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Atoms for Peace and Development

IAEA perspectives on Financing Nuclear and Decarbonization Objectives

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NEA-IFNEC Financing Initiative: High Level Warsaw Conference on Nuclear Financing,
Session 3: Towards robust nuclear financing frameworks aligned with decarbonization objectives

Outline

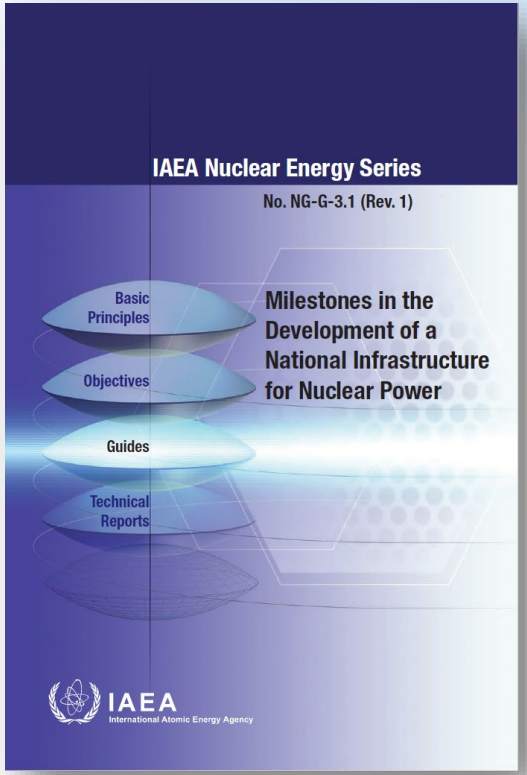
- IAEA support to newcomer countries, including on financing
- Recent studies and publications
- Climate urgency: IAEA at COP26, importance of nuclear energy in the transition towards net zero economies
- Towards a more active role of governments?
  - Financing new projects
  - Accelerating innovation – demonstration and commercialization of advanced reactors

IAEA support to newcomer countries

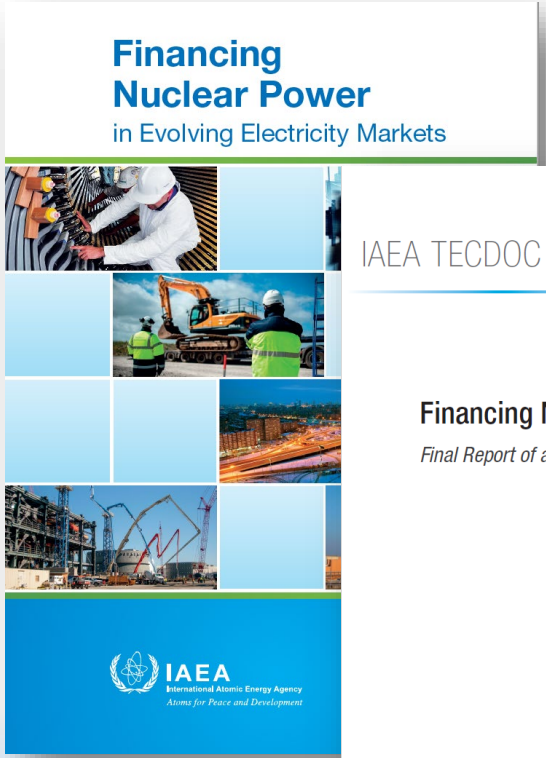
- IAEA's Milestones approach
  - Funding and Financing aspects are well identified in the Milestones approach.
  - They are one of the most pressing questions that embarking countries have.

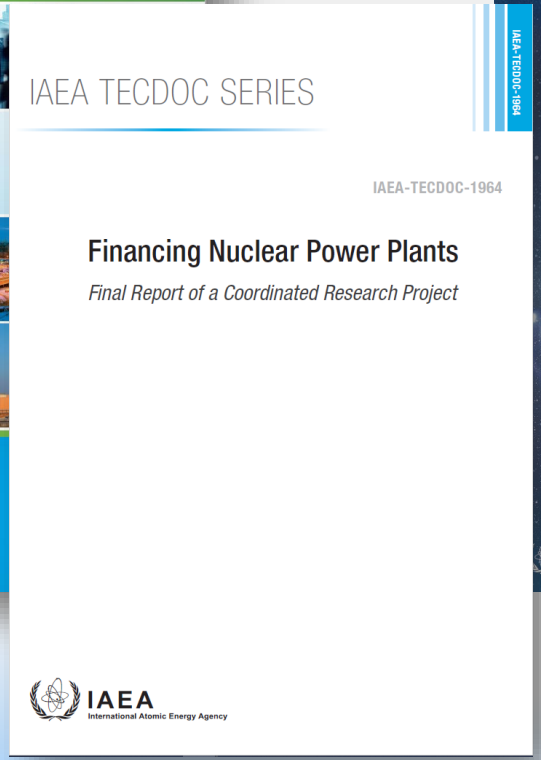
  → IAEA is providing regular updates to MS on various financial approaches and mechanisms (workshops, TM, CRPs, etc)

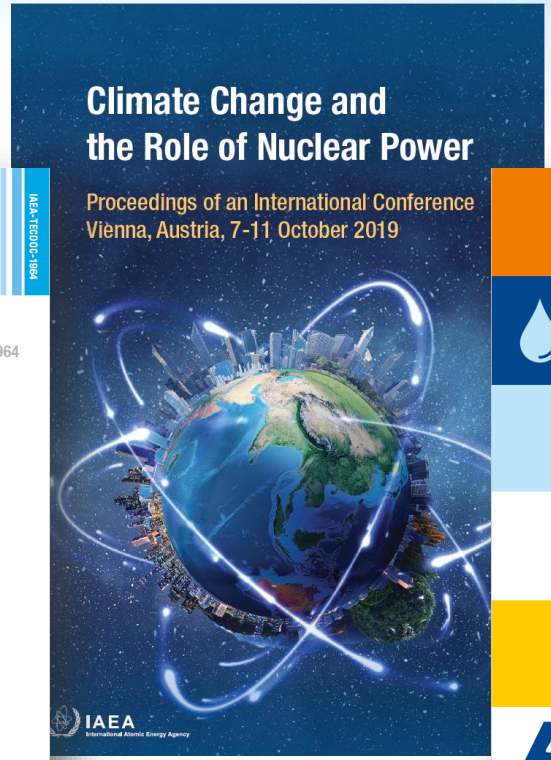
  → No universal solution exists, but IAEA able to share experience between MS



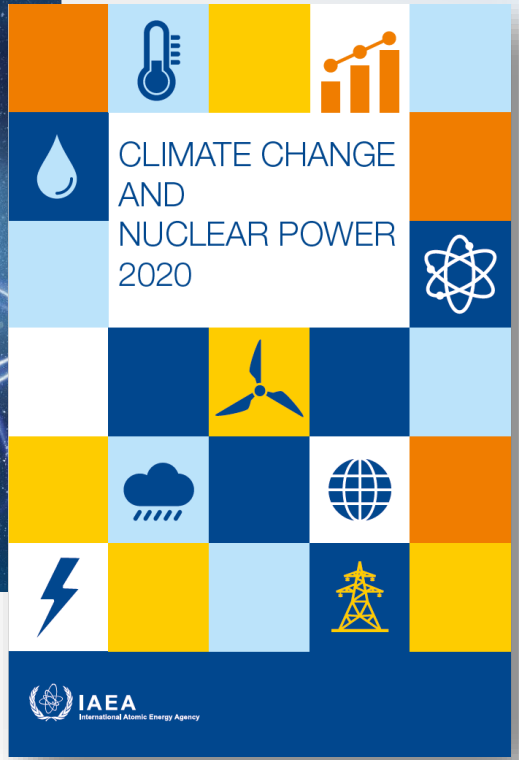
Recent studies and publications (1)







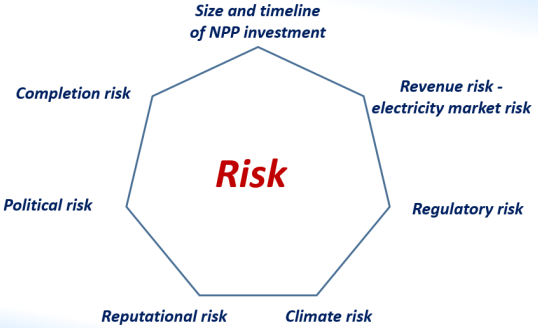
Specific sessions / chapters dedicated to financing



Recent studies and publications (2)

Specificities of financing NPPs

NPP financing has historically been on of the biggest challenges for NPP development

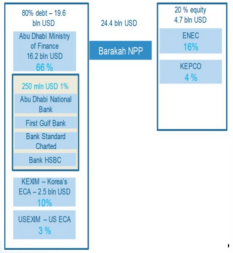


In recent years, a range of **new ownership structures** and **financial mechanisms** are applied in new NPP

United Arab Emirates - Barakah

Traditional project approach in a regulated market, with a **competitive bid**.

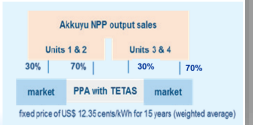
- Strong political and financial support from UAE and Korean Governments.
- Host Government and vendor finance.
  - ENEC is public company fully owned by the host Government.
  - Vendor (KEPCO) participates to the equity.
  - High proportion of the EPC contract is structured as a fixed-price agreement.
  - Sovereign guarantees on debt.
  - Debt financing provided by US and Korean ECAs, as well as a consortium of banks.
  - Highly leveraged project: D/E = 80/20
  - Power Purchase Agreement for the full electricity output of the plants with the Abu Dhabi Water and Electric Company



Turkey - Akkuyu

First time full vendor finance with a BOO model for a NPP in a market undergoing liberalization.

- Government to Government deal (IGA of 2010).
- Strong host Gvt commitment and incentives (VAT exemption, corporate tax reductions, free allocation of a site and grid connection, etc.)
- Most of the project risks are taken by the project company.
- Full ownership of the project company from Russian entities. Possibility to sell 49% of the share at a later stage.
- Financial structure includes a 70:30 D/E ratio, with part of the loans covered by Russian ECA.
- Power Purchase Agreement for 15 years at a (nominal) price of 123.5 $/MWh (70% and 30% of the production).
- After 15 year, exposure to the market risk (with 20% of profits paid back to the host Gvt)
- The owner retains part of the market risk



United States - Vogtle

A traditional project approach in a regulated market, with Gvtl support measures.

US Federal Energy Policy Act of 2005

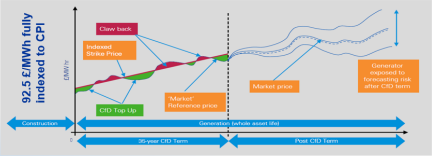
- Production Tax Credit of 18 $/MWh for the first 8 years of operation;
- Federal loan guarantees for the project (8.3 Billion $, with an interest rate of 3.283% and a tenure of 20 years);
- Federal Risk Insurance to cover regulatory delays in construction and operating licence.

- All shareholders of the projected work in regulated environments with predictable demand growth and stable revenue stream.
  - ✓Georgia Power (47.5%), rate-regulated by Georgia Public Service Commission
  - ✓Oglethorpe Power (30%), long-term PPAs with Electric Membership Corporations (EMCs), part-owners
  - ✓MEAG Power (22.7%), owned by municipalities who are also sole customers
  - ✓Dalton Utilities (1.6%) municipal electric company which provides the city of Dalton.
- Recovery mechanisms for capital spending during construction
  - Construction Work in Progress (CWIP)
  - Allowance for Funds used During Construction (AFUDC)

United Kingdom - HPC

Traditional project approach in a de-regulated market (with revenue mechanisms CfD).

- Strong support from the host Gvt (but not participation in the construction risk).
  - Loan guarantees provided by the host government.
  - CfD structure to mitigate electricity market risk (guaranteed by the UK Government).
- All equity financed (EDF Energy 66.5% and CGNC 33.5%)
  - Loan guarantees not used
  - Project owner takes all the project delivery risk



The UK Gvt is considering a new model (Regulated Asset Base) for new nuclear projects

Various models exist, however **a strong involvement of host and vendor Governments is essential** in any newbuild project.

Liberalized electricity markets do not provide market signals for long term investment. **Mechanisms to mitigate market risks** are essential (PPA, FIT, CfD)

Construction risks remain a major challenge in many NPP projects

Climate change and mitigation of CO_2 emissions are key drivers for development of nuclear. **Access to green/climate financing** is essential to scale up nuclear deployment to the level needed to achieve climate goals.

From M. Cometto, IAEA-EDF school presentation, 2020

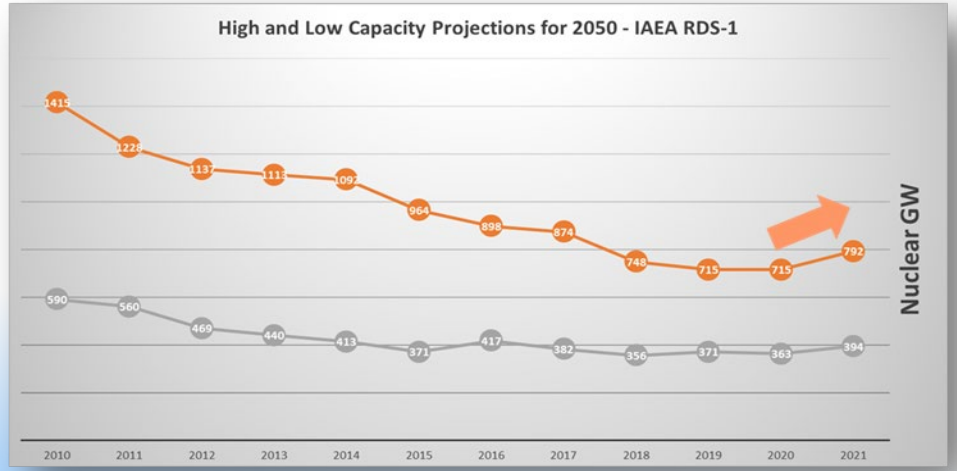
Role of nuclear in the transition to NZ?

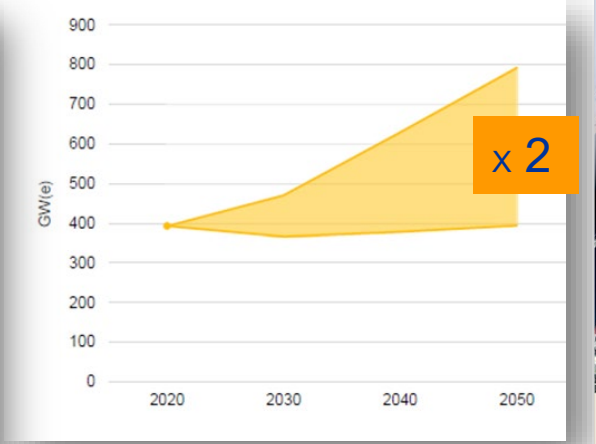
- Nuclear tomorrow?
  - What role for nuclear energy in the transitions to clean energy systems? (renewables, CCS, **hydrogen**…) – **electricity** and **beyond electricity**
  - What do "**Net Zero**" emission targets mean for nuclear power? What **policies** to support the development of nuclear power?
  - How can nuclear energy help **displace coal and other fossil fuels**?
  - Does **investing** in nuclear projects make sense for the post-Covid recovery and the clean energy transitions?

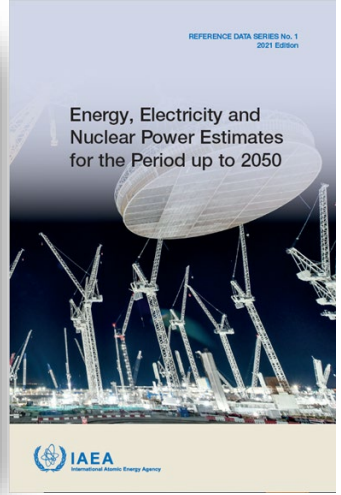
(access to) financing = key enabler of future investments

Nuclear Energy tomorrow?

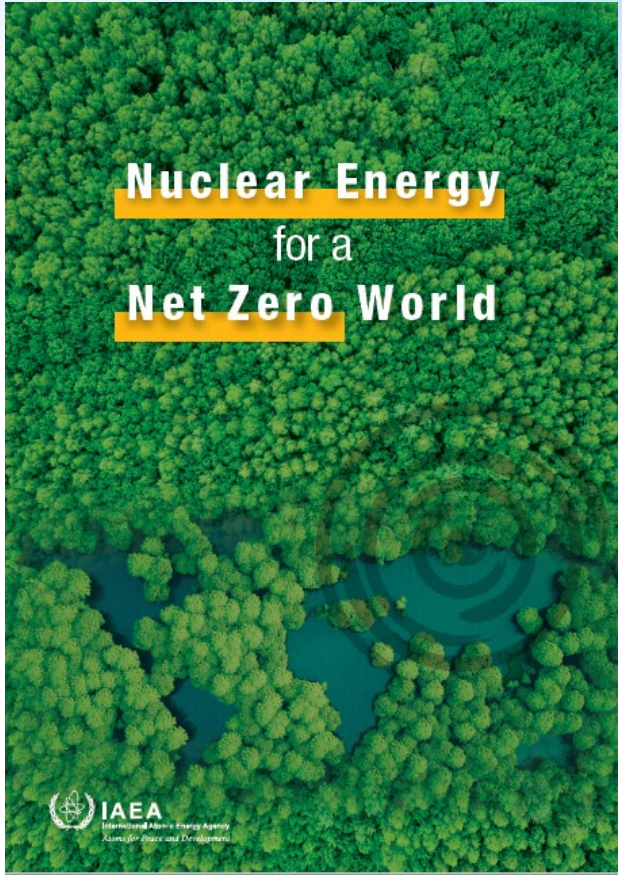
- IAEA projections (high case): doubling of capacity and generation by 2050
  - Based on existing and anticipated plans – essentially large reactors – for electricity production
  - LTO but also an ambitious newbuild programme – about **550 GW of new nuclear by 2050**
  - 1st time in one decade high case projections are revised upwards (one-off or start of trend?)
- Higher capacity projections can be anticipated if nuclear can take larger % of other energy markets (H2, heat, etc) to meet NZ objectives (advanced reactors, including SMRs)







Nuclear Energy for a Net Zero World



https://www.iaea.org/sites/default/files/21/10/nuclear-energy-for-a-net-zero-world.pdf

High level endorsement

Jean-François Tremblay, Deputy Minister of Natural Resources

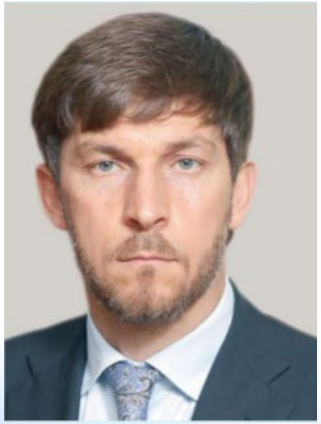
ZHANG Kejian, Chairman, China Atomic Energy Authority

Riku Huttunen, DG Energy, Ministry of Economic Affairs and Employment

Jean-Yves Le Drian, Minister for Europe and Foreign Affairs

KAJIYAMA Hiroshi, (former) Minister of Economy, Trade and Industry

Michal Kurtyka, (former) Minister of Climate and Environment



Ruslan Edelgeriev, Special Presidential Representative on Climate Issues and Adviser to the President

Greg Hands, Minister of State for Energy, Clean Growth and Climate Change

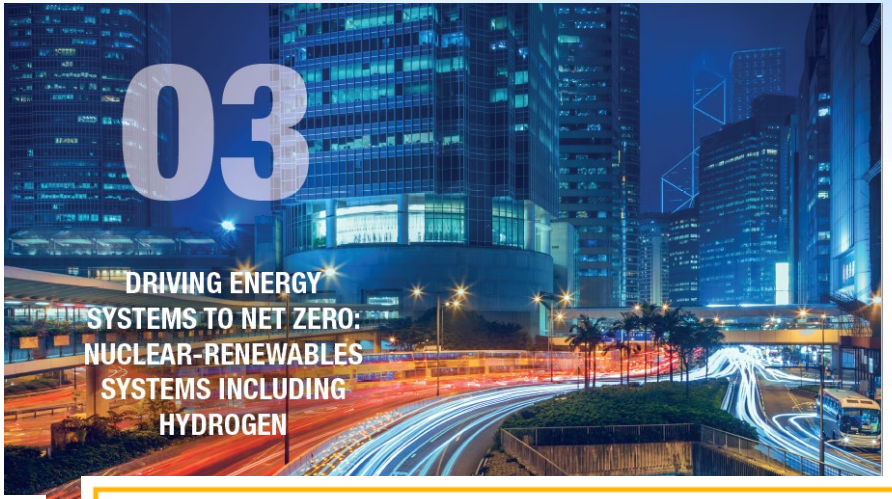
John Kerry, Special Presidential Envoy for Climate

Rafael Mariano Grossi
Director General, IAEA

Nuclear Energy for a Net Zero World:

Recommended Actions:

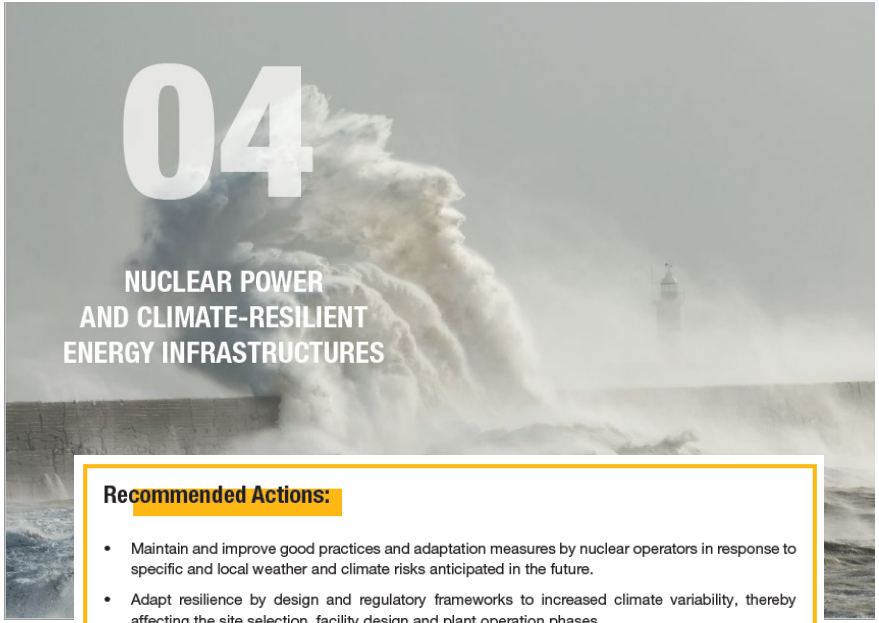
- Phase out public support and financing for investment in fossil fuels, coupled with additional measures including carbon pricing;
- Adopt objective, technology neutral ESG (Environmental, Social and Governance) frameworks for low carbon investment;
- Accelerate nuclear innovation through Public Private Partnerships, including the demonstration of non-electric applications with conventional and advanced reactors;
- Direct clean energy investment to enable a just transition, supporting regions and communities dependent on fossil industries, retraining workers, capitalizing on existing infrastructure, and driving new industrial development.



Recommended Actions:

- Improve the competitiveness of nuclear electricity generation by addressing/reducing costs, adapting to emerging energy market needs and capitalizing on synergies with other low carbon generation options.
- Ensure energy market regulatory and policy frameworks value and remunerate nuclear energy's contribution to a reliable, low carbon energy system.
- Foster integrated clean energy and industrial clusters utilizing multiple low carbon energy carriers (electricity, heat, hydrogen, etc.) and reducing energy distribution costs
- Support technology neutral low carbon hydrogen deployment.

Nuclear Energy for a Net Zero World:



Recommended Actions:

- Maintain and improve good practices and adaptation measures by nuclear operators in response to specific and local weather and climate risks anticipated in the future.
- Adapt resilience by design and regulatory frameworks to increased climate variability, thereby affecting the site selection, facility design and plant operation phases.
- Identify external, system level sources of potential climate vulnerabilities, including impacts of severe weather of grid networks.
- Improve the representation of extreme weather risks in energy planning, including the development of sophisticated risk assessment tools and innovative data processing techniques, drawing on climate science, meteorology and operational experience.
- Apply a coordinated approach to the climate vulnerability of energy systems and access to financing mechanisms for the implementation of adaptation measures.
- Promote diversified electricity systems to mitigate climate risks to energy infrastructure, ensuring the continuity and quality of electricity services.

Recommended Actions:

- Boost public investment and support for private investment in nuclear power, including lifetime extensions, as part of (and as a complement to) “green deal” and recovery packages
- Ensure coherent policy, embracing regulatory frameworks, market design, infrastructure planning and fiscal incentives (including taxonomy, ESG criteria to include nuclear energy)

IAEA Event “Nuclear Innovation for a Net Zero World” on Energy Day (4 Nov)

Raising awareness, sharing ambitions

- High level part (Ministers, Industry leaders)
- Technical panels including:

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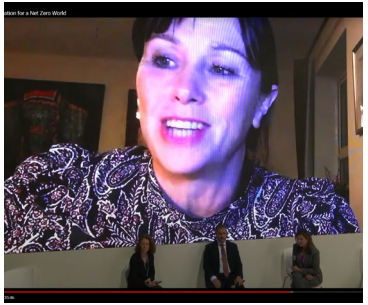
Part 2: Nuclear Innovations to Achieve Net Zero Targets (17h10 – 18h20)

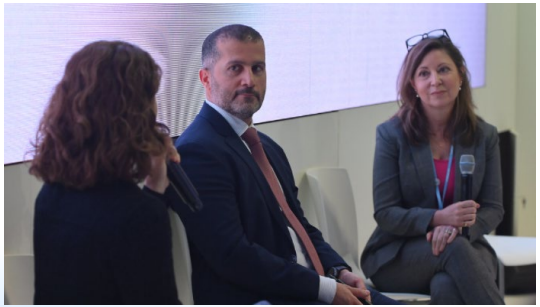
Panel 1: Enabling the transition, Ensuring a Level-playing field for all low C technologies (financing and public support) (17h10-17h40)

This moderated discussion will discuss the importance of Environmental, Social and Governance data collection and accounting metrics (ESG), taxonomies and other policy frameworks, accessing climate finance and the importance of consistency of approach and level playing fields for all low carbon technologies, including nuclear.

- **H.E. Mohamed Al Hammadi**, Managing Director and Chief Executive Officer of the Emirates Nuclear Energy Corporation (ENEC)
- **Maria Korsnick**, CEO NEI
- **Nicoletta Batini**, Lead Evaluator of the IMF’s Independent Evaluation Office
- **Fiona Reilly**, Managing Director FiRe Energy (UK)

Moderator: Kirsty Gogan, co-founder Terra Praxis





Take aways

- Less than 30 years to reach net zero and ensure global warming limited to 1.5°C: all low C technologies are needed, on a massive scale
- Nuclear has unique attributes to play a major role in the transition to Net Zero (only technology that can provide at scale low C electricity, heat and hydrogen)
  - Ambitious **newbuild programmes** are needed – de-risking nuclear investments to attract investors / financing → governments have a key role to play
  - For nuclear to fulfill its full role (i.e., beyond electricity), **technical innovation** is needed to advance design and demonstration of advanced reactor technologies → Government support is also needed.
- Changes in the policy space are needed to support nuclear (to recognize value in energy markets, to support financing of projects) → **Level playing field for all low C technologies**
- **Nuclear much more visible at COP, including from governments – a sign of change?**