

30 May - 3 June 2022
Lyon, France

NEA Seeking Excellence in Nuclear Education, Training, Knowledge Management and Supporting Research Infrastructure

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10th European Commission Conference on EURATOM Research and Training in Safety of Reactor Systems
30 May - 3 June 2022 | Lyon, France

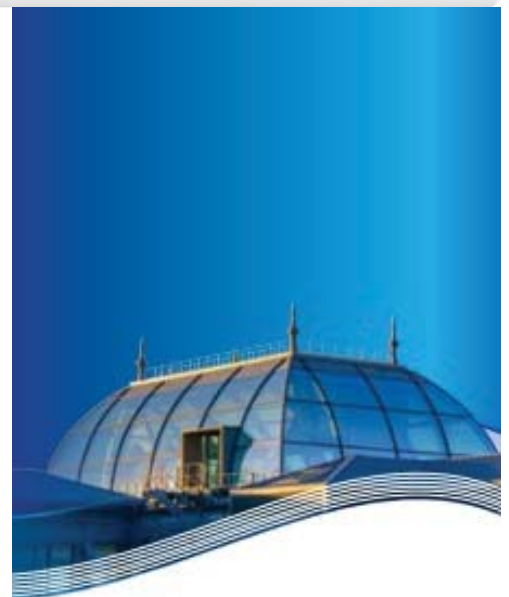


Nuclear Energy Agency



Outline

- Knowledge Management, Education and Training
 - International Mentoring Workshops
 - Global Forum on Nuclear Education, Science, Technology and Policy
 - Nuclear Education, Skills and Technology (NEST) Framework
- Framework for Irradiation Experiments (FIDES)



The NEA: 34 Countries Seeking Excellence in Nuclear Safety, Technology, and Policy

- 34 member countries and strategic partners
- The NEA is a framework for technical and policy cooperation in nuclear safety, stakeholder engagement, science, current and new and technology, economics, nuclear law, nuclear codes and data, waste management, decommissioning, legacy management, and radiation protection
- 8 standing committees and over 80 working parties and expert groups
- International joint projects



NEA countries operate about 85% of the world's installed nuclear capacity

NEA Countries' Shared Vision

Building up talented individuals is a long term investment, for every country, requiring strategic vision and involvement

Need for **international co-operation** in the area of **Knowledge Management (KM), Education and Training**

- to guarantee the worldwide sustainability and availability of necessary skills in the nuclear area

- to preserve, transfer, share and create knowledge for the next generation and address both Explicit and Tacit knowledge



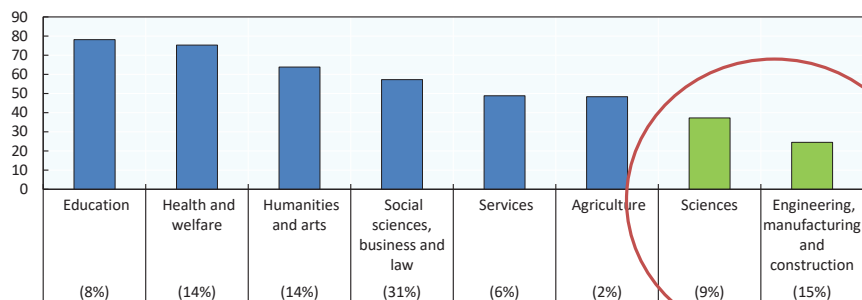
NEA International Mentoring Workshops

Purpose of the NEA International Mentoring Workshops

- Women remain **underrepresented in leadership positions** in science, technology, engineering and mathematics (STEM) fields.
- We believe that an event providing **mentoring** experiences for young female students with successful role models can help address these issues.

Women are underrepresented among new entrants in STEM fields in higher education

Proportion (%) of new entrants into tertiary education that are female, by field of education, OECD average, 2014



NEA International Mentoring Workshops Objectives

- **Encourage young students** to pursue Science, Technology, Engineering, Mathematics (STEM) studies and careers by providing them the opportunity to meet and converse with highly accomplished professionals in the STEM field from the host country and from around the world.
- The Mentors show the students what they can achieve, using their own experiences as examples. They provide presentations based on their personal histories, explain what motivates them as scientists and engineers, and answer questions about technical studies, careers, and life.



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NEA International Mentoring Workshops – A Brief History



- **13 mentoring workshops and events held since 2017 (in-person, hybrid and virtual)** in Japan, Kenya, Russia, Spain and Romania with distinguished female STEM professionals and adolescent girls
- A number of mentoring workshops are being planned for 2022 and 2023, including in new NEA member/strategic partner countries



- ✓ Chiba, Japan (July 2017)
- ✓ Tokyo, Japan (August 2018)
- ✓ Ávila, Spain (September 2018)
- ✓ Fukushima, Japan (August 2019)
- ✓ Vigo, Spain (September 2019)
- ✓ Moscow, Russia (October 2019)
- ✓ Joshikai, Japan (December 2020 *virtual*)
- ✓ Mombasa, Kenya (July 2021, *hybrid*)
- ✓ Granada, Spain (October 2021)
- ✓ Joshikai, Japan (October 2021, *virtual*)
- ✓ St. Petersburg, Russia (October 2021, *hybrid*)
- ✓ Romania (November 2021, *virtual*)
- ✓ NEA-WiN session, Tokyo, Japan (May 2022, *hybrid*)

[NEA mentoring workshops – YouTube](https://www.youtube.com/watch?v=V-4MKmV1tS4)
<https://www.youtube.com/watch?v=V-4MKmV1tS4>

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NEA Global Forum on Nuclear Education, Science, Technology and Policy

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NEA Global Forum Objectives

Entered into force on 28 January 2021

- **Engages with academic institutions** which are responsible for developing the next generation of nuclear science and technology experts
- Brings long-term, creative thinking to **address international policy challenges** that nuclear energy faces today as input to NEA processes
- Provides academic institutions around the world with a **framework for interaction, co-operation, and collective action**
- **Holds occasional symposia to highlight the Forum's work** and serve as a venue for academic experts, as well as other stakeholders, to identify emerging issues and creative solutions related to the strategic areas identified



1st Exploratory Meeting, Paris, 24-25 July 2019



2nd Exploratory Meeting, Paris, 23-24 January 2020

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NEA Global Forum: Areas of Work

Chair of the Council of Advisors: R. Lester (MIT, USA)

Council of Advisors
(35 members from 20 academic institutions)
Governs the Global Forum and defines its programme of work

www.oecd-nea.org/globalforum

Working Group 1 Gender balance in nuclear technology and academic workforces	Working Group 2 Future of Nuclear Engineering Education	Working Group 3 Relationship between nuclear energy and society	Working Group 4 Innovations in the nuclear sector
<ul style="list-style-type: none"> • Promotion of nuclear engineering and technology programs to women and non-binary individuals • Inclusion and leadership of women and non-binary in these fields • Encouraging men as vocal allies 	<ul style="list-style-type: none"> • Tools and Digital Technologies for Nuclear Education teaching and outreach • Multidisciplinary approaches in Nuclear Education • Open Science: Educational Benchmark Activities 	<ul style="list-style-type: none"> • Research benefits of nuclear, establishing affective associations • Research values of nuclear community • Research future nuclear scenarios and share with wider sectors of society and policy in accessible format 	<ul style="list-style-type: none"> • Large reactors; modular, small and micro reactors; • Production of alternative energy vectors • Integration of nuclear with renewables, storage and flexible grid systems

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3rd Global Nuclear Science and Engineering Commencement Theme: Nuclear Technology in Service to Society

Join remotely! 29 June 2022, 14:30- 16:00 CEST

- Keynote Speech: Bill Gates, Chairman of the Board, TerraPower
- The event will feature a panel discussion with students and young professionals

Student competition

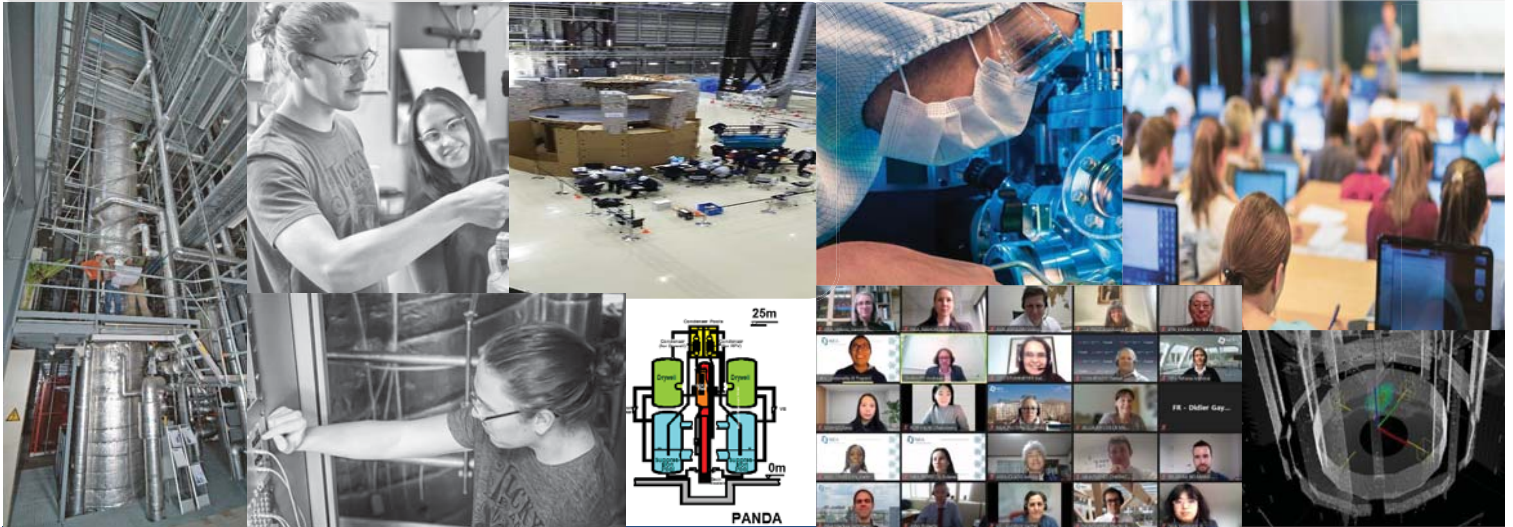
- Students are invited to send a 3-minute submission in any form on the theme *Nuclear and Society: What does this relationship mean to you?*
- Deadline: 22 May 2022
- Prize: Attend the major international nuclear conference with all expenses paid
- An international jury will select a winning entry to be shown at the commencement



<https://oe.cd/4r2>

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NEA Nuclear Education, Skills and Technology (NEST) Framework

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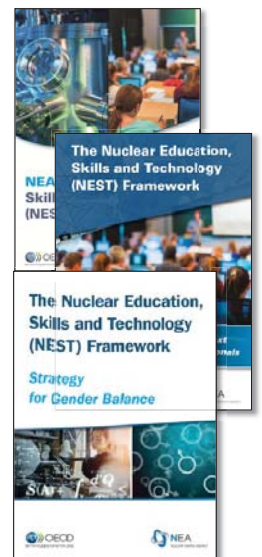
Nuclear Education, Skills and Technology (NEST) Framework

Launched in February 2019

A multinational framework designed to develop skills and nurture the next generation of nuclear subject matter experts through transfer of practical experience and knowledge

Added-values and benefits

- Fast track to leadership
- Multidisciplinary skills and competencies through hands-on training
- Access to state-of-the-art facilities
- Opportunity to develop a network through multinational co-operation
- Participation in challenging and innovative activities



www.oecd-nea.org/NEST

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NEST: Status of Work

Chair of the NEST Management Board: A. Pautz (PSI, Switzerland)

-  10 Countries
-  8 Projects:
6 ongoing
2 under preparation
-  50+ Participating organisations
-  200+ Fellowships
-  2 Hackathons
3 Workshops
-  5 Management Board meetings

- The MB approved the adhesion of Romania (11th NEST Country) to the NEST Framework.
- Signature of the Framework Agreement is underway- *welcome to Romania!*
- All NEST Projects have finalised their Project Agreements
- NEST Projects have been extended to compensate for COVID halt of activities
- NEST Fellowships have restarted in 2021-2022
- Discussion is ongoing on involvement of industry in NEST Projects
- Discussion is ongoing on enlargement of NEST Framework beyond the NEA membership

NEST Framework has been included in the European Commission ENEN2plus project- additional mobility funding for Fellows (under conditions)
GA to be signed by 7 June 2022

Ongoing NEST Projects

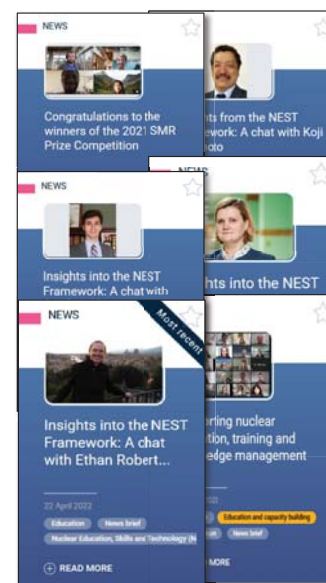
- **Hydrogen containment experiments for reactor safety (HYMERES)**
- **Small modular reactors (SMRs)**
- **Advanced remote technology and robotics for decommissioning (ARTERD)**
- **Radioactive waste management of i-graphite**
- **Medical applications, nuclear technologies, radioprotection and safety (MANTRAS)**
- **Building competence, expert knowledge, applied techniques, safe decommissioning, train fellows (BEAST)**

NEST Fellows: Master and PhD students, postdocs, and young professionals

200+ Fellows in 2019-2022
50+ participating organisations

NEST Mentors: experts in hosting organisations

Fellowship duration: 1-6 or 6-12 months



Benefits for NEST Members



For Nuclear Professionals

- Experience gained in relevant work jointly with experienced scientists, engineers and university professors
- A network of international contacts
- Opportunities for getting employment and/or better position



For Universities

- Education excellence connected to the state-of-the art in research organisations and industries bridging the gaps between the “know-why” and “know-how”;
- Education strategy consistent with energy and R&D policies

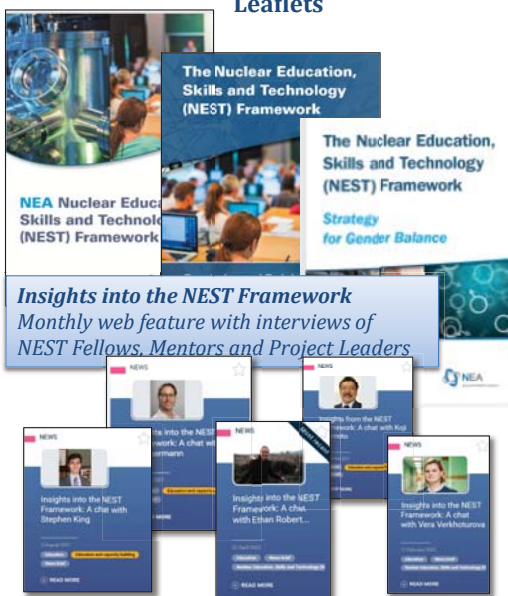


For Member States

- Advanced students, post-doctoral appointees, young professionals equipped with critical skills and knowledge
- Co-operation with other partners in NEA multinational projects
- Direct links with national policymakers for better energy policies and R&D priorities

NEST Outreach and Publications

Leaflets



Infographics



Articles



www.oecd-nea.org/NEST



NEA Framework for Irradiation Experiments (FIDES)

Why FIDES?

FIDES has been designed to address the post-Halden situation and

- Consolidate the needs of regulators, TSOs, industry and research institutions;
- Build a collective awareness of the needs and capabilities;
- Bring together a network of key research reactors in NEA member countries;
- Perform high-priority experiments on a cost-sharing basis to verify the safety and performance of fuels and materials;
- Support the sustainability of key research facilities;
- Safeguard the experimental knowledge for future generations;
- Address practical issues, including nuclear fuel transport and waste management;
- Enable bilateral arrangements between trusted partners within FIDES.



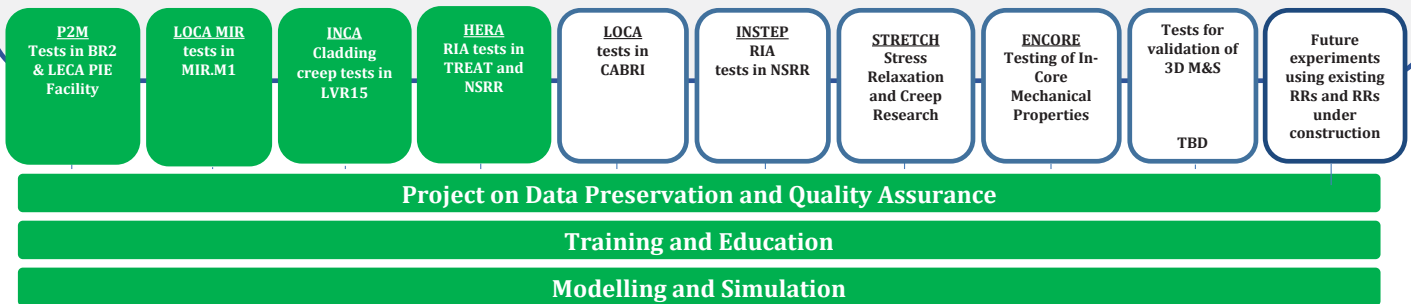
FIDES Structure

- NEA joint undertaking, established pursuant to Article 5 of the NEA Statute
- A stable, sustainable, reliable post-Halden platform for fuel and materials testing using nuclear research reactors and related facilities in NEA countries
 - Generates experimental results and expertise for shared costs
 - Enhances modelling and simulation, instrumentation, training and education

- Parties: 27 organisations from 12 countries and the EC
- Budget: ~ 23 M€/3 years
- Launched in March 2021
- Experiments are ongoing in 6 countries

PoW 2021-2024: 4 JEEPs and Project on Data Preservation and Quality Assurance

Joint Experimental Programmes (JEEPs)



FIDES Programme of Work, 2021 – 2024 (1/2)

- **JEEP P2M:** Programme for quantifying thermomechanical clad load mechanisms during LWR slow transient, or **Power to Melt** and **Manoeuvrability**, BR2 reactor and hot cells, SCK.CEN, Belgium and LECA/STAR facility, CEA, France
JEEP P2M Core Group: SCK.CEN (Belgium), CEA and EDF (France)



- **JEEP INCA:** In-pile Creep Studies of ATF Claddings, LVR-15 reactor and hot cells, ÚJV Řež, Czech Republic
JEEP INCA Core Group: CVŘ, ÚJV Řež, and Alvel (Czech Republic), VTT (Finland), and CEA (France)

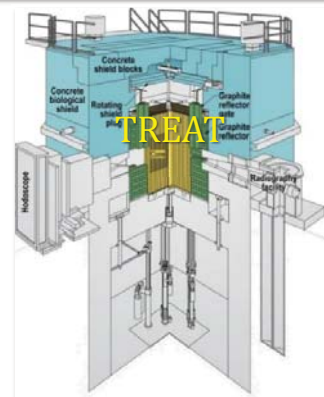


FIDES Programme of Work, 2021 – 2024 (2/2)

- **JEEP LOCA MIR:** LOCA experiments with Gd-doped fuel, MIR.M1 reactor and hot cells, RIAR, Russia
JEEP LOCA MIR Core Group: RIAR and TVEL (Russia)



- **JEEP HERA:** High burnup Experiments in Reactivity Initiated Accident, TREAT reactor and hot cells, INL, USA and NSRR, Japan
JEEP HERA Core Group: DOE, NRC, Westinghouse (USA), JAEA (Japan), IRSN (France)



FIDES: Recent Accomplishments

- **Framework**
 - FIDES meetings: 26-29 April 2022
 - Groups are being created to address practical aspects of irradiation experiments
 - Members are confidently planning for future phases
- **Experiments**
 - LOCA-MIR experiments completed
 - INCA experiments loaded into LVR-15 reactor April 27, irradiation began May 2
 - 10-year strategic plan under development to guide future of FIDES
- **Modeling and simulation (M&S)**
 - A “feedback loop” between modelling and experiments is being created with M&S exercises
- **Training and education**
 - Internships at FIDES facilities
 - Universities involved in modeling and simulation
 - Platform for developing expertise in irradiation testing hardware and experimental design



FIDES Governing Board endorsed the co-operation with European Commission's eurOpean platForm For accEssing nuclear R&d facilities (OFFERR) project

Looking Ahead

- NEA multi-national activities foster nuclear technologies and innovation by
 - Contributing to maintain expertise and competences, enhance human resources development and capacity building networks, and equip the next generation with technical and non-technical skill
 - Enhancing experimental work and supporting experimental infrastructure
- The NEA looks forward to enhancing the co-operation with the European Commission Euratom Research and Training Programme (EURATOM) through the participation in:
 - Building European Competence through Continuous Advanced and Structured Education and Training (ENEN2plus) project, which will co-operate with NEST
 - The European Platform for Accessing Nuclear R&D Facilities (OFFERR), which will co-operate with FIDES

