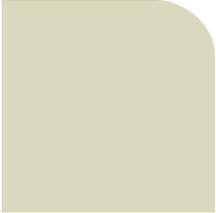


ETSON

EUROPEAN
TECHNICAL SAFETY
ORGANISATIONS
NETWORK

ETSON ANNUAL REPORT 2017



FOREWORD

2017 was again a busy year for ETSO. A new strategy has been approved and has started to be implemented. The vision of ETSO 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.

The technical work of ETSO is performed mainly by three working groups: (1) the Technical Board on Reactor Safety (TBRS) and its Expert groups, (2) the ETSO Research Group (ERG), and (3) the Knowledge Management Group (KMG).

The TBRS needs to add the last comments before to release beginning of 2018 a report comparing the regulations for reactor pressure vessel assessment. A workshop on probabilistic safety assessment was organised in November and one on external hazards will be organised in January 2018.

The ERG reassessed the definition of future priorities in safety research. The ERG is leading two projects: (1) mapping of all the infra-structures (experimental facilities and simulation codes) among ETSO members with their main objectives and capabilities, and (2) analysis of hydrogen deflagration

experiments through a benchmark between simulation codes.

The ETSO Junior Staff Programme (JSP) brings together young experts from all ETSO members. The JSP organised its annual summer workshop in Slovenia, hosted by the Jožef Stefan Institute. The subject was Uncertainty and sensitivity in safety analysis.

The European Commission submitted in September a tender to help in the technical implementation of the nuclear safety directive. ETSO did set up a consortium with 10 members to answer the tender, and the ETSO consortium won the tender. Work is expected to start in 2018.

ETSO also strengthened its link with the IAEA, which recognizes the role of TSOs (TSOs Forum, TECDOC on TSOs). An agreement between the IAEA and ETSO has been signed during the General Conference 2017, which allows ETSO to participate as an associated organisation to the IAEA activities and deliverables.

In 2017 RATEN ICN from Romania joined the network

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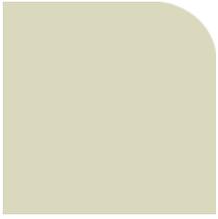
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ORGANISATIONAL MATTERS

1.1 ETSON network extension

During the General Assembly meeting in Frascati, 26-27 June 2017, RATEN ICN from Romania, represented by Mr. Ilie Turcu formally joined ETSON. The Institute for Nuclear Research Pitesti (ICN) is a subsidiary of the State Owned Company "Technologies for Nuclear Energy (RATEN)".

The Institute for Nuclear Research Pitesti (ICN) has as main activity objective the scientific research, the fundamental and applied technological development, the exploitation of its own research through technology transfer, design, investments, consultancy, expertise and technical specialized assistance, subordinated to ensuring the scientific and technical support for Romania's nuclear energy sector. RATEN ICN becomes the 16th ETSON member.

End of 2017, 16 members and associated members belong to ETSON (Bel V, GRS, IRSN, WOOD-RSD, CV Rez, ENEA, JSI, LEI, MTA-EK, PSI, VUJE, VTT, RATEN ICN, Associated: SSTC NRS, NRA, SEC NRS).

Discussions are engaged with other European TSOs and Safety Authorities with TSO embedded to enlarge the network, especially in Europe.

1.2 General Assembly and Board meetings

The year 2017 was an opportunity to further strengthen the overall functioning of the association.

Two General Assemblies coupled with Board meetings were held. A third Board meeting has been organized on the fringe of the NENE 2017 conference (Slovenia).

- On the 26th and 27th of June 2017 in Frascati (Italia); Board and GA
- On the 11^h of September 2017, in Bled (Slovenia), on the fringe of the NENE Conference 2017; Board
- On the 8th of November 2017, in Fontenay-aux-Roses (France), on the fringe of the Eurosafe Forum 2017; Board and GA
- Following a proposal from the President, the ETSON General Assembly decided to extend the mandate of the Board until the 2018 IAEA TSO conference (Brussels, 15-18 October 2018).



Signature for new ETSON member RATEN ICN (MM. Ilie Turcu and Benoît De Boeck, Frascati, June 2017)

The Board is composed of the following:

Mr. Benoît De Boeck (Bel V): President
MM Uwe Stoll / Hans Steinhauer (GRS): Vice President
Mr. Alexander Khamaza (SEC NRS): Vice President
Mr. Jean-Christophe Niel (IRSN): Secretary
Mr. Leon Cizelj (JSI): Treasurer

1.3

Accounting and fee payment

The Association collected the annual fees of 2000 Euros from the 16 ETSON members. The money is dedicated to the ETSON award, the promotion of ETSON and limited research actions.

1.4

ETSON Strategy

Starting from 3 partners in 2006 (IRSN, GRS and Bel V), the network reached within 11 years 16 members.

Due to this increase in power, it has been decided in 2016 to renew the ETSON strategy. A first discussion started during the June's Board and General Assembly. A task force was created at this moment. The taskforce presented a draft for a new strategy during the November General Assembly.

The new strategy has been approved during the June 2017 General Assembly in Frascati. The renewed ETSON strategy has been uploaded on ETSON website.

The objective of ETSON is to be THE sustainable and leading European expert

association in the field of nuclear safety and security.

With the agreement of the respective national Regulatory Bodies, ETSON is supporting the EC and IAEA and contributes to enhancing and harmonizing safety assessment practices and regulations in Europe through technical expertise, safety assessment and research.

In order to bundle this sustainable commitment and to achieve strategic alignment, the ETSON members focused on the following objectives and actions:

- Recognition at the international level for greater visibility and stronger impact
- Enlarge the membership and partnership for all European countries
- Develop ETSON production for enduring utility
- Specific programme / budget for ETSON with priority on the technical nuclear safety expertise and research

2

ETSON ACTIVITIES

2.1 ETSON Technical Board on Reactor Safety - Expert Groups

All ETSON members stressed the importance of the ETSON expert groups. The Technical Board on Reactor Safety (TBRS) proposed generic terms of reference. The main role of the TBRS is to manage the different expert groups and to propose to the General Assembly the Technical Safety Assessment Guides for validation before publication. The ETSON organization is presented in Annex 1. ETSON Expert Groups exist for the following topics:

N°	Technical issue
1.	OEF, including Incident and Precursor Analysis
2.	Mechanical Systems
4.	Severe Accidents
5.	Environmental qualification
6.	Safety Fluid Systems, including auxiliary systems
7.	Human and Organizational Factors
8.	PSA
9.	Lifetime-Management
10.	Thermal Hydraulic Analyses (Transients, Accidents)
11.	Safety concepts, Defense-in-Depth
12.	Core Behavior (operational and accident conditions)
13.	Emergency Preparedness
14.	Waste Management and Decommissioning

The new ETSON member RATEN ICN nominated experts for the different working groups.

The TBRS organized two meetings during the year (May and November 2017)

The TBRS will relaunch the group on Human and Organizational Factors to update the dedicated Technical Assessment Guide (based on case studies)

The TBRS will organize a workshop dedicated to external hazard and more precisely on aircraft crashes (January 2018). ETSON decided to create a dedicated working group on external hazards with a wide point of view (nuclear power plants, nuclear industry, natural and man-made hazards).

The Safety Assessment Guide (15 years old) will also be updated. The main focus is how to perform a good safety assessment from a technical point of view, an end-user guide for the safety assessors, taking on board more recent researches and challenges

The technical expert group on “Mechanical systems” presented its document, a new Technical Safety report: Comparison of regulation for reactors pressure vessel assessment. After slight modifications to take into account, the report is accepted and will be published on internet.

The group on Probabilistic Safety Assessment organized a dedicated workshop “PSA from a TSO expertise” the 8th of November.

2.2 ETSON Research Group

Concerning EURATOM Programme, The Chairman of ERG announced that four European projects with at least three ETSON members were accepted in the last H2020 Call (ATLAS+ (Advanced Structural Integrity

Assessment Tools for Safe Long Term Operation), NARSIS (New Approach to Reactor Safety ImprovementS), ESFR-SMART (European Sodium Fast Reactor Safety Measures Assessment and Research Tools) and GEMINI+ (Research and Development in support of the GEMINI Initiative). Besides, several ETSON partners are involved in R&D projects on severe accidents inside NUGENIA Association (IPRESCA and SAMHYCO-NET).

Upon OCDE/NEA invitation to make comments on the document Nuclear Innovation 2050 (NI2050) - A Roadmap to a Carbon-free Energy Future - and also to participate to the ranking of some topics, ERG answered in due time.

Because research is connected to expertise, TBRS reviewed and confirmed the ERG process of ranking the future priorities in research.

These eight priorities are:

- Improved thermal-hydraulics evaluation for the existing plants
- Impact of single or multiple external events
- Methodologies for beyond design basis assessments
- Development and validation of severe accident integral codes
- Spent fuel pool accident scenarios
- Corium thermophysical and thermodynamic properties
- Ageing/degradation mechanisms, modelling and materials properties for metallic components
- Small modular reactors

Among the different projects led by ERG :

Mapping of all the experimental infrastructures among ETSON members with their objectives and capabilities. There are two main objectives: first share the information on capabilities within ETSON, with, if possible mobility of researchers; and secondly promote the large ETSON competencies and capabilities. A written document will be published.

ETSON approved and funded a proposal of a research project among ETSON members. This project involves 8 ETSON members and concerns a benchmark between simulation codes on IRSN-CNRS hydrogen deflagration experiments. This is the first research project completely funded by ETSON, showing the will to strengthen the network. The results should be published in 2018.

A one day technical workshop for dissemination of knowledge on safety of fusion installations will be organized under the coordination of LEI with the participation of IRSN, ENEA and JSI. This day will be hosted by LEI end of 2018.

The technical aspects will concern safety analysis and R&D on both ITER and DEMO.

2.3

ETSON Knowledge Management

The ETSON Knowledge Management Group (KMG) organized two meetings on the fringe of the two General Assemblies.

The KMG is in charge of sharing information and of the diffusion of the knowledge.

The KMG will think about the development of ETSON internal and external communication, objective and implementation.

Starting from 3 members, ETSON reached now 16 members and needs to define a communication policy to increase its visibility outside and so, its influence. It is an essential issue for ETSON. On an internal point of view, the communication policy is also needed to strengthen the network.

After the KMG recommendations, a dedicated communication group should be created in 2018.

2.4

ETSON JSP

The ETSON Junior Staff Programme (JSP) brings together young experts from all ETSON members. The JSP aims at improving the long-term partnership of the member TSOs, establish a network for cooperation between young expert from different countries, and to encourage intercultural interaction. This network has long term objectives to allow young researchers to learn to work together and to maintain the contacts in the duration. These young researchers represent the future of ETSON.

The main yearly event within this framework is the ETSON Junior Staff Summer Workshop.

JSP SUMMER WORKSHOP 2017

- Subject: Uncertainty and sensitivity in safety analysis.
- Attendees: 28 from 9 TSOs.
- Lectures and working groups: around 20

presentations by the young experts themselves.

- Location: Reactor Centre of the Jožef Stefan Institute near Ljubljana, Slovenia.

RATEN ICN (Hungaria) proposed to host the ETSON JSP Summer Workshop 2018.



JSP in Slovenia (August 2017)

2.5

ETSON Award

The contest for the ETSON Award – in a format like a science slam - took place during the 2017 EUROSAFE Forum.

This year, nine papers have been submitted. A selection has been made for an oral presentation of 5 papers. The collaboration between ETSON members is highly encouraged to present common papers.

Two winners have been rewarded:

- 1) Oleksandr Kukhotskyi (SSTC NRS) and Tomas Iesmantas (LEI) for the topic “Methodology for PSA uncertainty estimation and application in risk-informed decision-making
- 2) Liviusz Lovasz (GRS) ,and Sebastian Weber (GRS) for the topic: Simulation of

asymmetric phenomena during core
degradation with the code system AC2

The winners of the first prize received 3000 €
and the second 2000 €.



ETSON RELATED INITIATIVES

As part of their activities, ETSON members have been involved in different initiatives in 2017.

In 2018, for more cohesiveness and to avoid possible confusions, all the EUROSAFE initiatives will be placed under ETSON patronage.

3.1 EUROSAFE Forum

The 2017 EUROSAFE Forum was organized in Paris, France at the Cité Internationale (6-7 November 2017).

247 people were registered to the conference.

6 sessions were organized:

- Plenary
- Session 1: Nuclear Installation Safety – Assessment, 11 papers
- Session 2: Nuclear Installation Safety – Research, 6 papers
- Session 3: Waste Management and Decommissioning & Dismantling, 11 papers
- Session 4: Radiation protection, environment and emergency preparedness, 11 papers
- Session 5: Security of nuclear installations and materials, 8 papers

About the TSO Café, the success observed during the first edition in 2016 is confirmed this year.

14 TSOs participated with 4 international organizations (Riskaudit, IAEA, ENSTTI and ETSON).

The 2018 EUROSAFE Conference will be organized in collaboration with IAEA in the

framework of the TSO Forum Conference which is planned in October 2018.

3.2 EUROSAFE Newsletter

In 2016, it was decided to renew the formula and to change the EUROSAFE Tribune into an ETSON Newsletter. One year after, the feedback from ETSON Members is positive and the new formula is definitively adopted.

With the new formula, each ETSON member in turn is in charge to propose a newsletter with the topics he defines. It is a monthly rotating position for each member.

4 ETSON EXTERNAL RELATIONS

4.1 IAEA

ETSON and IAEA decided to formalize their common work with the signature of a “Practical Arrangements between ETSON and IAEA on scientific and technical collaboration in the area of nuclear and radiation safety”.



Signature of the document during the 2017 General Conference

The preparation of the 2018 IAEA TSO Conference and in particular the ETSON event (planned during the conference) will be the first topics of cooperation.

ETSON took part in the following IAEA activities:

■ TSO Forum: Vienna 10-13 April 2017

Several actions/recommendations have been defined after the TSO Forum with:

- The objectives of the TSO Conference:
 - Promotion of the role/functions/values of TSOs in enhancing nuclear safety.
 - Achievement of the document dedicated to the TSO function (TECDOC)
 - Update of the safety standards revision (following Fukushima lessons)

-The creation of a common working group between the European Commission and IAEA on research and development coordination on nuclear and radiation safety (cooperation, exchange of information...).

- Definition of actions to define and create TSO for embarking countries:

- Increase of TSO capabilities in the INIR and IRRS missions
- Redaction of a ToR indicating how to help the embarking countries to reach the milestones in terms of TSOs
- Definition of a pool of experts.

■ General Conference: Vienna 18-22 September 2017

An ETSON/ENSTTI booth was installed during the General Conference to promote the TSOs actions.

■ TSO Forum: Vienna 17-20 October 2017

Three new members joined the TSO Forum: SSTC NRS (Ukraine), CNSS (South Africa) and PNRA (Pakistan).

The TECDOC should be released in 2018.

The question about how to involve the newcomers on the TSO functions needs an answer. A feedback on IRRS and INIR missions (document to write) on embarking countries should be helpful.

TSO Self-Assessment: a questionnaire will be sent to the TSOS with 28 important questions (for example what are the key competencies, how to apply these competencies...)

4.2

EUROPEAN COMMISSION

DG ENER

The harmonization of nuclear safety practices is a topic which is a focus of concern for the Technical Safety Organizations for a number of years now.

The Commission submitted in September a tender to help in the technical implementation of the nuclear safety directive (NSD).

This topic is the heart of ETSON activities that can already contribute to the implementation of the NSD such as:

- ETSON Technical Safety Assessment Guides record and formalize good technical practices, which are recognized to be one of the elements to be considered in demonstrating compliance with the NSD (for instance in defining what is 'reasonably practicable');
- ETSON activities, notably in Expert groups, contribute to ensuring the harmonization of methods, tools and practices in safety assessment, which are necessary for the homogeneous implementation of the NSD across Europe.

ETSON did set up a consortium with 10 members to answer the tender, and the ETSON consortium won the tender. Work is expected to start in 2018.

This action is very positive for ETSON because:

- It fulfills ETSON's objective to enhance safety and to promote harmonization;

- Working on technical issues dealing with safety assessments is the heart of TSO functions;
- It allows strengthening the link between ETSON and the Commission, showing that ETSON can mobilize very quickly for essential topics;
- this work will also be very useful for future national work as TSOs will have to review proposals from operators and assess at the technical level compliance with the NSD, and to support Technical Peer Reviews.

And, of course, this work will also be very positive for the Commission with the technical support of the European technical safety community, thus guaranteeing for the Commission the presence of the best experts in Europe.

JRC

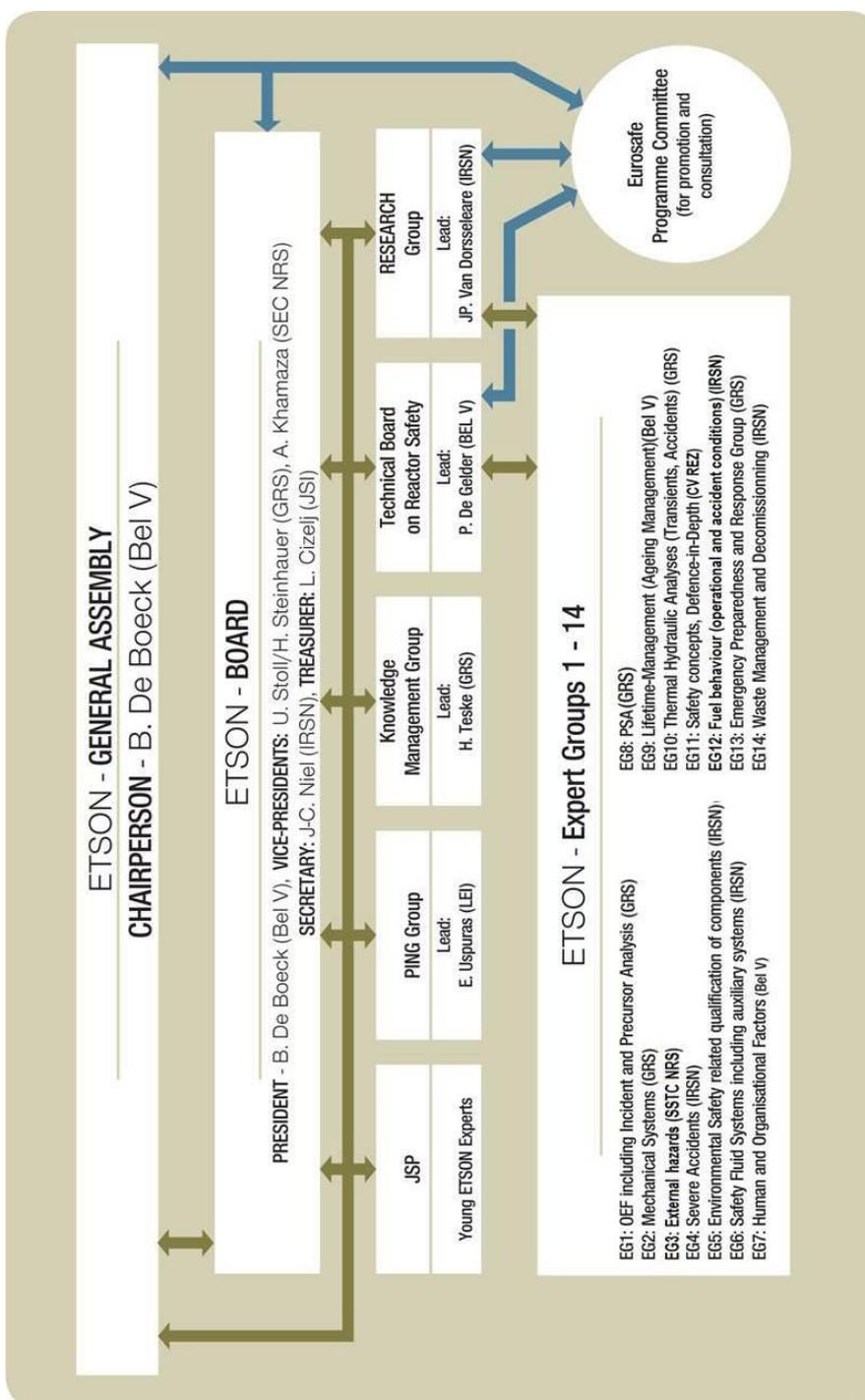
A meeting was organized between ETSON and JRC the 28th of September. The President presented and described all the ETSON actions.

Potential areas of collaboration have been discussed. ETSON and JRC decided to move closer because of the different common topics of interest.

The JRC is working on a collaboration agreement draft to be sent to ETSON for signature in 2018.

ANNEX

ETSON ORGANIZATION



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