Tsuruga International Symposium 2026

Nuclear Energy and Human Resource Development

Future of Nuclear Energy and Young Generation

Pedro Dieguez Porras

Section Head (Nuclear Knowledge Management)

Department of Nuclear Energy

International Atomic Energy Agency



Pedro Dieguez Porras

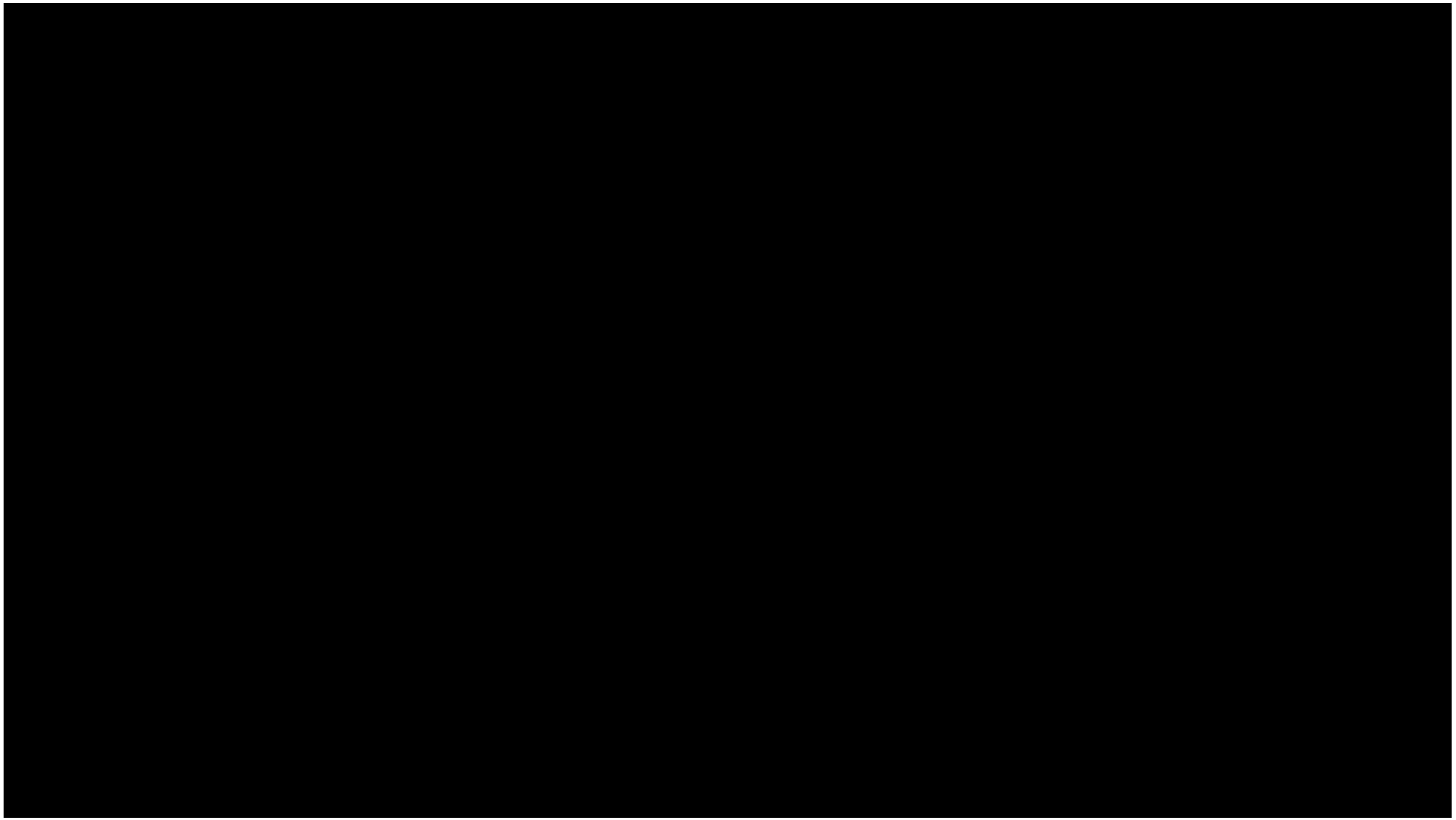
Head of the Nuclear Knowledge Management Section,
Division of Planning, Information and Knowledge Management
Department of Nuclear Energy



- Provides support to MSs on Nuclear Knowledge Management, Human Resource Development and Nuclear Education and Training.
- Technical Lead on Management and Capacity Building in the Nuclear Power Engineering Section, 2020-2023.
- Executive Director at the European Nuclear Education Network, international nonprofit organization, in Brussels, 2014-2019.
- Senior Manager and PWR Instructor at Tecnatom, Spanish nuclear engineering services company, in Madrid, 2009-2013.
- Previous professional career in engineering services and construction industry in Spain.

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This is the IAEA (Video)



Atoms for Peace and Development

“The Agency is a formidable institution that deals with issues of war and peace, of human health, of energy, food and water – fundamental concerns of all human beings.”

Rafael Mariano Grossi,
Director General, IAEA



Historical Milestones



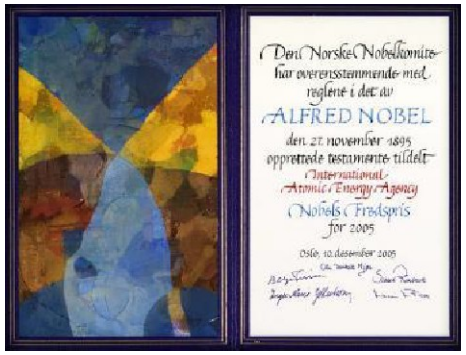
1930s
Discovery of fission



1957
IAEA Statute



1970
Non-Proliferation Treaty



2005
Nobel Peace Prize



2015
ReNuAL



2020s
CoP – Climate Change

As **an autonomous international organization** within the United Nations system, IAEA is the global centre for cooperation in the nuclear field.

IAEA at a Glance





- HQ in Vienna
- **Laboratories** in Seibersdorf, Monaco and Vienna
- **Regional offices** in Toronto and Tokyo
- **Liaison offices** in New York and Geneva

Policy-Making Organs



General Conference



Board of Governors

WHO

All **181** Member States

WHEN

Once per year (Usually in September)

WHAT

- Considers and approves the IAEA's programme and budget.
- Decides on other issues raised by the Board of Governors, the Director General and Member States.

35 Board Member States (varies by term)

5 times per year (March, June, September x2, November)

- Examines IAEA's financial statements, programme and budget.
- Approves safeguards agreements and publication of the IAEA's safety standards.
- Appoints the Director General, with the approval of the General Conference.

Main Areas of Work



Nuclear Science and Technology

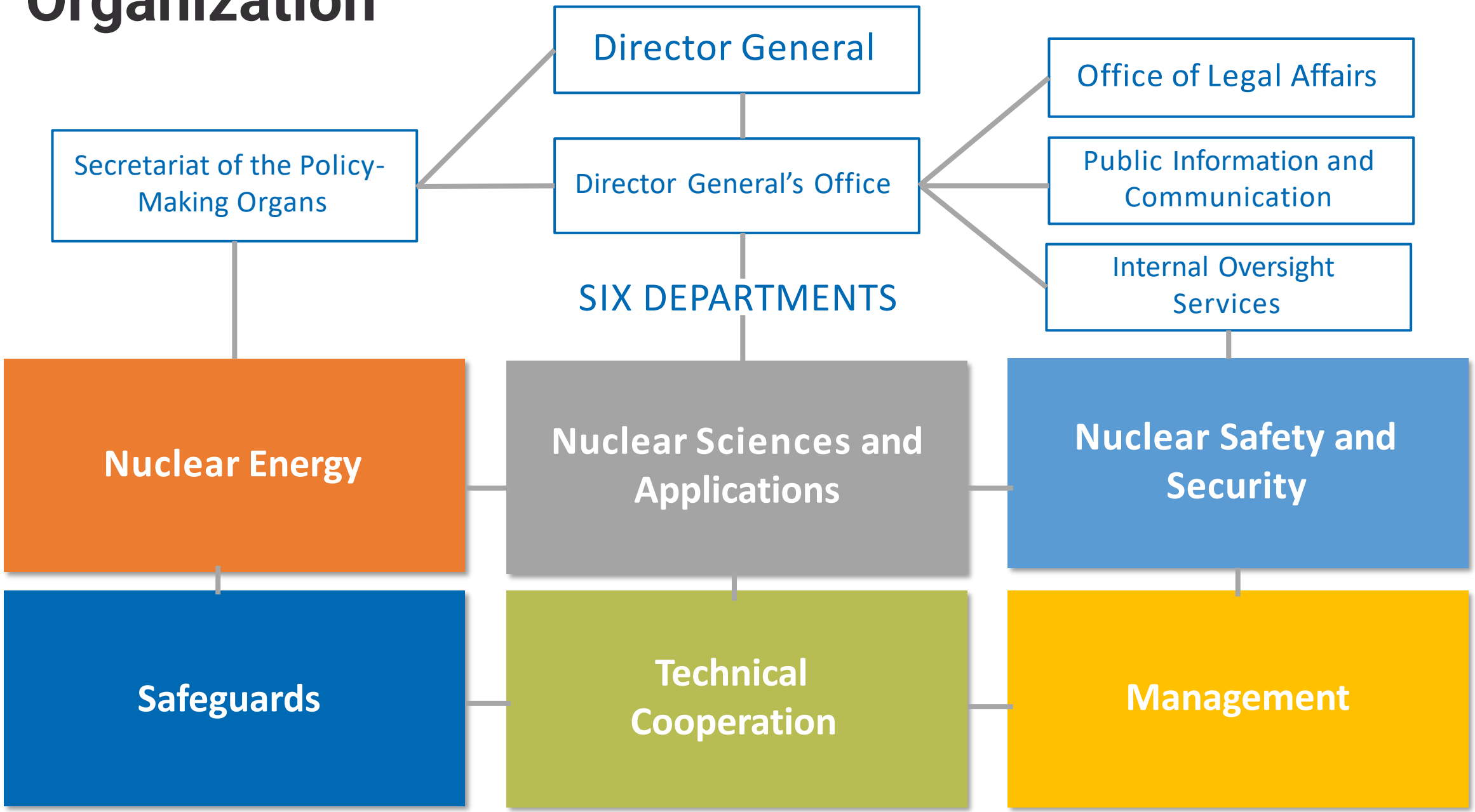


Nuclear Safety and Security



Nuclear Verification

Organization



Nuclear Power – Sustainable Energy

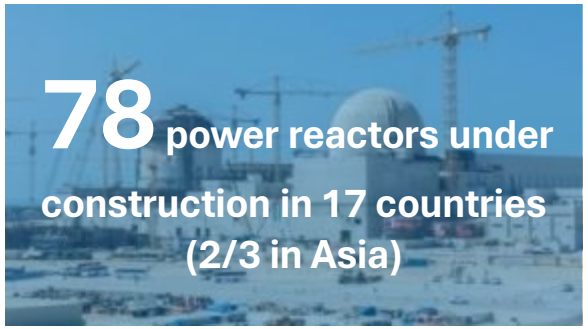
IAEA Power Reactor Information System (PRIS) - Link

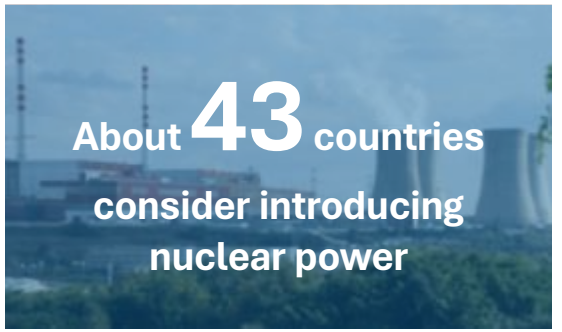


Nuclear power reactors today provide ~10% of global electricity.

More than **ONE QUARTER** of the world's **LOW CARBON** electricity.







Global Nuclear Momentum

- Nuclear in COP 28 **Global Stocktake**, UN Common Messages for COP 29&COP30.
- Tripling nuclear energy capacity by 2050 pledged by more than **38** countries.
- 1st **Nuclear Energy Summit** in 2024 and 2nd **Nuclear Energy Summit** in 2026.









28. *Further recognizes* the need for deep, rapid and sustained reductions in greenhouse gas emissions in line with 1.5 °C pathways and *calls on* Parties to contribute to the following global efforts, in a nationally determined manner, taking into account the Paris Agreement and their different national circumstances, pathways and approaches:

(a) Tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030;

(b) Accelerating efforts towards the phase-down of unabated coal power;

(c) Accelerating efforts globally towards net zero emission energy systems, utilizing zero- and low-carbon fuels well before or by around mid-century;

(d) Transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science;

(e) Accelerating zero- and low-emission technologies, including, inter alia, renewables, nuclear, abatement and removal technologies such as carbon capture and utilization and storage, particularly in hard-to-abate sectors, and low-carbon hydrogen production;

(f) Accelerating and substantially reducing non-carbon-dioxide emissions globally, including in particular methane emissions by 2030;

(g) Accelerating the reduction of emissions from road transport on a range of pathways, including through development of infrastructure and rapid deployment of zero- and low-emission vehicles;

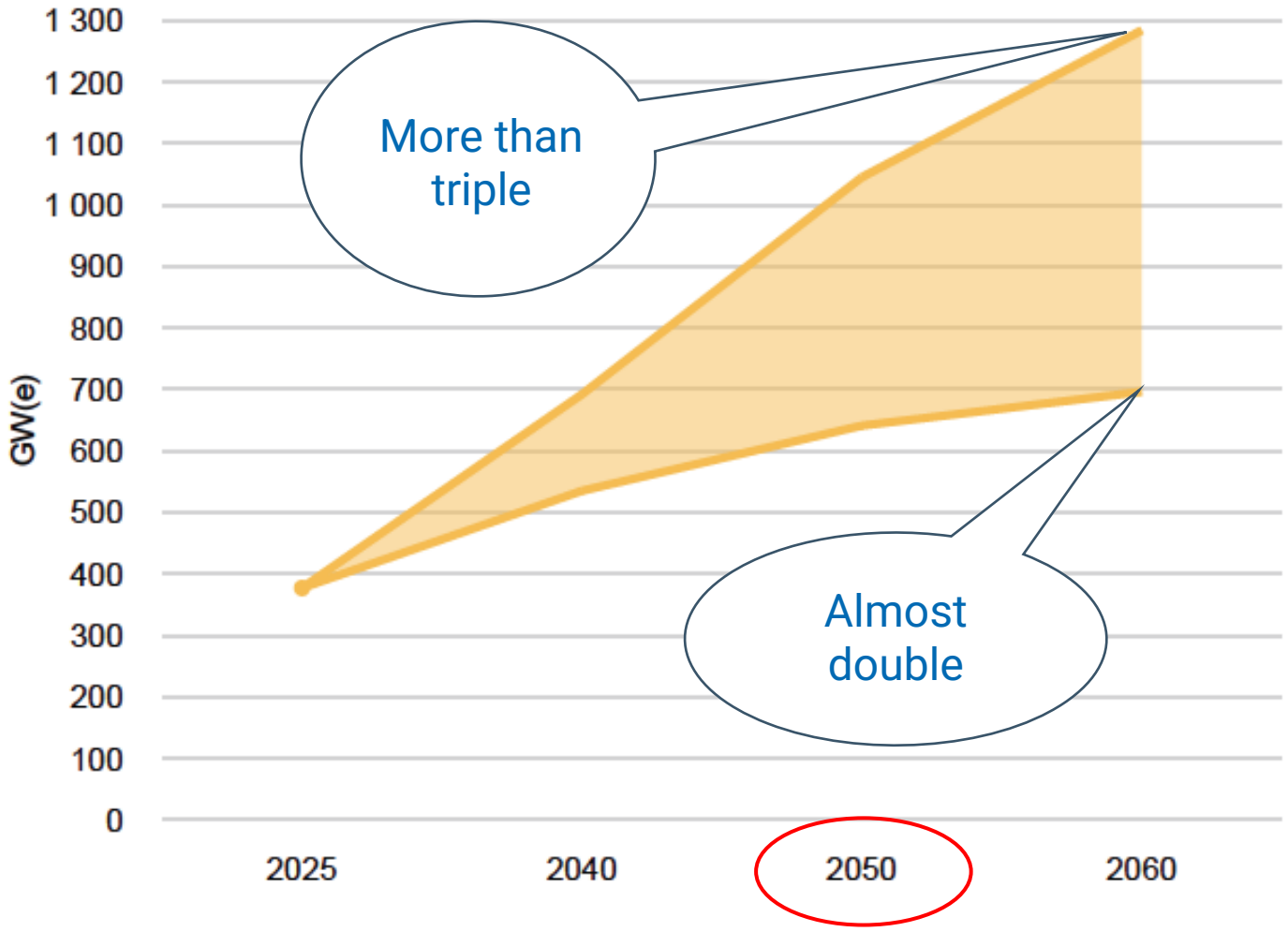
(h) Phasing out inefficient fossil fuel subsidies that do not address energy poverty or just transitions, as soon as possible;

World nuclear electrical generating capacity

2025
377 GW(e)

Low case 2060
696 GW(e)

High case 2060
1284 GW(e)

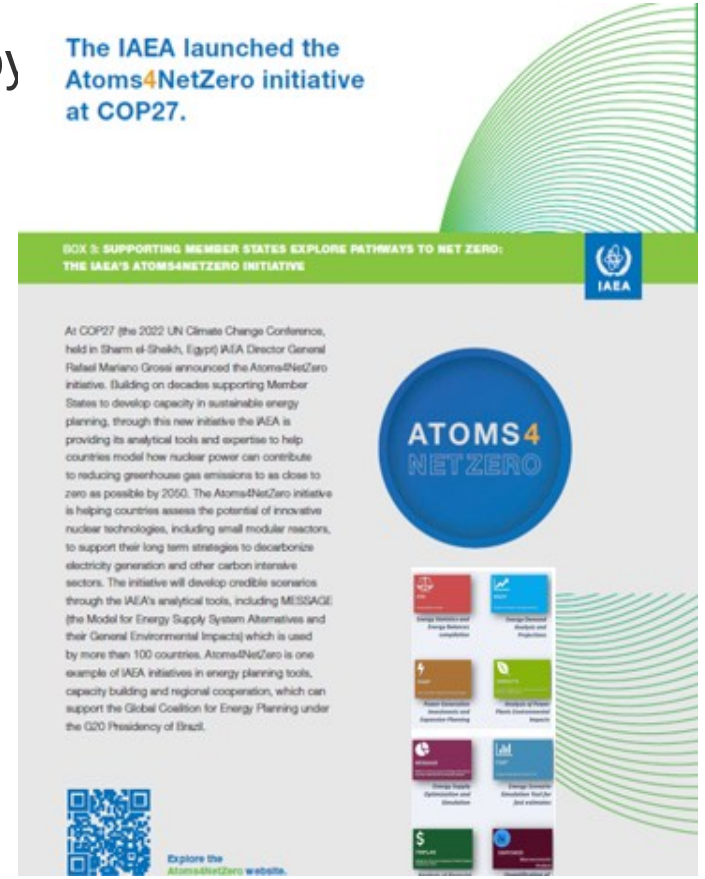


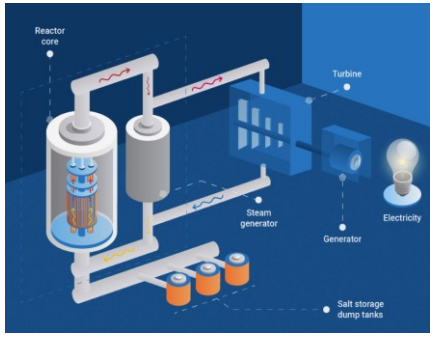
Turn Pledge into Power

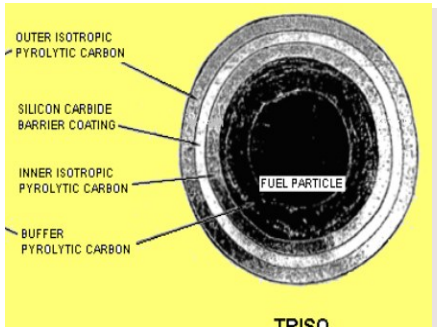
To release full potential of nuclear energy and achieve tripling objectives by 2050, concrete actions need to be taken:

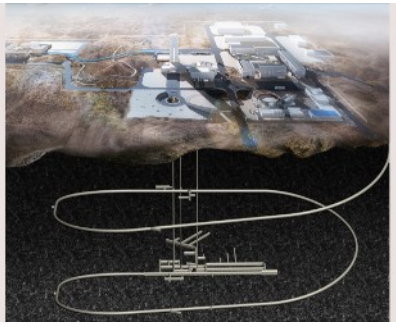
- Science-based long term energy policy and strategy.
- Innovation for nuclear energy technologies and regulatory framework.
- Stakeholder engagement.
- A level playing field for sustainable nuclear financing.
- Sustainable high-quality nuclear workforce
- International cooperation.

The IAEA has been collaborating with Member States and international partners to address the challenges and facilitate the development and deployment of nuclear energy through various initiatives and actions.



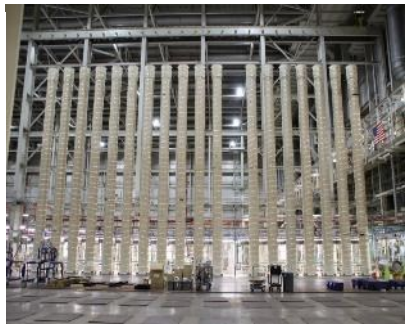












Energy planning

Over 135 countries and 20 international organizations have requested to use IAEA analytical tools for sustainable energy planning.



Energy Statistics and Energy Balances compilation



Energy Demand Analysis and Projections



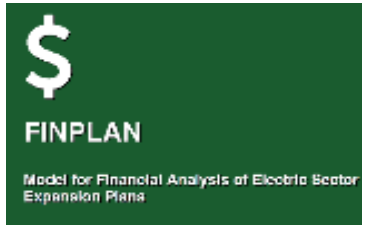
Energy Supply Optimization and Simulation



Power Generation Investments and Expansion Planning



Energy Scenario Simulation Tool for fast estimates



Analysis of financial viability of power generation projects



Analysis of Power Plants Environmental Impacts

Advanced Reactors



Support for NPP Operators



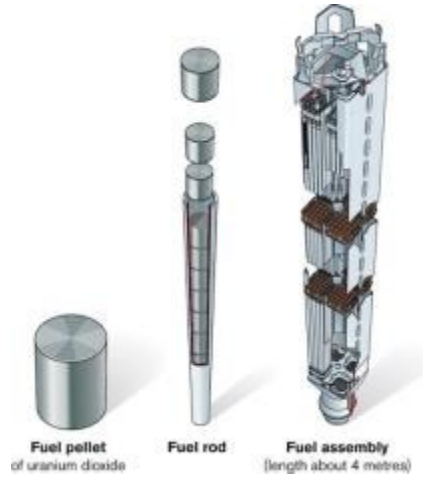
Instrumentation & control



Maintenance/
Outage management



Plant life
management



Nuclear Fuel

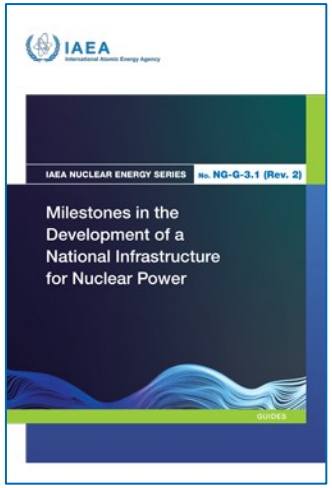
Interest in Nuclear Power

"The IAEA Statute authorises us to work on the 'development and practical application of atomic energy for peaceful purposes, including the production of electric power.' [...] As the centre for global cooperation in the nuclear field, we help countries to use nuclear power safely and securely."

Rafael Mariano Grossi, Director General, IAEA



DG Grossi at COP 27 in Egypt, November 2022



The IAEA Milestones Approach

MILESTONE 1

Ready to make a knowledgeable commitment to a nuclear power programme

MILESTONE 2

Ready to invite bids/negotiate a contract for the first nuclear power plant

MILESTONE 3

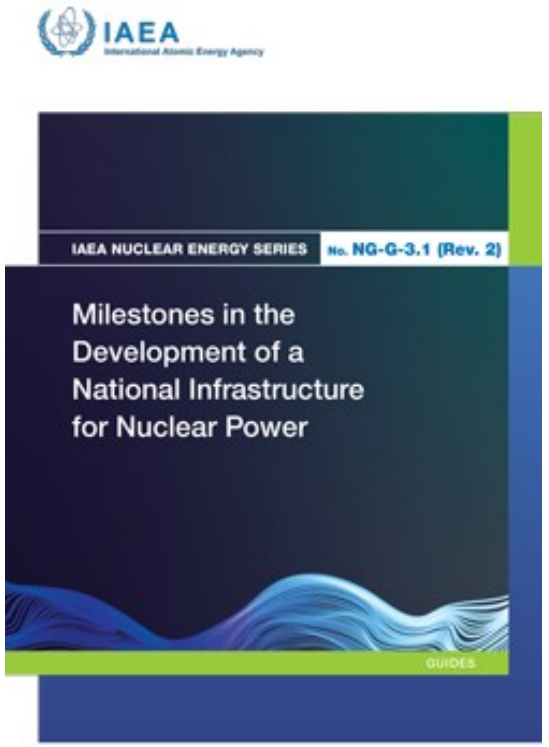
Ready to commission and operate the first nuclear power plant

IAEA Milestones Approach for Nuclear Power Infrastructure Development - HRD Issue #10

- Phased
- Comprehensive
- Integrated

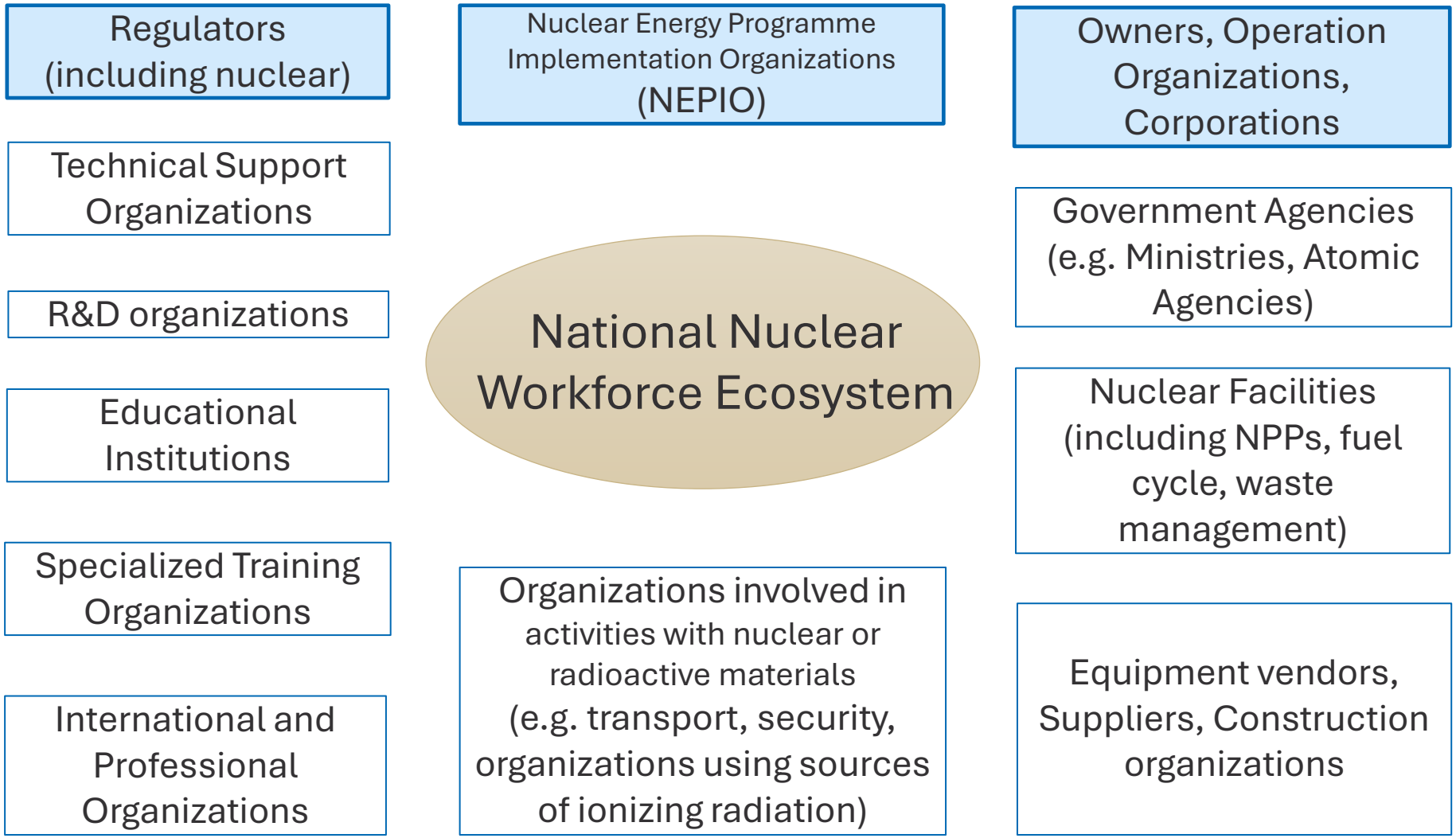


The Milestones Approach is holistic and considers 19 specific infrastructure issues. **Issue 10 deals with HRD.**



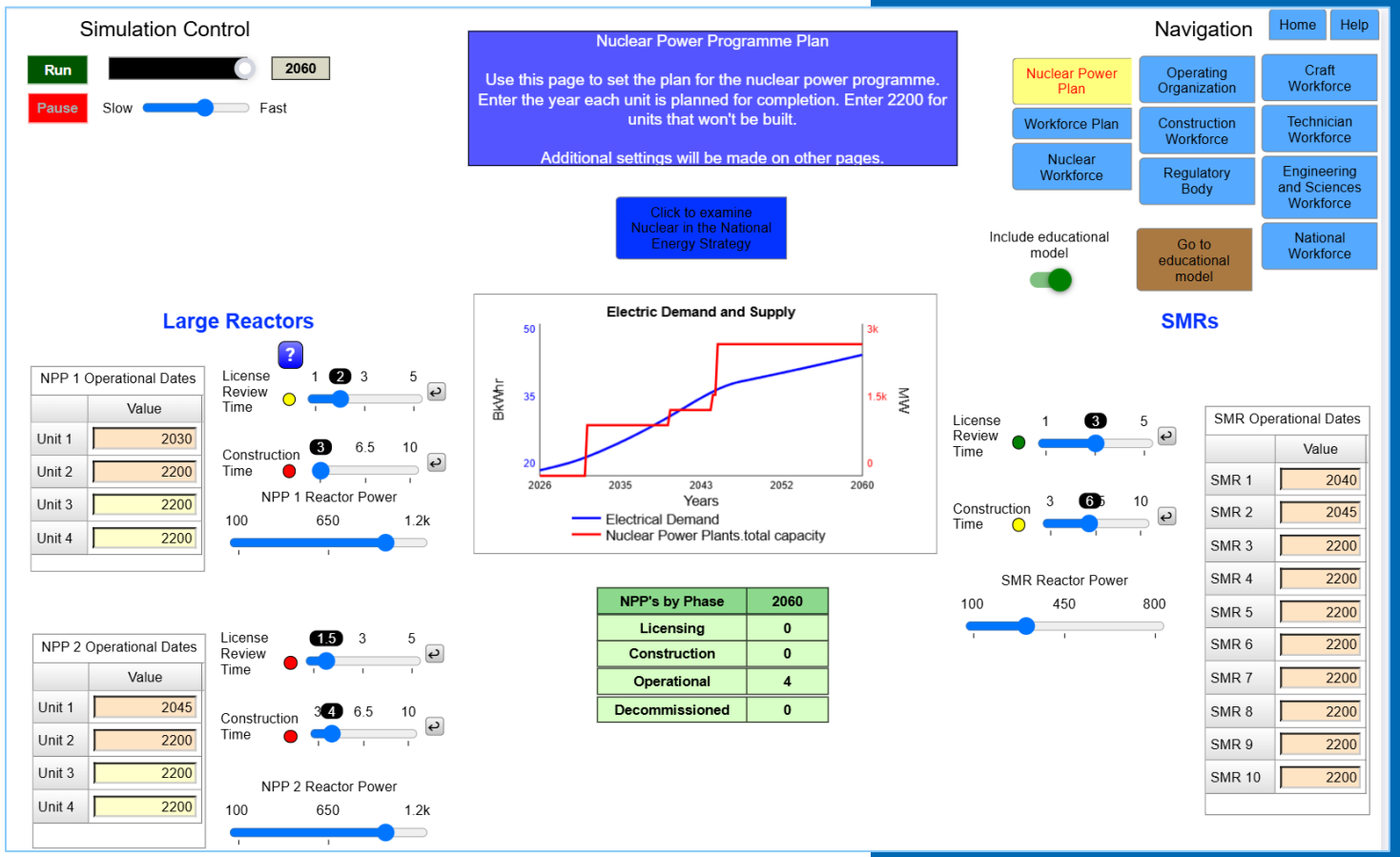
IAEA Nuclear Energy Series NG-G-3.1 (Rev. 2)

Organizations essential to the National Nuclear Workforce requiring HR considerations



Online access to the NPHR interface

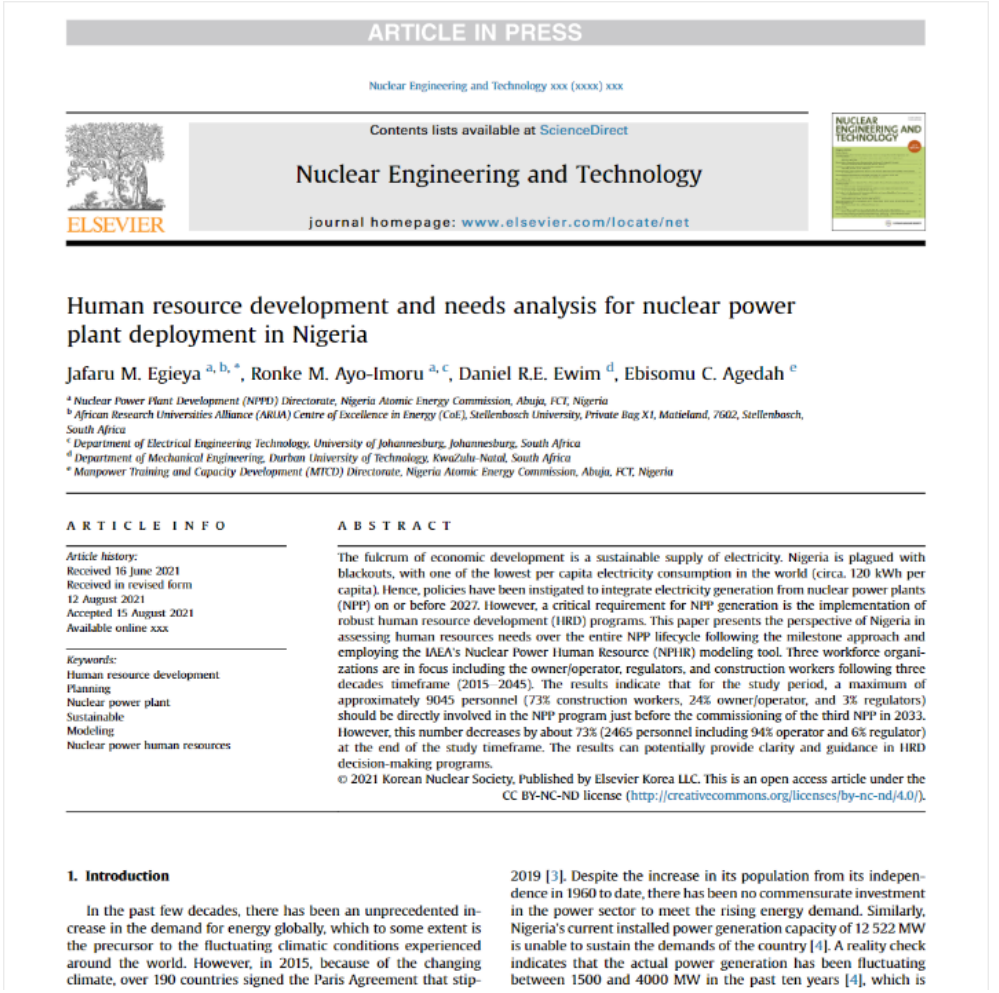




- Link to the latest NPHR 3.0:
- exchange.iseesystems.com/public/kristenkern/kris-kern/index.html#page1

Real life application

- The NPHR model is the **tool used to assist member states in assessing their plans for human resource development** and the key prerequisites for new NPP.
- The tool also has the advantage of being amenable to embarking and expanding NP programmes
- It has the potential to examine the critical workforce requirements at each stage of the NPP lifecycle using the IAEA milestone approach.
- Member States are requesting additional IAEA Support to expand the NPHR to include **SMR Scenarios**



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Human resource development and needs analysis for nuclear power plant deployment in Nigeria

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Nuclear power human resources

ABSTRACT

The fulcrum of economic development is a sustainable supply of electricity. Nigeria is plagued with blackouts, with one of the lowest per capita electricity consumption in the world (circa. 120 kWh per capita). Hence, policies have been instigated to integrate electricity generation from nuclear power plants (NPP) on or before 2027. However, a critical requirement for NPP generation is the implementation of robust human resource development (HRD) programs. This paper presents the perspective of Nigeria in assessing human resources needs over the entire NPP lifecycle following the milestone approach and employing the IAEA's Nuclear Power Human Resource (NPHR) modeling tool. Three workforce organizations are in focus including the owner/operator, regulators, and construction workers following three decades timeframe (2015–2045). The results indicate that for the study period, a maximum of approximately 9045 personnel (73% construction workers, 24% owner/operator, and 3% regulators) should be directly involved in the NPP program just before the commissioning of the third NPP in 2033. However, this number decreases by about 73% (2465 personnel including 94% operator and 6% regulator) at the end of the study timeframe. The results can potentially provide clarity and guidance in HRD decision-making programs.

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1. Introduction

In the past few decades, there has been an unprecedented increase in the demand for energy globally, which to some extent is the precursor to the fluctuating climatic conditions experienced around the world. However, in 2015, because of the changing climate, over 190 countries signed the Paris Agreement that stip-

2019 [3]. Despite the increase in its population from its independence in 1960 to date, there has been no commensurate investment in the power sector to meet the rising energy demand. Similarly, Nigeria's current installed power generation capacity of 12 522 MW is unable to sustain the demands of the country [4]. A reality check indicates that the actual power generation has been fluctuating between 1500 and 4000 MW in the past ten years [4], which is

Nuclear Education Outreach (NEO) Programme for Newcomer Countries

NEO
Nuclear Education Outreach
PROGRAMME

- Provides foundational knowledge and practical tools to build up and improve youth outreach strategies of nuclear organizations.

Target audience

Professionals from nuclear organizations of newcomer countries working with school graduates, promoting nuclear education, organizing career guidance and nuclear education outreach, and youth programmes

Objectives

- Learn about effective strategies and best cases of involving youth in nuclear university programmes and nuclear careers
- Broaden the global network of nuclear professionals working with youth
- Build a nuclear education outreach strategy tailored to participants' own nuclear organization and its needs
- Engage first-hand in major international youth outreach formats and events

Educational Networks



2022 INSTA

2021 Renewed Collaboration Agreement

2017 Renewed Collaboration Agreement

2015 STARNET

2013 First Collaboration Agreement

2013 AFRA-NEST

2010 LANENT

2004 ANENT

Partners
ENEN, National networks

- Promote regional cooperation
- Share educational experience and resources
- Forum for discussion of policies and strategies
- Share best practices and lessons learned
- Share e-courses and training materials
- Outreach programmes

Nuclear Energy Management Schools

'Foundation School' concept
Standard 2 weeks NEM School will be the 'Foundation' school, acting as a first step link to the specialised schools across the Agency

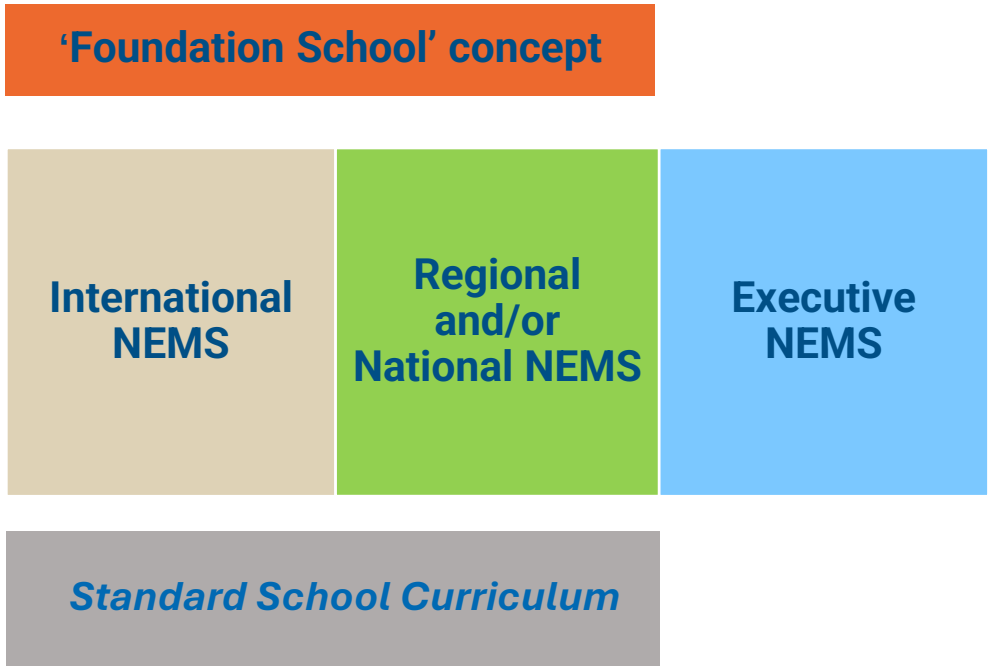
1. International NEMS
to be held in co-operation with ICTP in Trieste on an annual basis to meet demand with an option for an additional school in Vienna on an annual basis to meet demand

2. Regional and/or National NEMS

to be held in Member States based on their demand, following the standard school curriculum model

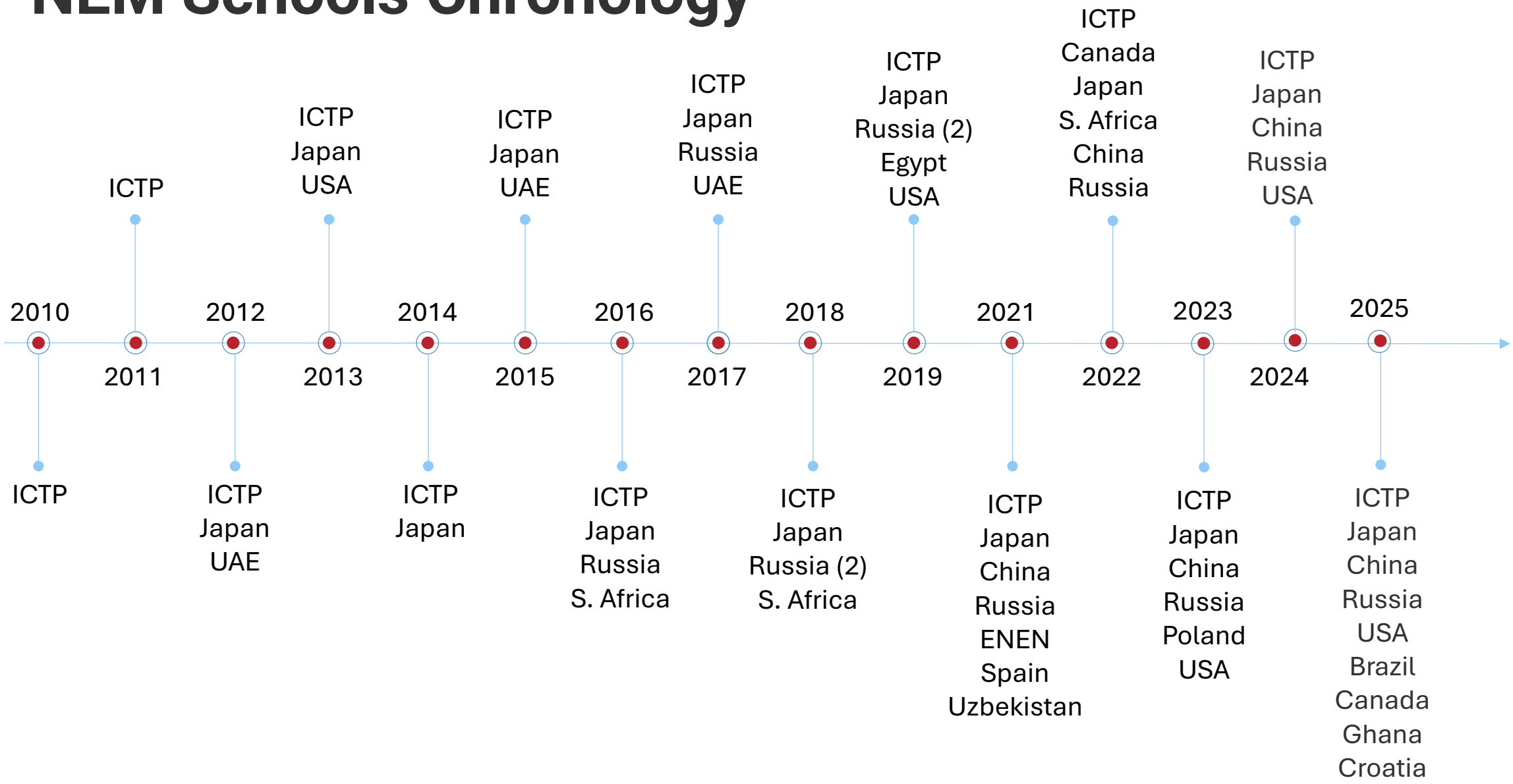
3. Executive NEMS

Optional 1-week Advanced NEM School for middle level managers focusing on specialist topics



Standard School Curriculum - Mandatory 'Core' topics & optional topics negotiated with the host organisation for the Regional and National Schools

NEM Schools Chronology



Nuclear Knowledge Management (NKM) School



Aim

To provide specialized Education & Training on

the development and implementation of

Nuclear Knowledge Management programmes

Audience

Professionals involved in Nuclear

Education & Training, NKM, and HRD

in the nuclear sector and supporting technologies

History of the NKM School

1378 PARTICIPANTS

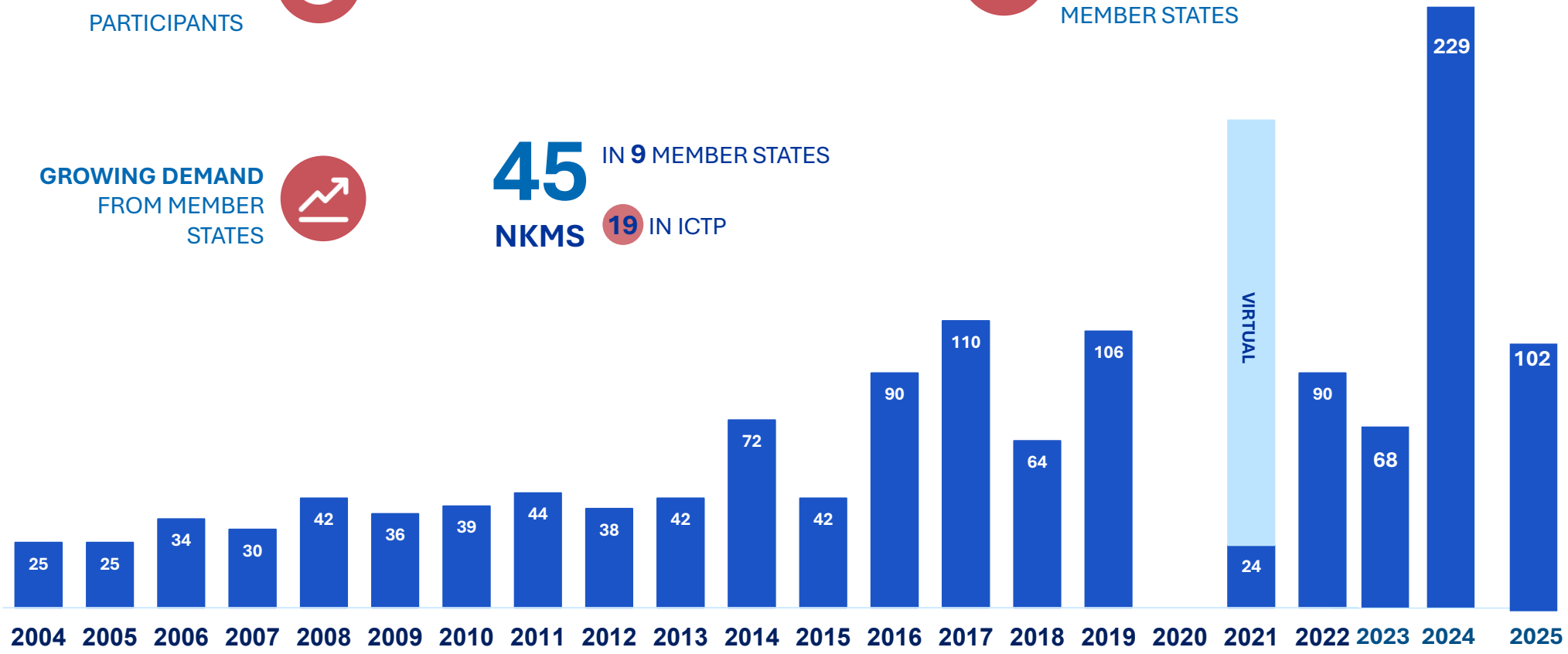
FIRST SCHOOL IN **2004** IN ICTP

84 MEMBER STATES

GROWING DEMAND FROM MEMBER STATES

45 NKMS IN **9** MEMBER STATES

19 IN ICTP



IAEA's Flagship Programmes

Lise Meitner Programme

Retention and career development for women in the nuclear field



Marie Sklodowska-Curie Fellowship Programme (MSCFP)

Attracting and supporting women students to pursue advanced studies in the nuclear field

MSCFP Scope



To inspire and attract women from IAEA Member States to pursue a career in nuclear related field. For Master's degree in nuclear related studies.

Scholarships

Tuition fee and stipend

Internships

Facilitated at IAEA and external institutions, companies, laboratories, etc.

Networking

Student and Alumnae (e.g., LinkedIn Group, Trainings)
Technical events (e.g., IAEA School on Nuclear Security, International Conferences on Topical Issues in Nuclear Installation Safety, Symposium on International Safeguards)

MSCFP at a Glance

860 selected fellows

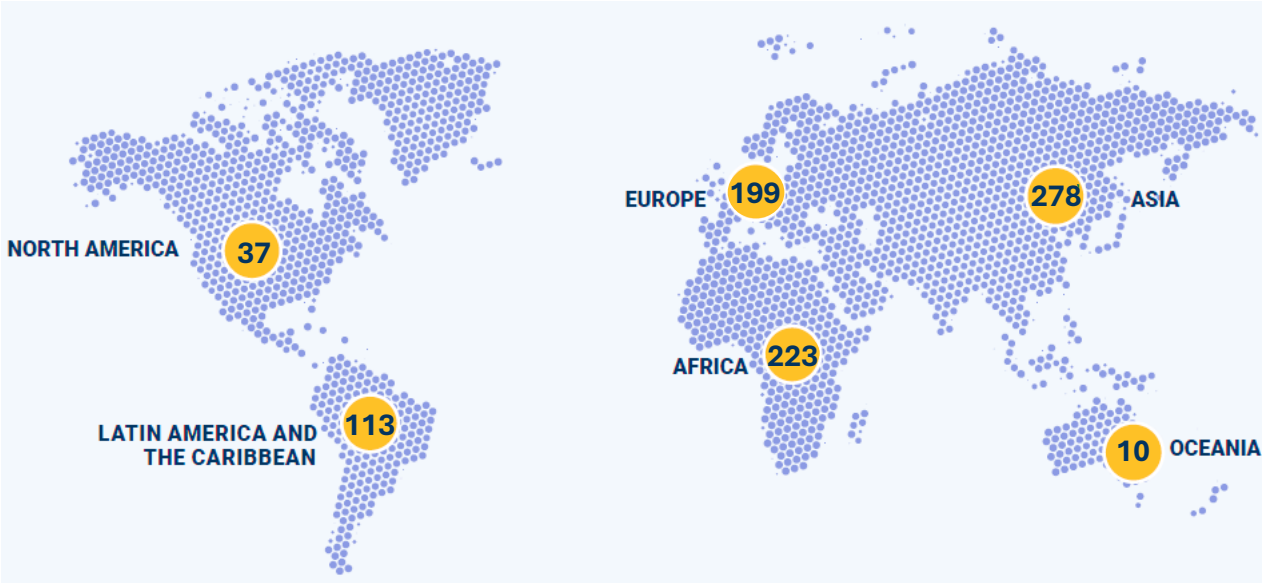
out of

3919 applications

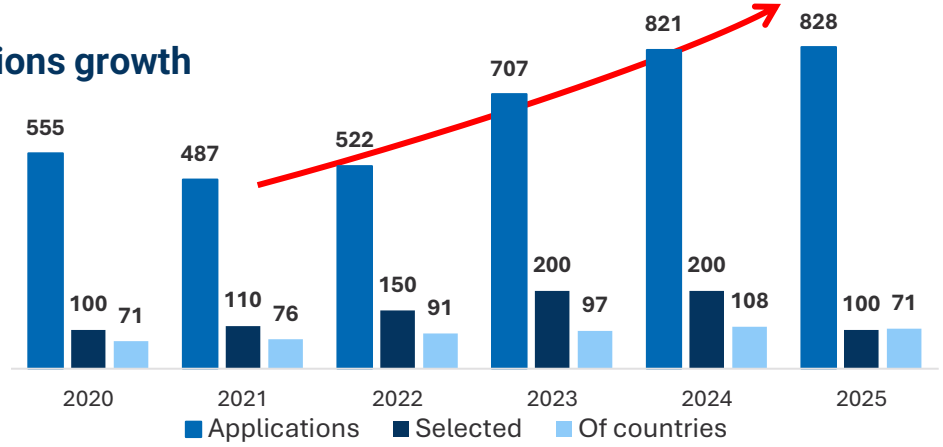
→ from **135** IAEA Member States

- **311** active fellows
- **522** completed their studies
- **232** placed for internship

Selected fellows by region



Applications growth



All data as of M

2-4 technical visits annually

~ 15 participants per cohort

Duration: 2 weeks/visit, varying by theme

LMP Scope

Sharpening Technical Skills

- Specialized hands-on experience
- Discussions with subject matter experts, interactive training
- Case studies, lectures, group work

Nuclear Facility Visits

- Visits to nuclear facilities:
  - Power plants (construction, operation, decommissioning), research reactors, scientific centres, and laboratories

Professional Development

- Leadership & Management Training
- Technical writing & communication
- Mentoring
- Networking with nuclear experts

IAEA Lise Meitner PROGRAMME

Eligibility

1

Women professionals from IAEA Member States

2

Min. 3 years (max 10) of relevant technical work experience

3

Employed or in the last year of PhD studies with previous work experience, both relevant to nuclear field

4

Completed relevant bachelor's degree, master's degree and/or PhD

1030 applications received from **93** nationalities

7 completed visits

6 host countries

101 women selected

45 nationalities



USA, June 2023
Theme: nuclear power.
Host: North Carolina State University.

USA, November 2023
Theme: nuclear reactor modelling & simulation.
Host: Oak Ridge & Idaho NLs.

RoK, April 2024
Theme: nuclear power & operation.
Host: KONICOF.

Argentina, May 2025
Theme: nuclear power program development.
Host: CNEA.

Japan, June 2025
Theme: advanced nuclear technology.
Host: U. Tokyo & JAEA.

Canada, July 2025
Theme: research reactors.
Host: McMaster U. & CNL.

Australia, February 2026
Theme: nuclear medicine production, nuclear science and technology research and application
Host: ANSTO.

IAEA Lise Meitner PROGRAMME

LMPs in 2026 and beyond

Future LMPs (2026/2027)	Host Organizations
Russian Federation (Aug 2026)	Joint Institute of Nuclear Research, Academies of Rosatom
France/Austria (Oct 2026)	Orano/IAEA
France/ITER (Nov-Dec 2026)	CEA/ITER
China (Nov 2026)	Harbin university
EU/EC (2027)	EC-JRC



Thank you!

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