



IAEA

International Atomic Energy Agency

IAEA Views on Supply Chain Development

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Senior Expert, Division of nuclear power

NIC 2024

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Mr. Pekka PYY, IAEA

Mr. Pekka Pyy is Senior Expert in the areas of Management, Organization & Supply Chain in the Department of Nuclear Energy, Division of Nuclear Power since 2015

Before joining the IAEA, Mr. Pyy has held several positions during his almost 40 years career, e.g, Senior Project manager with VTT Technology Research in Finland; Programme manager with the OECD Nuclear Energy Agency in France and Senior manager with TVO Olkiluoto, Finland.

Mr. Pyy Holds M.Sc degree in nuclear engineering and Dr.Tech. in reliability engineering & risk assessment from the LUT University, Finland.



Supply Chain Trends and Challenges - Overview

Operating organization view (“Customer”)

- **Availability** of suppliers (not only procurement but proactive SC risk management)
- LTO (use existing asset to generate as long as it is safe), **refurbishments**, **obsolescence**, and loss/change of suppliers along the way – are the suppliers capable for newbuild, or do I need new ones?
- What used to be globalization has recently turned into actions to **localize** to manage potential **supply chain disturbances** (pandemics, geopolitics, etc.)
- Consequently: supply chain is one of the most important stakeholders/supporting organization!

Technology vendor view:

- Often less **in-house capabilities** for lean structure and more outsourcing (design / construction / erection / manufacturing,...)
- How to have **quality suppliers** globally/locally, availability of **facilities** for module **prefabrication** (also applies to main contractor parties and operators) and avoid **counterfeiting/fraudulence**?
- **Differing** legislations, regulations and codes & standards across the **jurisdictions** (including the non-nuclear ones!)
- Newbuild: how to get **profitable** reactor production ongoing ...SMRs, other reactors?



Nuclear supplier view:

- Size of the **nuclear industry is relatively small** and niche equipment & services require highly **specialized skill & experience** (takes time to be able to be able make **profit**)
- Differing requirements across **jurisdictions** – which ones to serve profitably? Subcontracting ...
- How to keep **order books full** in all the foreseen market situations and **political winds** (even if the situation would now look better)?
- Consequence: **less original equipment manufacturers** where new nuclear is not being built (other industrial suppliers available, though)

Supply Chain Trends and Challenges - Overview

Regulatory view

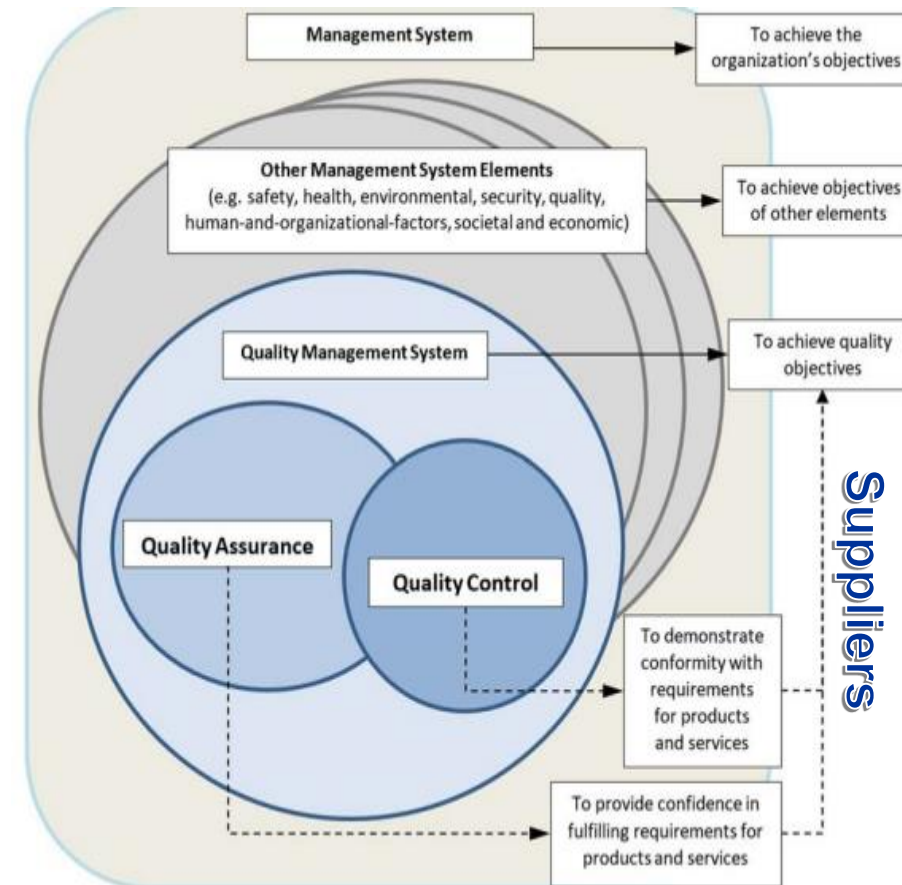
- Regulations **based on legislation** in each jurisdiction with relatively large differences in letter and application practice (reciprocal approvals special cases)
- Importance of **licensee responsibility** & liability – radiological safety
- **Conservative approach** – requirements to licensees for management, quality management and graded approach to risk(s)
- **Other than nuclear legislation** also needs to be complied with e.g. environmental (toxic chemicals, etc.), civil & fire protection codes, etc.

Societal view

- Energy generation is a **societal decision** sensitive the **political climate** and **acceptability** in each Member State
- **Large differences** between the Member States what it comes to if nuclear is **governmental or private** business
- Availability of original equipment manufacturers and service providers also varies as a function of the above
- Nuclear suppliers **contribute to the local and global economies**

International view

- **Mixed reality** ranging from MSs having large newbuild programmes to those shutting down nuclear
- LTO, building large units, promise of SMRs, ARs & fusion
- Many **International and non-governmental organizations** active in the field sometimes with rather similar themes



Other Trends and Challenges

New reactor generations & technology

- **SMRs, microreactors/transportable, Gen IV, fusion.....** may come with less radiological risks but **need demonstration** (and players wish to move fast to play a role for Net Zero)
- New materials & advanced manufacturing technologies (come through the supply chain with their properties “**one does not fit all**”)
- Increasing uses of modules, prefabrication (availability of factories and transport challenges – “where to check what to be effective & efficient?”)
- **Innovation** like digitalization & AI, e.g. robotics, digital twinning, digital I & C, product information systems, advanced manufacturing ... (through operators, vendors, suppliers – acceptability to regulators?)
- **Where are the real bottlenecks** (e.g. long lead item manufacturing capacity knowing that only a fraction is used now..? **Human resources** for special processes? Other?) – Only minority of suppliers are truly “nuclear”

Challenges with people & organizations

- New generation in old (LTO) or new companies (sometimes with SMRs, ARs, fusion, organizations in newcomer MSs, etc.)
- Oldtimers faced with new technologies / practices (digitalization, management systems/QA) and new people learning safe practices (in all forms) to work with nuclear

Supply of services on-site/off-site is important

- TSOs (complex engineering and safety analyses), testing & inspection, auditing etc. (**pandemics** showed importance of service supplier mobility)
- Management of myriad of contractors as “**informed customer**”



Memory Lane: Rationale behind the IAEA activities

- IAEA 64th General Conference GC(64)/RES/12 number 8 in section 5 “*Encourages the Secretariat to identify best practices and lessons learned with respect to procurement, supply chain, ...and to promote and disseminate them through publications and web-based tools with respect to supply chain management*”. (similar resolutions thereafter)
- TWG-NPP Operations TWG-NPPOPS ranked in 2018 *supply chain as the most important theme to focus upon (and in 2024 asked it to continue)*
- SAGNE* (2018/2023) and other Technical Working Groups has also seen the work highly important
- In 2019 TWG-NPPOPS made further recommendations to the Agency to accelerate use of industrial grade items more nuclear and to “make it easier for suppliers to supply and customers to buy”



Image: TVO



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International Atomic Energy Agency

Work done after receiving these recommendations to lead developments

IAEA SC Landing page



NUCLEUS CONNECT MSCQ



Bringing people together (in 2021-24)

1. IAEA Training Course on Nuclear Supply Chain Management and Procurement , virtual, 20-22 Oct 2021
2. Conference on [MSE2021](#) “Management systems for a sustainable nuclear supply chain”, 7-9 September 2021 (with Foratom)
3. Technical Meeting on Recent Topics of Nuclear Supply Chain Management (16-20 August 2021, VIC, Vienna)
4. Technical Meeting on Use of Commercial Grade Products and Services in Nuclear Power Plants, 19-22 April, Vienna
5. Technical Meeting on Codes and Standards, Design Engineering and Manufacturing of Components for SMR, 10-13 May 2022
6. IAEA Training Course on Nuclear Supply Chain Management and Procurement, Vienna, 18-22 July – Hybrid ([material](#))
7. SC [Webinars](#) on supply chain (2020-2022) – see the relevant page for updates
8. “Enhancing a sustainable nuclear supply chain”, 7-9 September 2022 (with Foratom) [Website](#)
9. Technical Meeting on the Harmonization and Use of Industrial Codes and Standards for Small Modular Reactors, 11-15 December 2023, VIC [Website](#)



10. Technical Meeting on Developing a Sustainable Nuclear Supply Chain for Near Deployment Reactors — 18th Edition of the NUCLEAREUROPE–IAEA Joint Event on Management, Dec 2024

Normally 100+ live participants – several hundreds of video views afterwards (publicly watchable – see QR)



Nuclear Supply Chain Introductory Webinars



- Covid-19 and Its Impact on the Nuclear Power Supply Chain (9 July)
- Nuclear Supply Chain Management – The Global View (3 December)
- Requirements to the Supplier – Why are they important and where do they come from? (16 December)
- How to Find Good Suppliers – and how to know if they are good for you (14 January)
- Supply Chain Management Strategy – How to simplify the complex? (28 January)
- Supervising the Supply Process – What do you need to do? (11 February)
- Non-Conformances – What are they and how to manage them? (25 February)
- Delivery Process Final Stages – What do you have to Remember? (18 March)

Nuclear Supply Chain Advanced Webinars

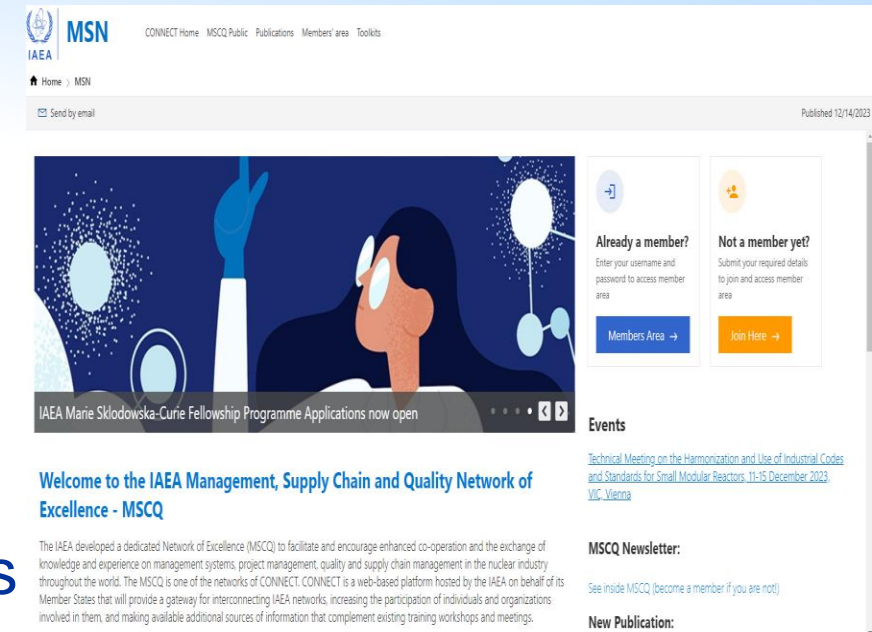


- Counterfeit, Fraudulent, and Suspect Items – What do you need to know? (6 May 2021)
- Use of Commercial Grade Items - When and how? (9 June in cooperation with NNF21)
- COVID-19 and the Nuclear Supply Chain – What have learned? (9 September 2021 in cooperation with FORATOM MSE2021)
- Remote and Hybrid Verifications, Audits and Inspections – What have we learned? (20 January 2022)
- Graded Approach – What are its secrets? (13 April 2022)
- Codes and standards in nuclear – potential for more common approaches? (7 December 2022)

Virtual supply chain management & quality toolbox



- [Landing page](#) for the nuclear supply chain and quality management – public access
- Nuclear supply chain [webinars](#) (2020-) – public access
- Nuclear supply chain management [toolkit](#) (2020)
- [Toolkit](#) for nuclear manufacturing oversight and standards for quality and management systems (see also NHSI)
- The nuclear contracting [Toolkit](#)



Material available for IAEA NUCLEUS
CONNECT MSCQ NETWORK MEMBERS!



MSCQ (earlier: MSN)

IAEA NUCLEUS CONNECT Network

[Link to join MSCQ](#)

MSN.Contact-Point@iaea.org

Regular Newsletter to MSCQ members



Management, Supply Chain and Quality Network of Excellence (MSCQ) Newsletter



August/September 2023

Relevant IAEA Resources & Important Links (may require registration to MSCQ)

[IAEA Connect](#)

[IAEA Management of the
nuclear supply chain](#)

[Nuclear Supply Chain Webinar
Series Videos](#)

[IAEA MSCQ Members Area
\(requires MSCQ registration\)](#)

[The Nuclear Supply Chain
Management Toolkit \(requires
MSCQ registration\)](#)

[The Nuclear Regulations and
Standards Toolkit \(requires
MSCQ registration\)](#)

MSCQ Registration & Quick Contacts

Join MSCQ Today!
*Registration link for joining the IAEA
MSCQ Network! Please reach out to us
(emails below) if you have any
questions (the old address still should
work).*

MSN.Contact-Point@iaea.org

News: MSN becomes MSCQ

Management, Supply Chain and Quality Network of Excellence (MSCQ)

Dear valued members,

This is the first MSCQ Newsletter, as we will be changing our network name from MSN (Management Systems Network) to MSCQ (Management, Supply Chain and Quality) network of excellence. This decision comes as part of our ongoing efforts to better reflect our evolving mission and to provide a name that is more streamlined with your needs and the network contents.

Rest assured, while the name is changing, our commitment to delivering the content, services, and support remains unwavering.

Please note that this change should not impact your account details, login credentials, or any of your existing interactions with our website. You may also see both acronyms MSCQ and MSN for some time as the modification happens gradually. Thank you for being a part of our community and for staying with us! Difficulties in pronouncing MSCQ? Just say “mask”.

New Online Course on Nuclear Supply Chain and Procurement Management!

Here is a [link](#) to enroll.

IAEA NENP is happy to announce that it has launched this self-directed course to provide training for specialists at, and newcomers to, nuclear facilities on nuclear supply chain oversight, including the related standards and management, procurement and engineering issues. The online course will also provide the Member States with information on good practices for the management of procurement and supply chain activities related to the construction, operation and maintenance of nuclear facilities.

The supply chain manager of Fermi Energia AS, Estonia, Ms Anu Koppel advises as follows: “The



TRAINING EVENTS & MISSIONS



One NSCM&P in-person training course planned in 2024 for advanced newcomers with TC funds (INIT), **14-18 October, Ulsan & Changwon, ROK (Nominations open until 10 June)**

Limited possibility also for tailored Missions

[Virtual training SC course](#) available on the IAEA learning management system



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IAEA Learning Management System
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Search



Home > My courses > Online Course on Nuclear Supply Chain and Procurement Management

Online Course on Nuclear Supply Chain and Procurement Management

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Announcements

Hidden from students

► Open all ▾ Close all

Instructions: Clicking on the section name will show / hide the section.

Nuclear Supply Chain - General Topics

P. Pyy - IAEA Guidance Related to Procurement and Management of the Supply Chain



Online Course on Nuclear Supply Chain and Procurement Management



Self-directed

Content offered

English

Duration: 12 hours

Enroll



How to enroll

CLP4NET course enrolment requires a valid NUCLEUS account. The NUCLEUS Web Single Sign-on system allows registered and authorized users to securely access a variety information resources with a single username and password.

To register a new NUCLEUS account, [click here](#).

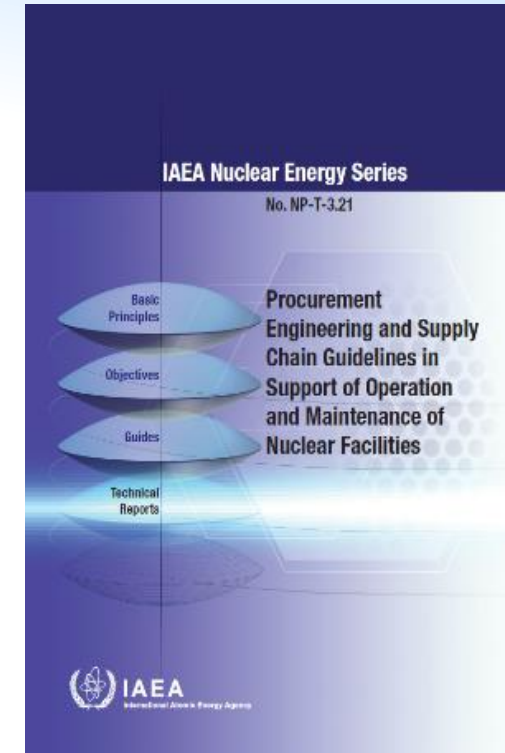
Please visit our [help pages](#) for information on how to register, sign-in or for other useful information.

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Publication Update – All freely downloadable (!)

IAEA has since 1979 issued publications and tools for quality of the supply chain and procurement

- **Procurement Engineering and Supply Chain Guidelines in Support of Operation and Maintenance of Nuclear Facilities, NP-T-3.21 - 2016**
- **Managing Counterfeit and Fraudulent Items in the Nuclear Industry, NP-T-3.26 - 2019**
- **Quality Assurance and Quality Control Activities in Nuclear Power Plants: Lesson Learned and Good Practices, TECDOC1910 – 2020**
- **Management of Nuclear Projects, NG-T-1.6 – 2020**
- **Challenges and Approaches for Selecting, Assessing, and Qualifying Commercial Industrial Digital Instrumentation and Control Equipment for Use in Nuclear Power Plant Applications, NR-T-3.31 – 2020**
- ***Suitability Assessment for Using Commercial Grade Products in Nuclear Power Plant Safety Systems – TECDOC 2034 - 2023***



SUPPLY CHAIN COOPERATION



INSIDE IAEA:

Inside NE: INIR missions (procurement and industrial involvement)

NS/NSNI – SALTO-missions, NHSI Regulatory Track, SMR Regulators Forum

CORR mission in the future

NPES Use of innovation to improve performance of operating NPPs

- NUCLEUS CONNECT ISOP network: Innovation & technology (e.g. AI, AM, digital twinning, robotics,....)

NPES Long-term operation

- NUCLEUS CONNECT LMNPP network (good practices, OPEX, risk-informed approaches to LTO, environmental impacts of NPP LM, equipment survivability & reliability)

EXTERNAL SUPPLY CHAIN COOPERATION – THE IAEA AIM IS TO MAKE AN IMPACT

WNA (CORDEL, WGTRANSPORT and WGSC/LTO) – partner in NHSI Codes & Standards work with its industrial members

OECD NEA (WGSUP) – regulators and TSOs sharing experience on SC challenges

NUCLEAREUROPE – Tradition of joint supply chain events with IAEA (**December 2024**) and WGSCO (SC optimization)

EU (JRC) – SC related projects (like NUCOBAM), events and contributions to publications

EPRI (Procurement engineering, SC management, Innovation, etc)

NEI, INL, USNRC Codes & Standards forums

GIF AMME, Industry Forum

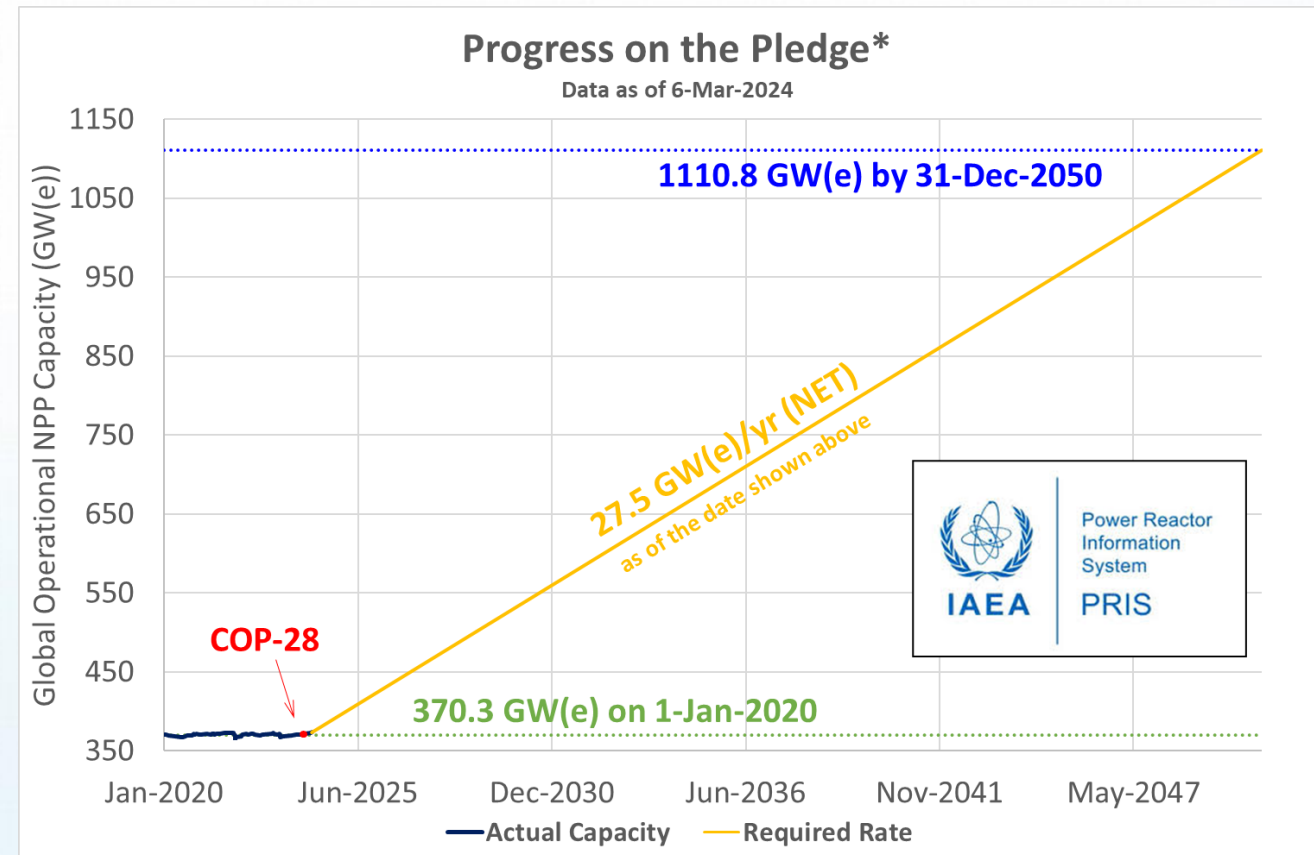
Fusion Industry Association, ITER/ F4E

Many other organizations to inform the IAEA SC related activities

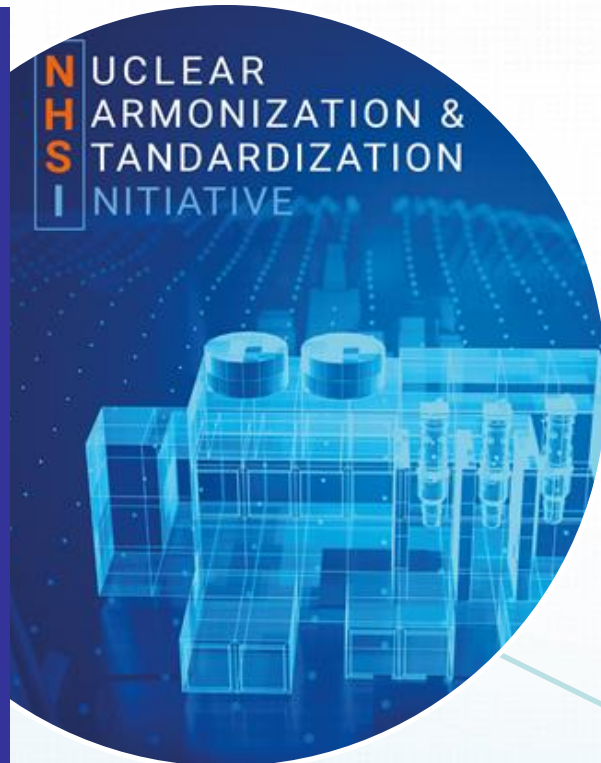


We need to bring tangible added value to the interested parties and aim **rethinking** nuclear so that it would play a role for **#NetZero**

NSHI #makenuclearsimpler



Effective Global Deployment of
Safe and Secure Advanced
Nuclear Reactors



NUCLEAR
HARMONIZATION &
STANDARDIZATION
INIATIVE

Harmonization
of **R**egulatory
Approaches
Track

- **WG1: Framework for information sharing**
- **WG2: Towards harmonization - multinational pre-licensing review process**
- **WG3: To leverage regulatory reviews in licensing**

IAEA as facilitator
within and between the tracks

- **Topic 1: Harmonization of high-level user requirements**
- **Topic 2: Common Approaches on Codes and Standards**
- **Topic 3: Experimental Testing and Validation for Design and Safety Analysis Computer Codes**
- **Topic 4: Accelerating the implementation of nuclear infrastructure for SMRs**

Harmonization
and
Standardization
of **I**ndustrial
Approaches
Track

Regulators

Governments

Technology
Holders

Operators and
other end-users

International
Organizations
and Associations



Topic 2 - Common Approaches on Codes and Standards



Mission & Vision with approaches on C&S:

- **Identify** similarities and differences
- **Understand** why they exist
- **Share** information on the findings
- **Develop** common approaches
- **Harmonize** where possible



Now 28 companies from 15 Member States so far with **WNA** as a strategic partner



For “**Nuclear Power without Borders**” to
“**Make Nuclear Simpler**”

#makenuclearsimpler

On suitable topics, outreach materials (**white papers, articles, publications, etc.**) may be prepared

A **platform for information** sharing
NHSI Topic Group 2
Scope

WNA as strategic partner

I. Codes & Standards

II. Oversight & Acceptance

- A. QUALITY AND MANAGEMENT SYSTEM STANDARDS USED WIDELY IN THE MEMBER STATES (APPLICABLE TO SMRS)**
- B. ENGINEERING STANDARDS FOR THE DESIGN AND CONSTRUCTION OF SMRS (WNA TO LEAD)**
- C. EQUIPMENT QUALIFICATION STANDARDS FOR NUCLEAR (SMRS) FACILITIES**
- D. C&S USED IN VARIOUS SMRS (AND THEIR PROJECTS)**
- E. C&S FOR ADVANCE MANUFACTURING (AM) TO BE USED FOR SMRS (AND THEIR PROJECTS)**

- A. A USE OF STANDARD, PROVEN SERIALLY MANUFACTURED INDUSTRIAL/COMMERCIAL-GRADE ITEMS**
- B. NON-NUCLEAR CODES, STANDARDS, LAW AND REGULATIONS RELEVANT TO SMR DEPLOYMENT**
- C. OVERSIGHT ACTIVITIES REQUIRED BY CODES, STANDARDS, LAW AND REGULATIONS**

High Integrity Component LLI topic as a part of II.C

First NHSI TG2 deliverables published !

“I am pleased to report that, since we started work a year ago, progress has been made on the two tracks of this key initiative, including the recent publishing of a [working] paper outlining why serially manufactured industrial products are crucial for the reliable deployment of SMRs,” **DG Grossi** said in his opening remarks to the General Conference in Vienna, Austria.

On the industrial side, a group of key players in the nuclear sector reached a general agreement on moving forward with SMR manufacturing. Their **working paper** proposes using serially manufactured or “off the shelf”, commercially available parts rather than bespoke designs to speed up procurement, reduce production delays and costs and ensure reliable supply chains compliant with safety requirements. “The steps outlined in the paper can facilitate the timely deployment of safe and secure SMRs to address the climate crisis and the security of energy supply,” said **Aline des Cloizeaux, Director of the IAEA Division of Nuclear Power**.

Related IAEA TECDOC 2034:

Suitability Evaluation of Commercial-Grade Products for Use in Nuclear Power Plant Safety Systems

IAEA Showcases Progress in Nuclear Harmonization and Standardization Initiative to Facilitate Deployment of SMRs

Lucy Ashton, IAEA Department of Nuclear Energy

SEP
28
2023



IAEA Director General Rafael Mariano Grossi (second from right) spoke at a side event on the IAEA Nuclear Harmonization and Standardization Initiative (NHSI), held on the margins of the 67th IAEA General Conference in Vienna, Austria, on 27 September 2023.

Related stories

 IAEA Initiative Advances Efforts to Support the Safe, Secure Deployment of SMRs

 IAEA Initiative Sets Ambitious Goals to Support the Safe and Secure Deployment of SMRs

 Robust Safety Demonstration and International Harmonization - Key to Strengthening the Safety of Reactors Designs, TIC Concludes

 Accelerating SMR Deployment: New IAEA Initiative on Regulatory and Industrial Harmonization

Deliverable Example: Suitability Assessment for Using Commercial Grade Products in Nuclear Power Plant Safety Systems – TECDOC 2034



Deliverable example: Opinion paper “Why serially manufactured industrial products are crucial for reliable deployment of small modular reactors”



I. Codes & Standards

- I.A. [QUALITY AND MANAGEMENT SYSTEM STANDARDS USED WIDELY IN THE MEMBER STATES](#)
- I.B. [ENGINEERING STANDARDS FOR THE DESIGN AND CONSTRUCTION OF SMRs](#)
- I.C. [EQUIPMENT QUALIFICATION STANDARDS FOR NUCLEAR \(SMR\) FACILITIES](#)
- I.D. [SHARED C&S USED IN VARIOUS SMRs \(AND THEIR PROJECTS\)](#)
- I.F. [C&S FOR ADVANCED MANUFACTURING \(AM\) TO BE USED FOR SMRs \(AND THEIR PROJECTS\)](#)

II. Oversight & Acceptance

- II.A. [USE OF STANDARD, PROVEN SERIALLY MANUFACTURED INDUSTRIAL/COMMERCIAL-GRADE ITEMS](#)
- II.B. [NON-NUCLEAR CODES, STANDARDS, LAW AND REGULATIONS RELEVANT TO SMR DEPLOYMENT](#)
- II.C. [OVERSIGHT ACTIVITIES REQUIRED BY CODES, STANDARDS AND REGULATIONS](#)

Materials



Technical Meeting 12-15
December 2023



Consultancy Meeting 14-15
September 2023



Consultancy Meeting 10-11
July 2023



Consultancy Meeting 12-14
April 2023



1 December 2022



Consultancy Meeting 27-28
February 2023

Full access to resources requires IAEA NUCLEUS CONNECT [MSCQ](#) and NHSI TG2 membership

Deliverables for members of MSCQ only shared [here](#)



First IAEA International Conference on Small Modular Reactors and their Applications

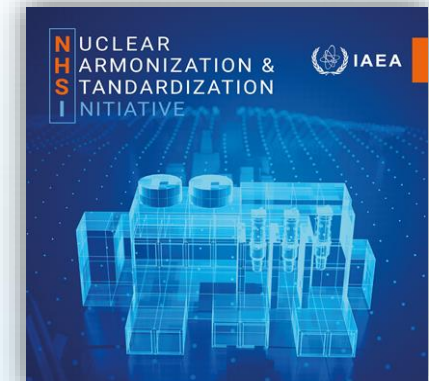
Save the dates: 21-25 Oct 2024

NHSI Plenary on the first day of the
Conference

NHSI II Planning Ongoing

Visit our [Portal](#) for up-to-date information on
IAEA SMR related events and [its NHSI pages](#)

<https://smr.iaea.org>





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International Atomic Energy Agency



Thank you!

Questions?

MSCQ.Contact-Point@iaea.org

Links not working? Become a NUCLEUS CONNECT MSCQ member:

[Pages - MSCQ Registration \(iaea.org\)](#)

IAEA NENP is grateful for the contribution of US DOE PUI funding making many of these deliverables possible