.
					Developing a sector-wide guideline	2029	In progress. A working group is being created.
					Performing the analysis for all operating Ukrainian NPPs	According to a separate schedule	