ENSREG
European Nuclear Safety Regulators Group

Topical Peer Review II
Fire protection
at nuclear installations

Key findings from the country reviews

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TPR II - Second Stakeholder Meeting

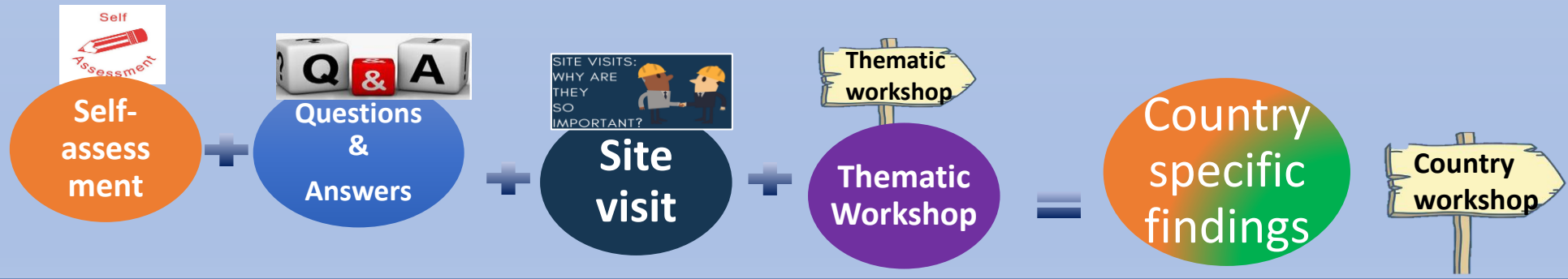
1 Process

2 Examples of good performance, areas of improvement

3 Conclusions

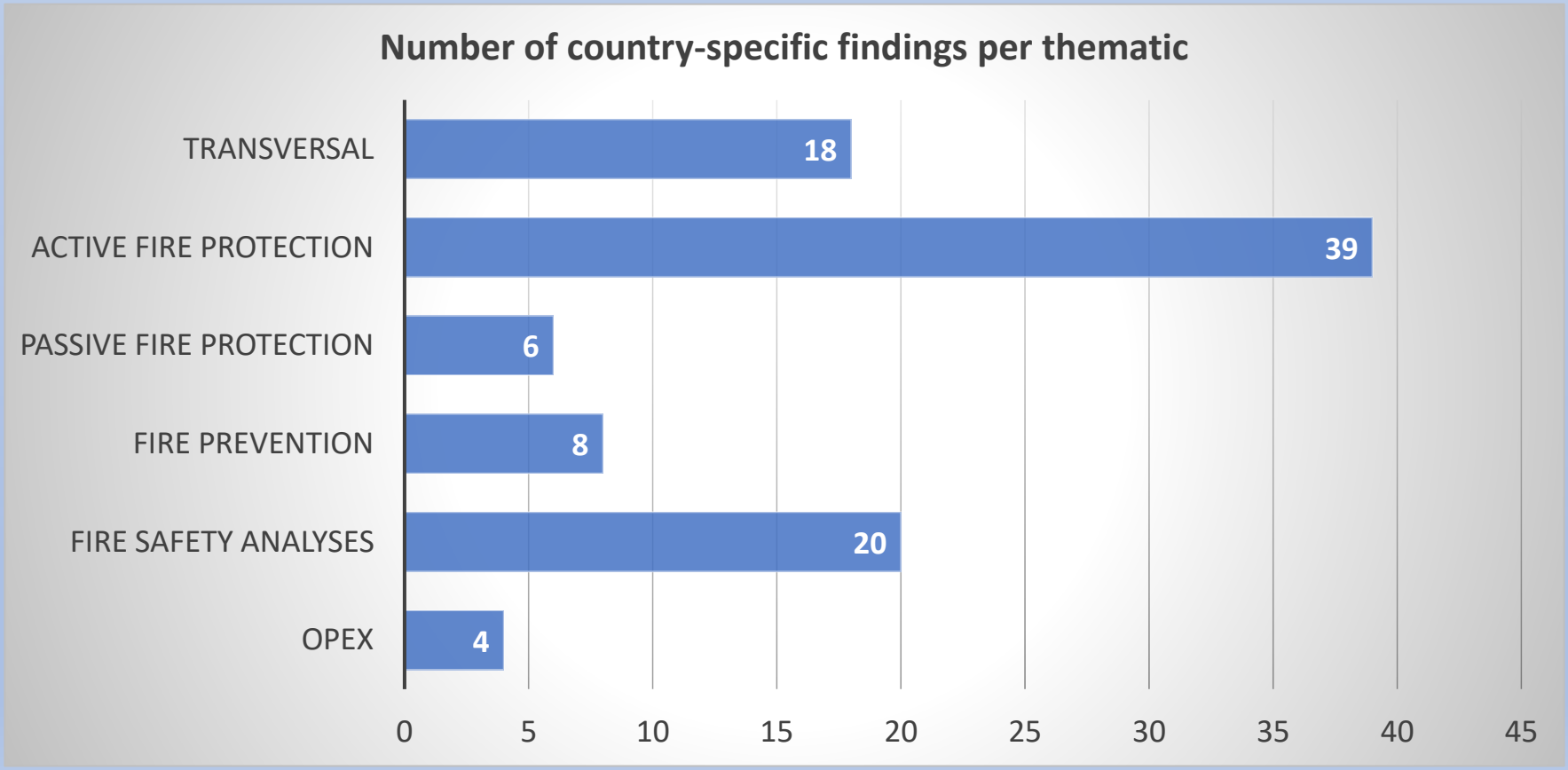
1. Overview of the process

- TPR Country review workshop, held 30 Sept – 3 Oct 2024, Luxembourg
- Country sessions open to all workshop participants in order to share experience
- Country sessions **focused** on the **review of each country**, taking into account:
  - ❑ the self-assessment
  - ❑ the outcomes of the peer review
  - ❑ the findings of the site visit to the country, where applicable
  - ❑ the conclusions from the thematic sessions



Conclusion on the findings categorised as an area of good performance (AGP) or area for improvement (AFI)

1. Overview of the process



2.1 Examples of good performance (1)

Use of experience feedback

- Learning from experience feedback from fire events outside nuclear installations

❑National-level fire risk assessments driven by past industrial fires (e.g., Grenfell and Lubrizol) led to regulatory actions and improved fire prevention across all nuclear installations

- The nuclear sector-wide review of combustible cladding risks instigated by the nuclear regulator, to identify and implement any transferable learning from the Grenfell fire (all installations, UK)
- Comprehensive national review after Lubrizol (chemical industry) fire accident resulting in ASN requests and consequently in concrete actions in all nuclear installations (all installations, FR)

❑ New fire-fighting procedures and training have been implemented as a result of the lessons learnt from conventional industry (Vandellos 2 NPP, ES).

2.1 Examples of good performance (2)

Fire safety analyses

- High-level modelling of the effects of fire (soot, pressure effects…) to confirm the fire resistance of SSCs (NPPs, FR)
- Large-scale modernisations to improve fire safety
  - ❑ An extensive and targeted modernisation programme of fire protection equipment and systems has been undertaken at the NPPs (NPPs UA)
  - ❑ Modernisation of the facility with significant improvements (both on passive and active components) including the ones in the frame of the PSR (RHF RR, FR)
  - ❑ Implementation of new and modern provisions, in particular to meet the current fire protection regulations (MARIA RR, Świerk PL)

2.1 Examples of good performance (3)

Fire prevention

- Enhanced safety and control measures for worksite risk management
  - ❑ Use of a mobile scanner device with an intuitive IT tool and barcode on items to easily identify equipment or material allowed to be stored (Tihange 3 NPP, BE)
  - ❑ There is an independent verification of hot work in addition to the assessment by the 'Hot Work Selected Person' and review by the 'Hot Work Controller' for enhanced control of work areas (all installations, UK)
  - ❑ Implementation of thermal cameras on particular worksites providing an alarm in the main control room in order to be alerted of a fire outbreak (all installations, FR)

2.1 Examples of good performance (4)

Active fire protection : Firefighting

- The presence of a well-resourced on-site fire brigade
  - ❑ A large professional fire brigade (ranging from 12 to 18 depending on the NPP) is deployed on a permanent basis on the **NPP** site (CZ, HU, RO, SK, TR)
  - ❑ Permanent presence on the site of the **research reactor under decommissioning** of a well-resourced on-site fire brigade (ESSOR RR, IT)
  - ❑ The existence of first-intervention teams (composed of operators) and second-intervention teams (composed of professional fire fighters) (NPPs, BE)

2.1 Examples of good performance (5)

Transversal

- Combination of hazards
  - ❑ A systematic approach for combination of hazards is applied (HFR RR, NL)
  - ❑ Aircraft crash onto spent fuel storage facility and also the radioactive waste storage buildings are considered at the design stage (Zwilag SFS, CH, OPEC2 and D2 EUREX - Waste IT, SFS in SI)
- Compartmentation
  - ❑ Fire doors and hatches which form part of the nuclear fire compartment have position monitoring that initiate an alarm in the MCR if the door is left open (Hinkley Point C, Sizewell B and 2nd generation AGRs, UK)
  - ❑ A solid process is in place to manage the authorisations to have fire doors opened: the wedge to block the fire door can be collected at the Main Control Room after approval (Tihange 3 NPP, BE)
  - ❑ Implementation of door-open alarms for the ones representing a safety risk (PSA based) (Tricastin 900 MWe NPP (FR))

2.2 Examples of areas for improvement (1)

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 (UA)
- Need for consideration of the radiological risks in the FHA (FCF, ES)
- Necessary to update and supplement the fire protection concepts and associated documentation in accordance with the national fire protection regulations (CH)
- Need to update fire protection provisions in compliance with fire protection requirements of decommissioning guidelines (ESSOR RR and EUREX FCF (decommissioning), IT)

2.2 Examples of areas for improvement (2)

Fire prevention

- Fire Load Management
  - ❑ No inventory of the flammable materials transported into the facility (e.g. packaging materials, paints) (RR, HU)
  - ❑ No explicit fire loading limits: a proportionate approach is needed to implement the day-to-day management of fire loading with the assessment of fire loadings in the nuclear safety case (Dounreay Prototype Fast Reactor -Decommissioning , UK)
  - ❑ There are two different systems to support the fire load management. It doesn't allow to get information efficiently (Leibstadt NPP, CH)
  - ❑ There is a need to implement a system to document the inventory of fire loads (e.g. computer system) (Riso –Waste, DK)

2.3 Examples of areas for improvement (3)

Active fire protection

- Detection strategy
  - ❑ There is a need to reassess the detection strategy in area/rooms with harsh environment, in particular high radiation, according to the FSA, and consider the adoption of appropriate fire detection solutions where needed (All NPPs, CH)
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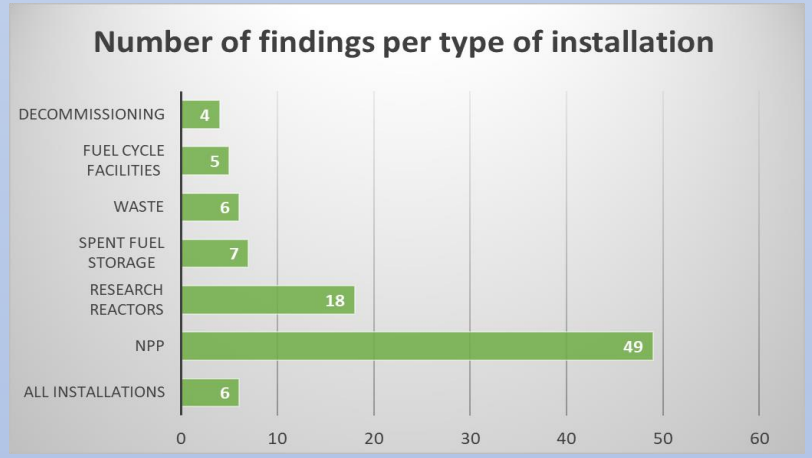
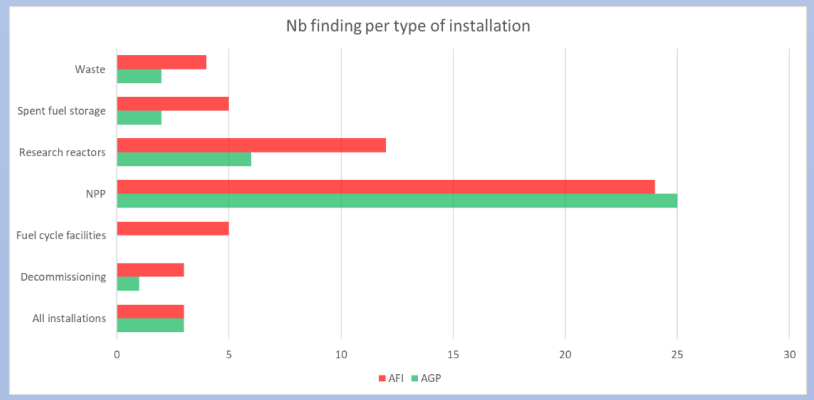
- Detection reliability
  - ❑ A need to implement solutions to improve the reliability of fire detectors that are operating in hard conditions (for instance, high radiation, humidity) in Solid waste treatment and storage facilities (B3/4 project) and Solid waste storage buildings 157, 157/1. (Waste, LT)

3. Conclusions (1)

- 95 country-specific findings (AGP and AFI)
- No critical deficiencies identified
- Importance of applying all levels of defence-in-depth to ensure robust fire protection, supported by thorough fire safety analyses.
- Effective fire load management remains a priority, with leadership, accountability, and a strong safety culture playing a crucial role in minimizing fire risks.





Key messages: More than 50% of the findings refer to NPPs but they are balanced between both AGPs and AFIs unlike other installation types

3. Conclusions (2)

- National regulatory frameworks for fire protection in nuclear installations vary significantly across countries and facility types
- The NARs demonstrate an emphasis on compliance with national fire safety requirements and international safety standards, with ongoing efforts to enhance fire protection across all installation types
- Proactive measures by licensees supported by regulatory oversight, effective training and exercising of fire response teams, are commonly reported as essential for maintaining fire safety

Key messages: Proactive measures by licensees supported by regulatory oversight, effective training and exercising of fire response teams, are commonly reported as essential for maintaining fire safety

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Use the online chat

Short clarification question at the end of this session

Longer questions in the Q&A session