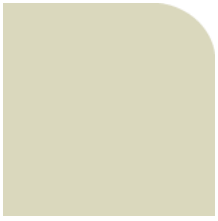




**TECHNICAL BOARD  
AND REACTOR SAFETY  
WORK PLAN 2020-2025**





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# EXECUTIVE SUMMARY

ETSON is a European TSO networking group with 16 Technical Safety and Support Organizations (TSOs), mainly from the European Union, supporting their national Regulatory body. The expertise and the contacts consolidated within ETSON contain a very high potential to achieve the best technical results in the interest of nuclear safety and to support harmonization of the Member States practices of the European Union. The benefit and influence of ETSON is based on the sustained production of relevant outcomes. This production is guided by a well-defined and explicit scientific strategy, specifying the priority areas for ETSON technical work according its two major lines: Safety assessment and Research and development. Safety assessment activities are performed under the umbrella of the Technical board for reactor safety (TBRS) and are based on R&D activities being handled by the ETSON research group (ERG).

The TBRS relies on Experts groups (EGs) dedicated to specific safety issues that enable sharing knowledge and experience among the ETSON members and potential stakeholders to facilitate efficient, robust and thorough safety assessments, encourage enhanced nuclear safety and facilitate international cooperation in the field of safety assessment throughout Europe in their domain. Experts' groups develop *Technical reports on comparison of rules-*

*making and practices*, Technical assessment Guides (TSAG) and may also develop and publish *Position Paper of the Technical Safety Organisations* to formalize common positions on nuclear safety [<http://www.etsn.eu/publications>]. ETSON TBRS already covered an extended area of safety issues during the past years: several Guides (TSAG) or technical Reports dedicated to technical issues are already available on ETSON website<sup>1</sup>. The present summary specifies the priority areas for ETSON technical work for the next 3 to 5 years and give some examples of the deliverables that are envisaged during this period.

Sharing information on knowledge progress and lessons learnt in the different members' countries of incident and accident, rules and hypotheses of the safety demonstration contribute to safety improvement of nuclear power plants all over Europe, in accordance with the EU safety directive<sup>2</sup>. A particular attention is paid to events and phenomenon highlighted either by experience feedback or by research that could jeopardize plant safety or safety demonstration, as fuel assembly bowing, as fatigue or stress corrosion that may affect mechanical equipment or as external hazards. Deliverables will be published soon on these issues, for instance, a technical Report comparing the approaches in the participating countries on topics of interest in fatigue evaluation for NPP should be for instance issued, and a

<sup>1</sup> <http://www.etsn.eu/>

<sup>2</sup> EU DIRECTIVE 2014/87/EURATOM of 8 July 2014

TSAG on Approaches to Warm-Pre-Stress (WPS) and its application.

TBRS members also share their views on plant modifications and safety improvements that have been or should be introduced by operators to limit the consequences of accidents, especially severe accidents. In this field, the TBRS makes use of knowledge gained in R&D activities, especially through EC platforms (SNETP, H2020) or state-of-the-art OECD CSNI reports, in safety assessment practices. A TSAG on the Hydrogen Risk Assessment in LWRs is envisaged as a Technical Report on Possible mitigation strategies in case of fuel assemblies melting in a spent fuel pool.

Concerning plant improvements, Probabilistic safety assessments help having a broad view on safety issues, highlighting the need to implement equipment or emergency operating procedures evolutions to increase the facility robustness or the needs for new research programs. Several technical Reports, are under preparation to be issued in the next years on Lessons learned from the Fukushima Daiichi accident on, from and for PSA, Spent Fuel Pool PSA or PSA quantitative objectives, targets and limits. A TSAG on PSA knowledge management for improving decision makers' PSA understanding should also be published.

As many plants are already being dismantled and decommissioned (among them 50 in Continental Europe) and several light water reactors are already close to completion of decommissioning, there is a need to share feedback and compare safety reviews and assessment practices on decommissioning and waste management to improve dismantling strategies of nuclear facilities all over Europe. ETSO plans to publish a paper on Dismantling strategies applicable to LWRs as well as a report on Safety challenges and priorities for LWRs dismantling. A TSAG on the Safety demonstration approach to dismantling of LWRs (from transition to completion) is then envisaged.

As new concepts of reactors are being developed, especially small modular reactors, the TBRS starts looking at challenges raised by these new concepts in terms of safety demonstration and safety review, for instance the intensive use of passive systems. Through its different experts' groups, reliability and performance of passive systems are examined, as codes qualification and PSA modelling. A Report on the safety assessment of a design involving passive and active systems is envisaged, including some views on requirements to ensure a high reliability of the supported safety functions. A Report on expectations regarding code qualification, uncertainties and need of experiment regarding passive cooling systems is also planned.

Finally, even if ETSO recognize the large discrepancy of roles and responsibilities of its members in national emergency response organisations, a common understanding of approaches available to provide assessments during emergencies could help developing best practices. After a first report on Comparison of rules-making and practices available to provide assessments during emergencies, a report on the possible Evolutions of the accident database developed in the frame of the FASTNET project is envisaged to intend to share common approaches, methodologies and tools.

# 2 FOREWORDS

ETSON is a European TSO networking group with 16 Technical Safety and Support Organizations (TSOs), mainly from the European Union, supporting their national Regulatory body. The expertise and the contacts consolidated within ETSON contain a very high potential to achieve the best technical results in the interest of nuclear safety and to support harmonization of the Member States practices of the European Union. The benefit and influence of ETSON is based on the sustained production of relevant outcomes. This production should be guided by a well-defined and explicit scientific strategy, specifying the priority areas for ETSON technical work.

The ETSON strategy aligns along two major lines:

- Safety assessment,
- Research and development.

Safety assessment activities are performed under the umbrella of the Technical board for reactor safety (TBRS), R&D activities being handled by the ETSON research group (ERG).

The TBRS contributes to:

- Enhance and harmonize safety approaches and practices in Europe; Identify and discuss common safety issues that may challenge regulatory reviews associated with nuclear facilities in Europe and, if possible, recommend common approaches for resolution;
- Develop guidance for safety assessments;
- Assess the implication of R&D results on safety approaches and practices.

It relies on Experts groups (EGs) dedicated to specific safety issues that enable sharing knowledge and experience among the ETSON members and potential stakeholders to facilitate efficient, robust and thorough safety assessments, encourage enhanced nuclear safety and facilitate international cooperation in the field of safety assessment throughout Europe in their domain. Experts' groups develop Technical reports on comparison of rule-making and practices and Technical Safety Assessment Guides (TSAG) [<http://www.etson.eu/publications>]. They are kept informed, by the ERG, of R&D activities and main findings related to safety issues (OECD, H2020...); the TBRS takes into account state-of-the-art reports on specific issues, based on last research and studies developments (OECD/CSNI reports, lessons learned from R&D programs involving ETSON members...). EGs evaluate the implications of knowledge evolution on safety provisions and safety assessment practices. They may also develop and publish « Position Paper of the Technical Safety Organisations » to formalize common positions on nuclear safety. Besides the coordination of these planned EGs activities, technical workshops on issues that are not covered by EGs are regularly organized to share views within ETSON and discuss R&D findings, with the ERG. On the past years, several topics were addressed as safety implications of NPP non-baseload operation, safety approach for fusion reactors or the assessment of accidental

aircraft crash in the safety case. A future workshop is envisaged on the use of AI technologies in safety assessment.

Moreover, the TBRS has constituted a “TBRS network” that can be activated in case one ETSON member needs to have information on a particular issue raised in the frame of its safety reviews or assessments, on how the issue is tackled abroad. Even if regulations and guidance are available, a discussion with other TSOs helps to better understand the rationales. The TBRS network thus contributes to a stronger, more sustainable and harmonized support to national competent authorities/regulators.





# TBRS WORK PLAN 2020-2025

The expected lifespan of nuclear power plants, including commissioning and decommissioning, extends well over the century. Disposal of radioactive waste from power and non-power applications may extend well beyond a millennium. Safe, competitive and sustainable use and development of nuclear technologies is therefore based on the long-term commitment of all stakeholders to vigorously participate in the quest for new and management of existing knowledge and expertise. Securing further and sustainable developments in education, training, skills, competences, attitudes and cultures of personnel involved in industry, academia and regulatory organizations, is therefore at the core of the effort to maintain and further improve the safety of nuclear facilities.

Assessment activities of TSOs are essential for the safety of nuclear facilities. European TSOs, by supporting European regulators, contribute decisively to the creation and supervision of nuclear safety. All activities of European TSOs with relation to nuclear facilities should rely on state-of-the-art knowledge and systemic approaches. The TBRS contributes to disseminate such approaches and state-of-the-art knowledge.

ETSON TBRS already covered an extended area of safety issues during the past years, in order to compare and harmonize TSO practices in Europe by producing different documents like a

Safety assessment guide (SAG) giving harmonised general review principles and Technical Safety Assessment Guides (TSAG) dedicated to technical issues, available on ETSON website<sup>3</sup>:

- TSAG on Event Review and Precursor Analysis
- TSAG on Deterministic Severe Accidents Analysis
- TSAG on Human and Organisational Factors in nuclear facilities design and modification processes
- TSAG on Transients and design basis accident Analyses
- TSAG on Safety Fluid Systems
- TSAG on Environmental safety related qualification of components

The TBRS is nowadays focusing on main safety issues encountered by European countries, primarily on light water reactors. Many plants in operation in Europe have been commissioned in the 80s or earlier and are approaching the 30 to 40 years of operation, with ageing and lifetime extension problematics and more and more increased attention is paid to Dismantling & Decommissioning related topics. Both accident prevention and accident mitigation issues are dealt with, from normal operation to severe accident management.

The TBRS workplan gives the objectives identified in the main areas of interest for the ETSON members and deliverables that are envisaged in the next years.

Sharing information on knowledge progress and lessons learnt in the

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<sup>3</sup> <http://www.etson.eu/>

different members' countries of incident and accident, rules and hypotheses of the safety demonstration contribute to safety improvement of nuclear power plants all over Europe, in accordance with the EU safety directive<sup>4</sup>.

A particular attention is paid to events and phenomenon highlighted either by experience feedback or by research that could jeopardize plant safety or safety demonstration, as fatigue or stress corrosion that may affect mechanical equipment or fuel assembly bowing. ETSON members try to anticipate as far as possible ageing phenomenon that could affect nuclear facilities and question the environmental qualification sustainability, by a scrutiny of OPEX weak signals. By establishing TSAG and reports on comparison of rules-making and practices, experts share their views in these fields as assessment approaches and conclusions.

TBRS members also share their views on plant modifications and safety improvements that have been introduced by operators to limit the consequences of accidents, especially severe accidents. They take into account R&D results, as state-of-the-art reports, especially those published by the OECD CSNI. Probabilistic safety assessments help having a broad view on safety issues, highlighting the need to implement equipment or procedures evolutions to increase the facility robustness or the needs for new research programs.

As new concepts of reactors are being developed, especially small modular reactors, the TBRS starts looking at challenges raised by these new concepts in terms of safety demonstration and safety review, for instance the intensive use of passive systems. Through its different experts' groups, reliability and performance of passive systems are examined, as codes qualification and PSA modelling.

Several EGs may have an interest in a same topic, encouraging a cross-cutting discussions on related safety issues.

Then, many plants are being dismantled and decommissioned, among them 50 in Continental Europe, and several light water reactors are already close to completion of decommissioning. There is a need to share feedback and compare safety reviews and assessment practices, strategies for life extension, decommissioning, waste management... Sharing information on knowledge progress and learning lessons from experience gained in the different members' countries contribute to improve dismantling strategies of nuclear facilities all over Europe.

The TBRS looks in the meantime to much specialised topics as for instance the pressure vessel integrity requirements or in-vessel melt retention and keeps a global view through its activities on OPEX, Probabilistic Safety Assessments (PSA)... It pays particular attention to human and organisational factors that should not be considered independently from technical issues and the need to consider the nuclear facility as a whole socio-technical system. Pragmatic approaches are developed on the basis of existing practices.

Due attention is paid to other international existing initiatives (WENRA, OECD, IAEA, JRC...) to avoid any duplication of work.

## 3.1 Fuel safety issues

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Operating experience highlights the need for considering new phenomena regarding fuel behavior in the safety case and potentially to reconsider current nuclear fuel safety requirements and criteria notably related to fuel assembly bowing, fuel cladding corrosion, boiling crisis or fuel dispersal.

The main TBRS objectives regarding fuel behavior are as follows:

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<sup>4</sup> EU DIRECTIVE 2014/87/EURATOM of 8 July 2014

- Gathering information, knowledge and experiences with respect to regulatory developments of fuel safety requirements and criteria in the various countries;
- Providing an overview of validation scheme of codes to nuclear fuel safety issues;
- Identifying needs of R&D that would be worthwhile to share with the ERG and/or needs of codes development and validation including suitable uncertainty analysis.

Activities in the near future are focused on the analysis of OPEX and safety implications. Since 2019, the points of view considering the fuel assembly bowing, which was highlighted as a major phenomenon observed during plant operation that needs to be assessed and taken into account in the safety case, were shared through several members' presentations. Moreover, some members have already identified an interest on particular fuel items in the future that may be handled in the next years, for instance the following review topics:

- "wet and dry storage";
- "fuel rod failure during LOCA".

Furthermore, several R&D programs relates to accident tolerant fuel (ATF). The TBRS is kept informed on R&D results and may have some thoughts on ATF safety issues in the next future.

#### POTENTIAL INTERACTIONS WITH OTHER WORKING GROUPS

- OECD-NEA Working Group on Fuel Safety (WGFS)

#### DELIVERABLES ENVISAGED

- Technical report on comparison of rules-making and practices about fuel assembly bowing

## 3.2 Systems and components

ETSON activities regarding systems and components relates to passive cooling systems, mechanical systems and environmental qualification. Ageing management is a cross-cutting issue to be dealt with under these two last topics. Well established guidance and standards related to ageing management already exist, thus ETSON activities in this field aim to share knowledge on ageing phenomena affecting specific components and qualification sustainability.

### *Mechanicals systems*

ETSON TBRS is investigating different issues that need, from its expert's point of view, further comparison and/or harmonization. After having issued a report on PWR reactor pressure vessel integrity assessment, ETSON is now comparing approaches used in member countries to assess fatigue of mechanical components.

Two topics are investigated:

- Approach to Warm-Pre-Stress (WPS) and its application;
- Issues concerning the integrity of RPV internals.

WPS has two consequences that may be important for proving the absence of crack initiation of the RPV under thermal shock loading: Firstly, crack initiation is excluded in case of a monotonously decreasing stress intensity factor after warm pre-stressing of the RPV wall with a postulated or real crack (cooling under sustained load). Secondly, warm pre-stressing will also increase fracture toughness of the material at the crack front after cooling to lower temperatures. Both effects are generally accepted while the conditions of its application and their codification are under discussion in some countries.

RPV internals are subject to the impact of irradiation, corrosion, and cyclic loading that might lead to complex degradation mechanisms, including synergistic effects. Some of these degradation mechanisms were not fully considered or neglected during design, while they become more and more important with

increasing plant life. This makes the integrity analysis of RPV internals a challenging task for a further term.

#### DELIVERABLES ENVISAGED

- Technical report comparing the approaches in the participating countries on topics of interest in fatigue evaluation for NPP
- TSAG on Approaches to Warm-Pre-Stress (WPS) and its application

#### *Passive cooling systems*

The increasing interest in the « passive systems » topic is highlighted by the various works that have been undertaken worldwide notably by IAEA, NEA or even projects on the behalf of Euratom. Some ETSON members are or have been involved in these works.

Considering the interest in this topic, its highly technical aspects and potential safety issues that it raises, ETSON has decided to strive this issue by looking at passive fluid systems that have been or may be introduced in NPP designs.

ETSON TBRS objectives are:

- Gathering relevant knowledge related to passive systems and identifying needs of R&D that would be worthwhile to share with the ERG;
- Developing a harmonized approach for implementation of safety approaches when safety relies on passive systems. Notably, insights regarding the issues raised by WENRA in its dedicated report will be provided.

The TBRS has a particular concern regarding the passive system reliability assessment, including probabilistic quantification, code qualification including uncertainties and passive systems testability for both design and operation phases, including adequate instrumentation.

#### DELIVERABLES ENVISAGED

- Report on the safety assessment of a design involving passive and active systems at the levels 3 and 4 of the Defence-in-depth - requirements that

should be applied to safety systems to ensure a high reliability of the supported safety functions (how to assess reliability, performance...of passive systems, combination of passive and active systems)

- Report on expectations regarding code qualification, uncertainties and need of experiment regarding passive cooling systems
- Update of the TSAG on safety systems assessment if deemed appropriate

#### *Equipment qualification*

A TSAG on « Environmental safety related qualification of components » has been published in 2019. The TBRS intends to share knowledge on the sustainability of qualification of some particular equipment like I&C, cables, equipment access hatch seal, containment penetrations, polymer...

No report is yet forecast.

## 3.3 Severe Accident management

In this field in particular, safety reviews by TSOs should rely on latest state-of-the-art knowledge: Implications on severe accident mitigation strategies and provisions should be assessed.

The TBRS intends to look at two main issues, i.e. In Vessel Melt Retention (IVMR) and Hydrogen Risk. The objectives are to analyse the implication of R&D project that have been performed recently or are near completion on these two topics to review possible impacts on safety requirements and assessment.

In the aftermath of the Fukushima Daiichi accident, some R&D projects on the behavior of a spent fuel pool in case of loss of cooling accident and possible strategies to prevent fuel melt or mitigate the associated consequences have been initiated.

Investigating possibilities to mitigate a fuel melting inside spent fuel pool (SFP) is of interest for most of ETSON members, so this topic will be dealt with after completion of the two previous tasks identified; it may be supported by results of spent fuel pool PSA.

#### DELIVERABLES ENVISAGED

- Paper « TSO perspectives to Review a Reactor Concept based on In Vessel melt Retention (IVR) strategy for severe accidents » - (presented in the IVMR meeting on January 21-23, 2020 in Juan Les Pins, France) - Update of this paper in 2023/2024 if needed;
- TSAG on Hydrogen Risk Assessment in LWRs ;
- Report on possible mitigation strategies in case of fuel assemblies melting in a spent fuel pool.

### 3.4 External hazards

The Fukushima Daiichi accident highlighted the need to improve the way external hazards are considered in the safety case (limit of the load-case approach) and to enhance the robustness of NPP regarding rare and severe hazards. EC stress-tests performed just after the accident underlined the need to broadly revisit safety approaches related to natural and man-made activities hazards.

ETSON members decided to share practices in the field of assessment of external hazards on NPPs, in particular on:

- Regulatory context for Design Basis Hazards (DBH) and Design Extension Hazards (DEH)
- Main assumptions considered to define DBH and DEH definition
- Safety cases studies rules and hypotheses
- Protection measures

<sup>5</sup> List of considered hazards could be changed in EG “External Hazards” interaction process

At a first stage, the TBRS will consider aircraft crash, extreme winds and tornadoes. As a second step, external fire and explosion will be treated as man-made induced hazard.

#### POTENTIAL INTERACTIONS WITH OTHER WORKING GROUPS

- OECD-NEA Working Group on External Events (WGEV) and Subgroup on Seismic Engineering of the Working Group on Integrity and Ageing of Components and Structures (WGIAGE) ;
- WENRA/RHWG.

#### DELIVERABLES ENVISAGED

- Requirements and approaches applied for assessment of external hazards impacting NPP safety. Aircraft Crash ;
- Requirements and approaches applied for assessment of external hazards impacting NPP safety. Extreme Winds and Tornadoes ;
- Requirements and approaches applied for assessment of external hazards impacting NPP safety. External Fire and Explosion ;
- Requirements and approaches applied for assessment of external hazards impacting NPP safety. Hazard Combinations ;
- Report on the overview of requirements and approaches applied for assessment of external hazards on NPPs safety, in the scope of beforehand mentioned hazards<sup>5</sup>.

### 3.5 Human and organizational factors

Human and Organizational Factors (HOF), including safety culture, are now part and parcel of nuclear safety. For several decades, safety assessment in

this field gained in maturity from fieldwork practices, event analysis and scientific research.

Nevertheless, HOF assessment practices and approaches remain a « black-box » for non-specialists. Various HOF dimensions are well known but, in contrast, methods aiming at evaluating behavioral, organizational or cultural issues are still poorly understood outside the HOF experts' community.

In that regards, the enhancement of HOF practices faces many challenges. Firstly, HOF techniques remain a craft, i.e. a set of skills and abilities mainly developed through individual or organizational practices. There is then a need to better formalize and disseminate HOF practical knowledge. Second, a critical issue for nuclear safety is to better integrate HOF within the nuclear life-cycle. From the design and construction stages to the Long-Term Operation or decommissioning steps, HOF issues must be addressed at an early stage, and not only when problems occur.

The objectives in this field are to identify HOF methods or topics that could be applied within TSOs in order to improve nuclear safety assessment. A practical perspective will be adopted, which means core activities will focus on the « How to do » questions: How to conduct a HOF assessment? How to perform a HOF inspection?

An important driver is to better explain HOF methods in order to ensure a deeper understanding of human dimensions of safety and a larger dissemination of a « HOF culture », so it was decided to develop guides explaining the HOF methodologies to non-specialists and demonstrating the added-value of HOF approaches. Using case studies is considered as relevant for that purpose.

#### POTENTIAL INTERACTIONS WITH OTHER WORKING GROUPS

- OECD-NEA Working Group on Human and Organizational Factors (WGHOE).

#### DELIVERABLES ENVISAGED

- Technical report – Comparison of rules-making and practices through case studies concerning safety culture oversight – 2020.

## 3.6 Probabilistic Safety Assessment

The importance of PSA in decision making differs among member countries and organizations. But the added value of PSA in safety assessment, combined with deterministic approaches, is more and more recognized. ETSO TBRS aims to generate and share information related to probabilistic safety assessment (PSA) in order to extend and enhance TSOs capabilities in this highly complex area of expertise. The cooperation in this field facilitates expert discussions on the different approaches applied in EU member states and help to get a common understanding of PSA related issues and challenges. In the longer term, harmonized approaches may be envisaged to be used over Europe.

Main TBRS objectives in the field are:

- Enhancing existing approaches and good practices within ETSO in the frame of probabilistic safety assessment considering insights from recent state-of-the-art R&D activities in member countries;
- Discussing potentially challenging safety related issues to be dealt with in PSA trying to jointly find resolutions;
- Developing and enhancing guidance for ETSO practitioners working in the field of PSA and PSA related topics.

Activities will consider lessons learned on, from and for PSA in the aftermath of the Fukushima Daiichi accident as site-level (multi-unit, multi-source) PSA and benefits of post-Fukushima Daiichi provisions demonstrated by PSA having resulted in modifications in different NPPs

(e.g., filtered venting, mobile equipment, etc.).

The modelling of passive systems in PSA will be discussed as well in the frame of the development of small and advanced modular reactors (SMRs/AMRs).

#### POTENTIAL INTERACTIONS WITH OTHER WORKING GROUPS

- WENRA/RHWG (SFP PSA and Site-Level PSA requirements) ;
- EC through the ASAMPESA\_E project.

#### DELIVERABLES ENVISAGED

- Technical Report on “PSA Lessons Learned on, from and for PSA” ;
- Technical Report or Workshop on Spent Fuel Pool PSA ;
- Technical Report or publication on quantitative objectives / targets / limits in partner countries and organisations ;
- TSAG on PSA knowledge management and transfer for improving decision makers’ PSA understanding.

## 3.7 Decommissioning and waste management

Society is deeply concerned by the becoming of nuclear waste management and decommissioning at the end of facilities life, and those topics remain challenging for all ETSON members. The interest in decommissioning strategies is increased by the need to be prepared for the decommissioning of European NPPs in the coming years. The TBRS offers the opportunity to share views and experiences on decommissioning strategies and on the way to review decommissioning plans.

Nowadays, as more than half of the ninety Light Water Reactors decommissioning worldwide are in Europe, TBRS decided to stay focused for the first step to decommissioning practices on LWRs, even if graphite reactors could be considered at a further step.

Main TBRS objectives in the LWR reactors decommissioning field are to:

- Overview the LWR decommissioning programs in Europe within the next decades and share Experience feedback from TSO’s safety reviews on post-operation management, dismantling and decommissioning, approaches and findings;
- Question Safety demonstration approach of LWRs throughout the decommissioning, especially regarding periodic safety reviews and clarify the “post-operation phase”;
- Define Dismantling strategies applicable to LWRs;
- Assess how to gather experience feedback from decommissioning for R&D purposes.

Sustainable waste management processes are also actually a major preoccupation of nuclear regulators and TSOs. TBRS members are already well involved in existing international initiatives. ETSON intends to develop common positions on issues identified by WASSC and WATTEC standing committees.

An ETSON workshop on sustainable waste management processes took place in 2016 and produced a good output, collecting a considerable amount of background information on waste types for which a cradle to grave solution still held challenges. The workshop identified a number of areas where further exchange and possibly common positions or collaborative work could prove valuable. This will serve as a basis for further work.

#### POTENTIAL INTERACTIONS WITH OTHER WORKING GROUPS

- SITEX network – exchange on technical guidance on the operational safety of underground disposal facilities;
- Standing committees of the IAEA dealing with waste safety standards and waste technology, especially WASSC and WATTEC, which advises the IAEA programme of work on radioactive waste management technology ;

- WENRA Working Group on Waste and Dismantling ;
- IAEA international project on completion of decommissioning ;
- NEA/CDLM Expert Group on a Holistic Process for Decision Making on Decommissioning and Management of Complex Sites ;
- EC-H2020 R&D projects (SHARE, PLEIADES and LD-Safe).

#### DELIVERABLES ENVISAGED

- Position paper on issues identified by WATTEC and WASSC ;
- Report on Safety Challenges and priorities for LWRs dismantling ;
- TSAG Safety demonstration approach to dismantling of LWRs from transition to completion ;
- Paper on Dismantling strategies applicable to LWRs ;
- Possibly common paper (TBRS/ERG) on End of operation and dismantling of LWRs: Opportunities to collect experience feedback data to improve the safety of LWRs in operation.

### 3.8 Emergency Preparedness & Response

In the aftermath of the Fukushima Daiichi accident, the associations HERCA (Heads of European radiological Protection Competent Authorities) and WENRA (Western European Nuclear Regulators' Association) recognised the need to be prepared for a severe accident occurring in Europe, even if the probability of such event is very low. Even if ETSON recognize the large discrepancy of roles and responsibilities of its members in national emergency response organisations, sharing technical views and information on what is going on at the affected nuclear facility may contribute to the quality of the technical

emergency expertise and at the end to the coherence of decision-making.

Initiatives have been taken to help enhancing emergency expertise all over Europe in case of a nuclear emergency. In the frame of the H2020 program in particular, the FASTNET project aimed at developing a «Tool for the fast and reliable prediction of severe accident progression and anticipation of the source term of a nuclear accident ». Several ETSON members were involved in the project and the TBRS is looking at possible ways to share the work done and pursue it, taking advantage of the knowledge of its members on a large range of nuclear facilities (PWR including VVER, BWR, SFR, HTR...).

ETSON plans to set up an « ETSON Emergency Response Club » that will use and share available data only, made public through the IAEA USIE system or directly by Member States. Outputs of expertise assessments are of paramount to supports emergency expertise done by ETSON members. In the next years, the TBRS intends to:

- Develop best practices in terms of emergency expertise methodologies and usage of emergency tools (a follow-up of the initiative done during the conduct of the FASTNET project). A common understanding of approaches available to provide assessments during emergencies will be developed. The main effort would be done to prepare ETSON members to be able to share common approaches, methodologies and tools;
- Generate and share information that TSOs may use to enhance their safety assessment in case of emergency (emergency preparedness & response arrangements, nuclear facility description...);
- Organize the participation of the Emergency Response Club to international exercises, for instance IAEA Convex exercises;
- Share practices in terms of on-site emergency plan assessment and inspections.



Particular attention will be paid to avoid duplicating information that already exists.

#### POTENTIAL INTERACTIONS WITH OTHER WORKING GROUPS

- IAEA ;
- HERCA/WENRA ;
- OECD/WPNEM.

#### DELIVERABLES ENVISAGED

- ETSON Emergency Response Club Terms of reference ;
- Technical report - Comparison of rules-making and practices concerning approaches available to provide assessments during emergencies ;
- Reports on emergency exercises feedback ;
- Evolutions of the accident database developed in the frame of the FASTNET project ;
- Technical safety assessment guide (TSAG) on on-site emergency plan.

## 5

# ETSON MEMBERS AND ASSOCIATED

## ETSON Members



Bel V  
Walcourtstraat 148, B-1070 BRUSSELS  
BELGIUM  
[www.belv.be](http://www.belv.be)



SURO (UJV)  
National Radiation Protection Institute  
Bartoskova 1450/28, 140 00 PRAHA 4 – Nusle  
CZECH REPUBLIC  
[www.suro.cz](http://www.suro.cz)



VTT  
Technical Research Centre of Finland  
Vuorimiehentie 5, P.O. Box 1000, FI - 02044 VTT  
FINLAND  
[www.vtt.fi](http://www.vtt.fi)



Institut de Radioprotection et de Sûreté Nucléaire  
BP 17, 92 262 Fontenay-aux-Roses Cedex  
FRANCE  
[www.irsn.fr](http://www.irsn.fr)



Gesellschaft für Anlagen- und Reaktorsicherheit GmbH  
Schwertnergasse 1, 50455 Köln  
GERMANY  
[www.grs.de](http://www.grs.de)



Centre for Energy Research, Hungarian Academy of Sciences  
KFKI Campus 1121 Budapest, Konkoly Thege Miklós út 29-33  
HUNGARY  
[www.energia.mta.hu](http://www.energia.mta.hu)



Italian National Agency for New Technologies, Energy and Sustainable Economic Development  
Lungotevere Thaon di Revel, 76, 00196 Roma  
ITALY  
[www.enea.it](http://www.enea.it)



Lithuanian Energy Institute  
Breslaujos 3, LT-44403 KAUNAS  
LITHUANIA  
[www.lei.lt](http://www.lei.lt)



Institute for Nuclear Research  
Str. Campului, No 1  
115400 Mioveni, Jud. Arges  
POB 78, PITEȘTI  
ROMANIA  
[www.nuclear.ro](http://www.nuclear.ro)



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SLOVAKIA  
[www.vuje.sk](http://www.vuje.sk)



Jozef Stefan Institute  
Jamova cesta 39, SI-1000 Ljubljana  
SLOVENIA  
[www.ijs.si](http://www.ijs.si)



Paul Scherrer Institut  
CH-5232 Villigen PSI  
SWITZERLAND  
[www.psi.ch](http://www.psi.ch)



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Koppongi First Bldg., 1-9-9 Koppongi  
Minato-ku, Tokyo 106-8450  
JAPAN  
[www.nsr.go.jp](http://www.nsr.go.jp)



State Scientific and Technical Center for nuclear and  
radiation safety  
35-37 V.Stusa Str., 03142 KYIV  
UKRAINE  
[www.sstc.com.ua](http://www.sstc.com.ua)



Scientific and Engineering Center for Nuclear and Radiation  
Safety  
ul. Malaya Krasnoselskaya 2/8 - building 5 - Moscow - 107140  
RUSSIA  
[www.secncrs.ru](http://www.secncrs.ru)

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31, avenue de la Division Leclerc

B.P. 17

92262 Fontenay-aux-Roses Cedex

France

[www.etsn.eu](http://www.etsn.eu)

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