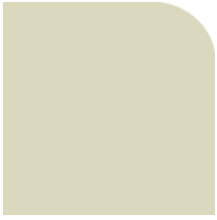


ETSON

EUROPEAN
TECHNICAL SAFETY
ORGANISATIONS
NETWORK

ETSON ANNUAL REPORT

2018



FOREWORD

2018 was an important and active year for ETSON. A strategy has been approved and has started to be implemented. The vision of ETSON is to contribute to enhancing and standardizing safety practices and science based safety assessments. Indeed it is not sufficient to verify compliance with regulations to ensure safety. A safety approach based on technical expertise is necessary. And this expertise must be based on knowledge management and relevant safety researches.

For the next two years, ETSON has to be more visible and to get more influence.

The two main tasks will be:

- Being recognized at the international level for greater visibility and stronger impact. The ETSON contribution to the IAEA TSO conference was a first step.
- The membership to European countries should be enlarged (Belarus is considering to be part of ETSON and maybe Poland).

I proposed the following priorities for its mandate:

- Getting acceptance from all ETSON members national safety authorities for the ETSON activities
- Enhancing ETSON cooperation with WENRA/ENSREG and promoting common Working/Expert Groups
- Promoting ETSON work inside EC with JRC and establishing common

activities/projects

- Strengthening ETSON technical activities by:

- + Promoting and issuing position papers and technical documents

- + Performing Seminars/Workshops on current topics inside ETSON (for example safety in fusion, load follow up, decommissioning, waste management issues, lifetime extension and mid-term storage...) and in cooperation with IAEA/EC

- Enhancing the promotion and communication inside and outside ETSON and implementation of its technical results.

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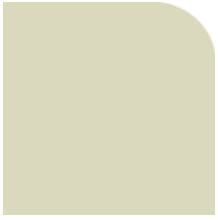
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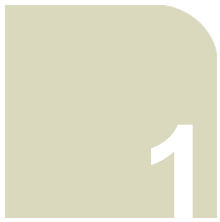
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ORGANISATIONAL MATTERS

1.1 ETSON network extension

No new TSO joined ETSON network in 2018. Discussions are still opened and engaged with other European TSOs and Safety Authorities with TSO embedded to enlarge the ETSON network, especially in Europe.

1.2 General Assembly and Board meetings

Two General Assembly (GA) coupled with Board meetings were held.

- On the 25th and 26th of June 2018 in Budapest (Hungary); Board and GA
- On the 15th and 16^h of October 2018, in Brussels (Belgium), on the fringe of the IAEA TSO Conference; Board and GA
- During the last General Assembly in Brussels, a new Board (below) has been elected for a two years mandate.

The 2018 new Board is composed of the following:

- Mr. Uwe Stoll (GRS): President
- Mr. Michel Van haesendonck (Bel V): Vice President
- Mr. Alexander Khamaza (SEC NRS): Vice President
- Mr. Jean-Christophe Niel (IRSN): Secretary
- Mr. Leon Cizelj (JSI): Treasurer

The General Assembly thanked Mr Benoît De Boeck (Bel V) for his outstanding leadership during his 4 years as President of ETSON.

The ETSON organization is presented in Annex 1.

1.3 Accounting and fee payment

The Association collected the annual fees of 2000 Euros from the 16 ETSON members. The funds are dedicated to the ETSON Award, the promotion of ETSON and limited research actions among ETSON members.

1.4 ETSON Strategy

ETSON decided to create a communication group to share its values and to enhance the promotion and communication. The main objective is to increase its visibility at the international level.

At the same time, ETSON decided to reinforce the development of the Junior Staff Programme (JSP). The young generation of ETSON is the future of the nuclear safety in Europe and beyond. The objective of ETSON is to create a living network, to connect the young people together and to help them to build common projects among ETSON members.

Following the General Assembly in October in Brussels, an effort will be done to increase the synergy between the JSP, the Technical Board on Reactor Safety (TBRS) and the ETSON Research Group (ERG) in order to bring more focus on ETSON developments for enhancing safety.

ETSON also continues to develop its relationship with international bodies. On the fringe of the IAEA TSO Conference in Brussels (Belgium) ETSON signed a

Memorandum of Understanding with the Joint Research Center from the European Commission.

ETSON also won a contract with the European Commission (DG-ENER) on “The analysis to Support Implementation in Practice of Articles 8a-8c of Directive 2014/87/Euratom in the Member States”. This project includes workshops and a questionnaire on national practical approach.



ETSON General Assembly in Budapest June 2018



ETSON ACTIVITIES

2.1 Technical Board on Reactor Safety (TBRS) & Expert Groups

The expert groups of the Technical Board on Reactor Safety (TBRS) represent the core of ETSON in enhancement of expertise in nuclear safety practices.

Ms Karine Herviou from IRSN has been nominated as the Chairperson of the TBRS this year in replacement of Mr. Pieter De Gelder (Bel V). The Members congratulated and thanked Mr. De Gelder for leading the TBRS during the past years with the main goal to harmonize the safety practices of TSOs.

The main role of the TBRS is to manage the different expert groups and to propose to the General Assembly workshops and publications (Technical Safety Assessment Guides, Reports) for validation before publication.

Topics of ETSON Expert Groups are:

N°	Technical issue
1.	OEF, including Incident and Precursor Analysis
2.	Mechanical Systems
3.	External hazards (man-made and natural hazards)
4.	Severe Accidents
5.	Environmental Safety related Qualification of Componentes
6.	Safety Fluid Systems, including Auxiliary Systems
7.	Human and Organizational Factors
8.	Probalistic Safety Assesment (PSA)
9.	Lifetime-Management (Ageing Management)
10.	Thermal Hydraulic Analyses (Transients, Accidents)
11.	Safety Concepts, Defense-in-Depth
12.	Core Behavior (Operational and Accident Conditions)
13.	Emergency Preparedness and Response
14.	Waste Management and Decomissioning

The final users are the Technical Safety Organizations, their Regulatory Bodies and, more generally, the organizations involved in safety assessment activities, either being well established or from an embarking country.

In 2018 the TBRS published two documents: The Technical Safety Assessment Guide dedicated to “Environmental qualification” and the technical report on “Comparison of rules-making and practices concerning reactor pressure vessel integrity assessment”. The documents are available on www.etsn.eu.

The TBRS organized in January a workshop in Germany dedicated to aircraft crash with three topics related to accidental aircraft crash (AC) on nuclear installations:

- safety related regulatory requirements
- nuclear installation design
- methods and boundary conditions for analyses (Methodology for determining the annual aircraft crash probability for each aviation category on the installation targets ; Methodology for determining the consequences of an aircraft crash ; Plant improvements and additional protection means ; Recent investigations and improvement proposals).

The general conclusions showed:

- AC is treated differently in different member countries regarding Probabilistic approach vs. design requirement, Load assumption and Scope/methodology of analyses
- Distinction between DBE and BDBE is common practice
- Consideration of civil aircrafts is state of the art
- Intentional AC is mostly part of security
- Many post Fukushima improvements are also valuable regarding AC

- Small/medium scale experiments were performed in Finland.

The Safety Assessment Guide is 6 years old. The goal of this SAG is to set down the harmonized principles applied in ETSO organizations to ensure that, whatever the technical analysis could be, safety assessments are performed by each ETSO member according to the same lines and can therefore be used with the same confidence by the people concerned.

This document will be updated with two main objectives:

- present further views and best practices related to the activity of safety review and assessment, based on the experience gained by ETSO organizations, taking into account the IAEA TEC DOC -1835
- set down the harmonized principles applied by ETSO organizations to ensure a common approach and high quality of safety assessment and to develop higher confidence in delivered safety assessments (introduction of TSAGs)

A new TBRS Roadmap is planned for the end of 2018 - the beginning of 2019.

2.2

ETSON Research Group (ERG)

Ms Martina Adorni from Bel V has been appointed as the Chairperson of the ERG this year in replacement of Mr. Jean-Pierre Van Dorsselaere (IRSN).

The Members congratulated and thanked Mr. Van Dorsselaere for leading the ERG during the past years with the main goal to develop research activities dedicated to nuclear safety expertise.

The ERG presented a paper at the 2018 IAEA TSO Conference describing the mapping of ETSO experimental infrastructures and modelling teams.

ETSO financed a research project about a benchmark on H₂ deflagration experiments. This project involved 8 ETSO members and was led by IRSN. It was composed of two distinct phases:

- An "Open" phase showed ability of codes to predict flame acceleration, deceleration and shock interaction but there is a need for additional investigations.
- A "Blind" phase showed the ability of most of the codes to predict qualitatively the pressure evolution but with an over-prediction of flame speed maximum value. There is a need to reduce weaknesses of combustion models (e.g. chemistry part, turbulent combustion model and coupling between both models).

The results have been presented at the NUTHOS-12 Conference in Qingdao, China (October 2018).

A report and a detailed paper for the Journal of Hydrogen are under preparation.

Concerning EURATOM Programme, several ETSON members are involved in 4 project proposals:

- MUSA: numerical tools for reducing SA uncertainties and improving SAMG
- R2CA: numerical tools for source term in Design Basis Accident
- ELSMOR: Small Modular Reactors
- Joint Programming on Radioactive Waste Management and Disposal

The ERG prepared a letter sent by the ETSON President to the Commission with several messages:

- Retain long-term sustainability of experimental research infrastructures in Europe and the associated know-how
- Higher priority to safety R&D of Gen.II-III-III+ LWR operated in Europe today or in the near future (e.g. SMRs), with respect to safety of Gen.IV NPPs
- Preventing accidents through a robust implementation of defence in depth and avoiding radioactive releases outside a nuclear installation (link with 2014 European Directive).

The ERG proposed also several high priorities in its letter:

- Advanced systems, methods and numerical tools to manage extreme conditions and to prevent severe accidents
- Impact of NPP ageing on safety
- Safety aspects of radioactive waste management, interim storage and final disposal in Europe including the safety issues of decommissioning and dismantling
- Human factors in design and operation, together with safety culture and operating experience feedback as well as for accident management.

The ERG Chairperson was also invited to the meeting of the Committee on the Safety of Nuclear Installations (OCDE/NEA) on the 5th of December 2018 in order to present ETSON network, its goals and also possible areas of common interest in order to enhance cooperation and work, to promote the working groups and technical activities and to avoid the duplication of efforts.

ETSON will organize a workshop in Lithuania at LEI during second quarter of 2019. It will be a workshop about the safety of fusion installation, an important topic for safety assessment, first for ITER (500 MW) then for DEMO (2000 MW) and should be open also for Non-ETSON members.

Because research is connected to expertise, TBRS and ERG decided to work closely together and to organize common high-level meetings.

2.3

Junior Staff Programme (JSP)

The ETSON Junior Staff Programme brings together young experts from all ETSON members. The JSP aims at improving the long-term partnership of the member TSOs, establishing a network for cooperation between young experts from different countries, and encouraging intercultural interaction. This network has long-term objectives to allow young experts and researchers to work together and to maintain the contacts in time.

The ETSON General Assembly in Brussels (October 2018) decided to reinforce this network, which is a real asset for ETSON. It is a priority to develop the network from bottom to the top and also to diffuse the spirit of ETSON among all the members. From a practical point of view, it has been decided to implement specific tools (interactive forums, webinars, digital space working areas, etc.). Meetings of previous JSP events participants are also encouraged.

JSP SUMMER WORKSHOP 3-7 September 2018

The main yearly event within this framework is the ETSON Junior Staff Summer Workshop. This event was organized in 2018 by the Romanian ETSON member - RATEN ICN in Mioveni.

- Subject: radioactive waste management, environmental protection and decommissioning
- Attendees: 38 from 11 TSOs. Several young experts from Safety Authorities also participated.
- Lectures and working groups: around 30 presentations by the young experts themselves.

The ETSON Board thanks RATEN very much for hosting this workshop, which was a real success. The participants enjoyed to meet their colleagues from other TSOs and also to work together. It was an excellent opportunity to establish professional ties for the future.

ENEA (Italy) proposed to host the ETSON JSP Summer Workshop 2019 in Bologna.



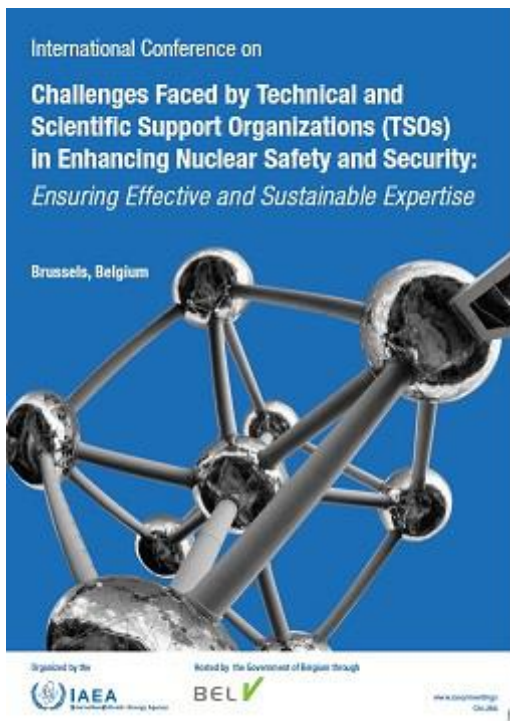
JSP in Mioveni (September 2018)

3

ETSON EXTERNAL RELATIONS

3.1 IAEA

ETSON and IAEA worked together for the preparation of the fourth IAEA TSO Conference (15-18 October 2018, Brussels, Belgium) which was hosted by the ETSON member Bel V.



Several ETSON TSOs were members of the Conference Programme Committee and ETSON was particularly active during the Conference.

A side event was organized by ETSON on the first day with a general presentation from the President of ETSON, Mr. Benoît De Boeck. ETSON had several presentations from TBRS, ERG and also the ETSON support activities to the IAEA through the TSO Forum.

A TSO Café was organized on the first day of the conference. Each ETSON member had a booth to present its activities.

During this side event, ETSON performed the ETSON Awards session with two presentations:

1. R. Henry (GRS), I. Tiselj (JSI), L. Snoj (JSI), *Neutronics and thermal-hydraulics coupling for simulations of the Triga Mark II reactor*
2. R. Grosseuvres (IRSN), A. Bleyer (IRSN), L. Maas (IRSN), M. Povilaitis (LEI), T. Holler (JSI), *Temperature conditions effect on hydrogen-air flame propagation in the ENACCEF2 experimental facility*

Each contribution received an Award with a price of 2500 €.

The IAEA TSO Conference was divided in several sessions:

- Roles of the TSOs supporting regulatory functions
- Safety assessment
- Radiation and waste management safety
- International cooperation
- Role of the TSOs in emergency preparedness and response
- Other challenge of the TSOs
- Key components to develop and maintain the technical and scientific expertise
- How to build your technical and scientific capability?

All sessions included the presentations of ETSON members on different topics related to safety.

The general conclusions of the Conference are:

1. The Conference acknowledges the results of the developments undertaken under the auspices of the IAEA TSO Forum based on past TSO Conference conclusions, notably the TSO Initiative, and encourages further progress on them in the following directions:

(a) Based on TECDOC-1835, existing IAEA advisory services (including Integrated Regulatory Review Service missions) could be implemented in such a way as to encompass with appropriate in-depth analysis the contribution of TSOs to the challenges faced by the national regulatory system.

(b) The finalization and field test of the draft TSO self-assessment tool should enable Member States to practically perform an assessment of their national TSO strategy in reference to TECDOC-1835.

(c) A test of the “national TSO workshop” approach as recommended by the TSO Forum should be carried out in the near future in cooperation with a candidate Member State.

2. The Conference encourages Member States to support the TSO Initiative and to take advantage of the specialized advice on strategic issues relevant to TSOs, in order to contribute to setting up a suitable TSO capability at national level.

3. The Conference recommends that the TSO Forum further addresses the following aspects of potential TSO contribution to the independence and sustainable effectiveness of the national regulatory system:

(a) The role of TSOs in activities of regulatory bodies communicating with stakeholders, noting that the openness and transparency of the safety expertise may enhance nuclear safety.

(b) The role of TSO expertise in providing independent advice or recommendations to the regulatory bodies about state of the art safety assessment tools and methodologies, and technical and staff capabilities.

4. The Conference highlighted TSOs’ need for effective and sustainable research, education and training, and knowledge management to feed and sustain expertise in the long term, to better support regulatory systems. The TSO Forum could consider how to encourage embarking countries to address the above-mentioned priorities in the development of strategic plans and roadmaps for building up an independent and sustainable TSO in the long term.

The next IAEA TSO Conference is planned in 2022.

Moreover, in 2018, ETSON took part in the following IAEA activities:

■ Release of the IAEA-TECDOC-1835

After several years of work, discussions and a strong involvement of ETSON members, IAEA released the IAEA-TECDOC-1835 “Technical and Scientific Support Organizations Providing Support to Regulatory Functions”.

The document is divided in four main chapters:

1. Introduction
2. TSOs in the regulatory framework and their relationship with the regulatory body and other interested parties
3. Characteristics and management of technical and scientific support (conditions for effective technical scientific support)
4. Nature and scope of technical and scientific support activities.

This document is a very important step in the worldwide recognition of the TSO function. It is an essential document for the new comers who want to build a national stand-alone nuclear regulatory system.

The TSO Forum set up dedicated technical consultancy meetings related to support of the new comers. These meetings are helpful to define and build a TSO resource (what kind of technical activities to implement, how to have a budget, link between research and expertise...).

Most of the ETSON members are deeply involved in the TSO Forum and its initiatives.

The JSP could be involved in this strategy.

DG ENER

In 2017, ETSON - under the lead of GRS - won a tender with DG ENER about the harmonization of nuclear safety practices at the European level. Ten ETSON members participate in the consortium. The main objective of this contract is to help the Commission in the technical implementation of the nuclear safety directive (NSD).

3.2

EUROPEAN COMMISSION

JRC – Joint Research Center

A collaboration agreement has been signed the 15th of October 2018 between ETSON and the JRC on the fringe of the IAEA TSO Conference in Brussels (Belgium).

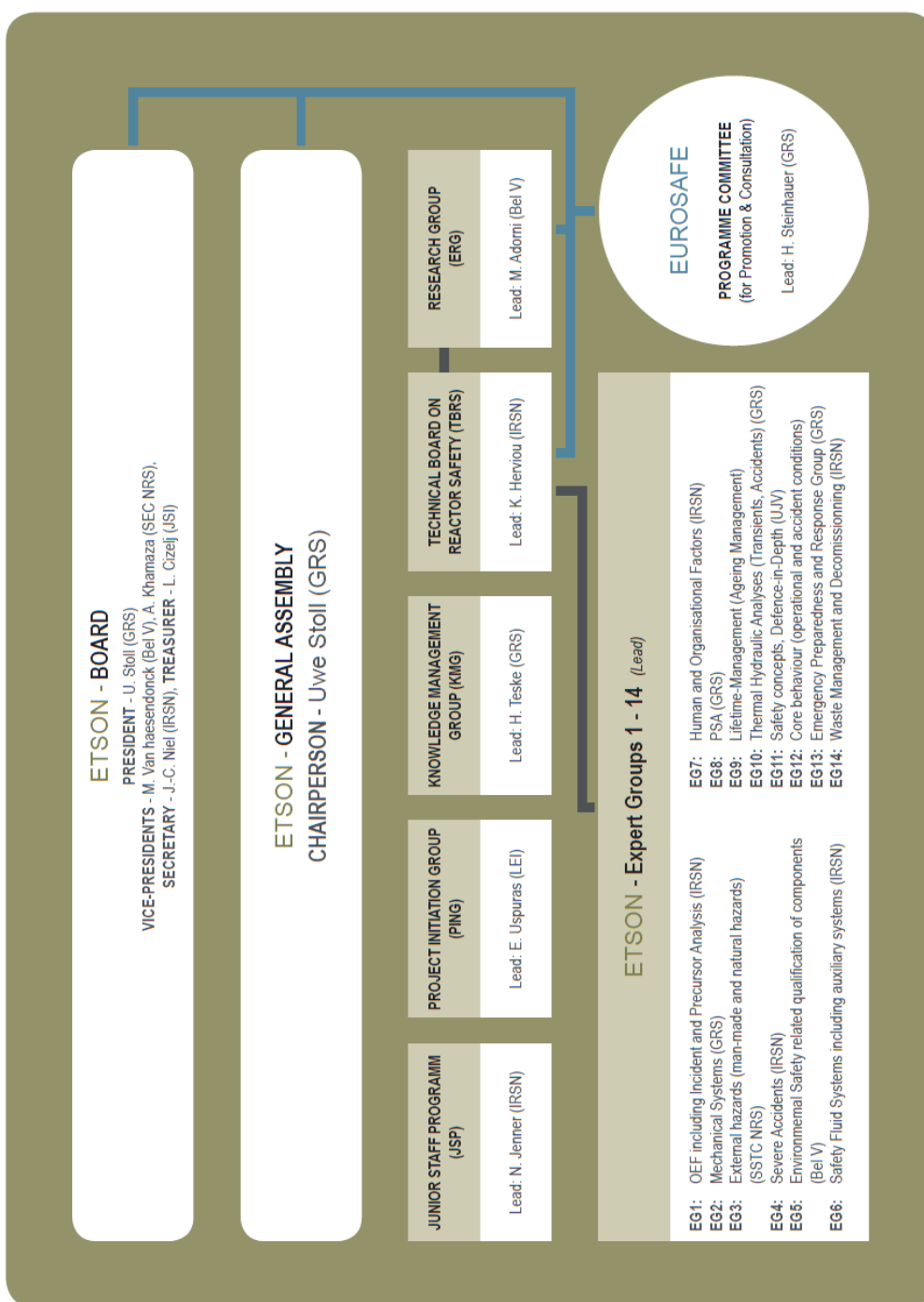
This is an important agreement, both on a strategical point of view, showing the visibility of ETSON and on a technical point of view because ETSON and JRC share together several interests on research in nuclear domain.

JRC will be invited to participate in several ETSON groups.

JRC could also be actively involved in the promotion of young ETSON researchers. This promotion is fully supported by the European Commission. The Commission presented a new strategy for Europe in 2018 for the 2019-2027 time period “EMPOWER: Supporting youth empowerment through quality, innovation and recognition of youth work”.

ANNEX

2019 ETSO ORGANIZATION



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