WORLD NUCLEAR ASSOCIATION

Working together to accelerate nuclear energy development

Dr. Sama Bilbao y León
Director General

NE·RS 2022

14 June 2022

WORLD NUCLEAR ASSOCIATION

We are the voice of the global nuclear industry

We work with, support and represent the industry

HARMONY
What will power our electric future?

We are a thought leader for nuclear energy in the global energy debate

wnn
world nuclear news
Celebrating 15 years

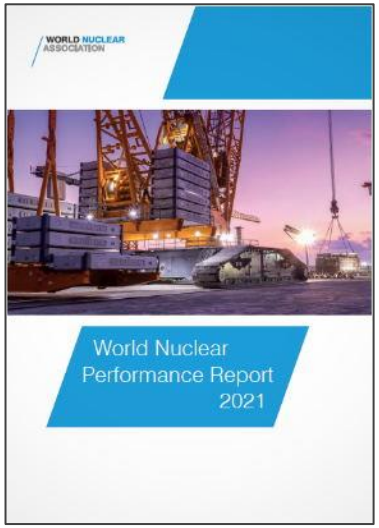
We inform and communicate on nuclear energy

WORLD NUCLEAR UNIVERSITY

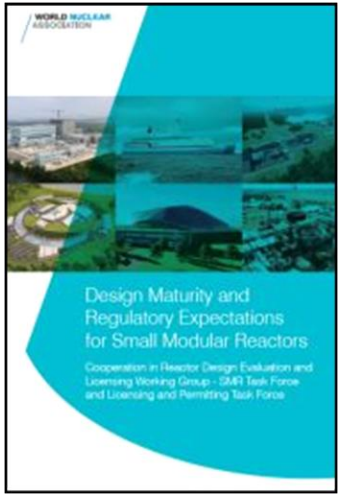
We train the nuclear leaders of tomorrow

We provide authoritative information about nuclear

Nuclear Performance



https://world-nuclear.org/our-association/publications/global-trends-reports/world-nuclear-performance-report.aspx

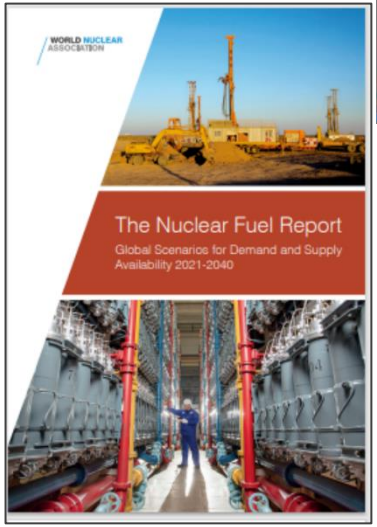


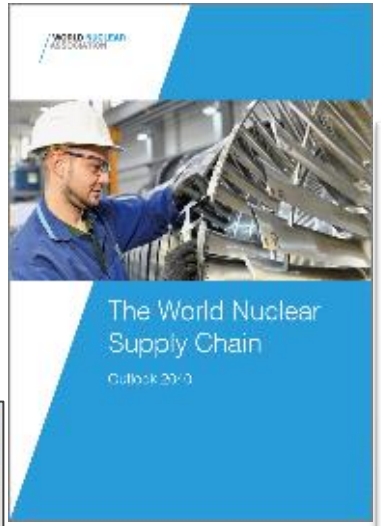
Harmonization SMR Licensing

https://world-nuclear.org/getmedia/23cea1aa-8b63-4284-947a-a0273327fce0/smr-design-maturity-report-FINAL-June.pdf.aspx

https://world-nuclear.org/shop/products/the-nuclear-fuel-report-global-scenarios-2021.aspx

Nuclear Fuel

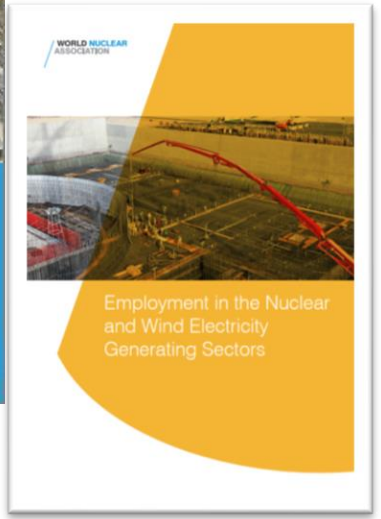




Supply Chain

https://world-nuclear.org/shop/products/the-world-nuclear-supply-chain-outlook-2040.aspx

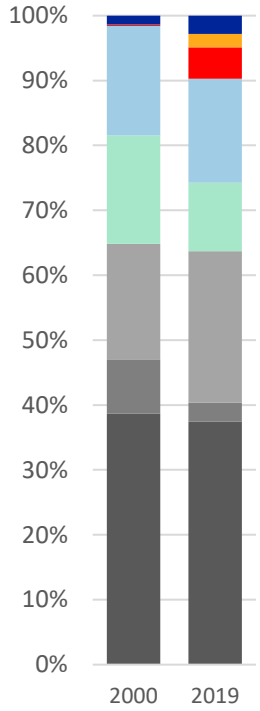
Nuclear jobs



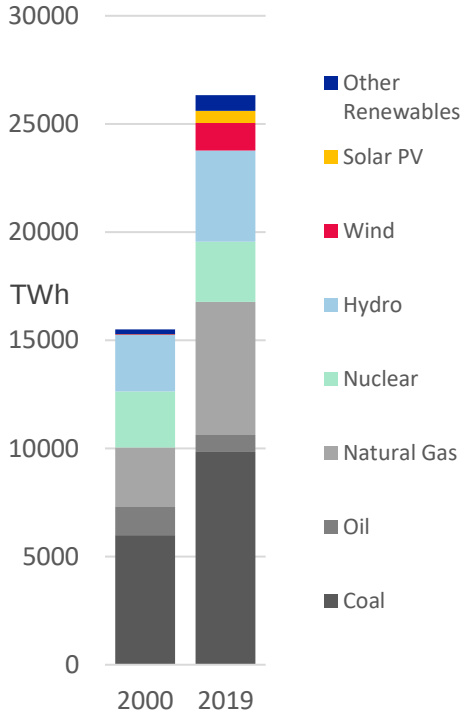
https://www.world-nuclear.org/our-association/publications/technical-positions/employment-in-the-nuclear-and-wind-electricity-gen.aspx

WORLD NUCLEAR ASSOCIATION

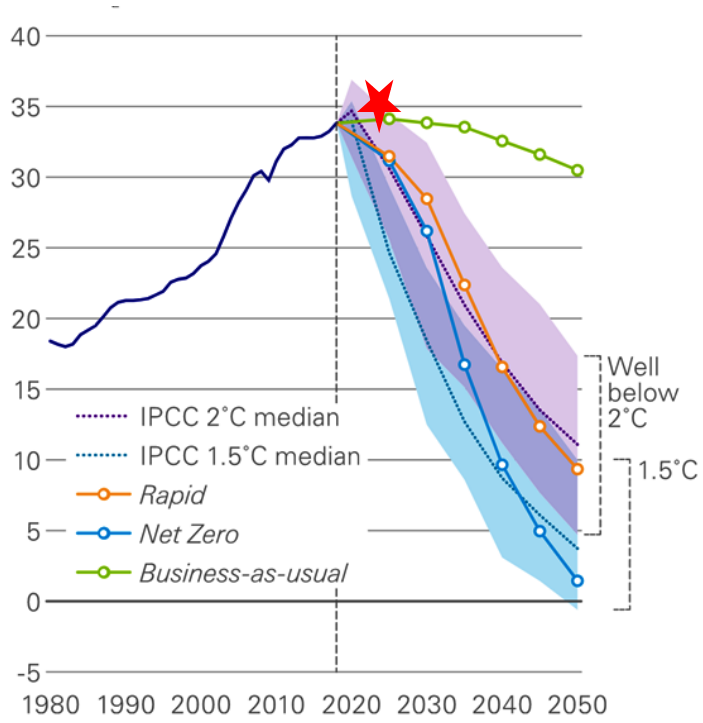
The enormity and the urgency of the climate change challenge are staggering



The share of fossil electricity generation has not significantly reduced since 2000



Electricity generation from fossil fuels in 2019 higher than total generation in 2000

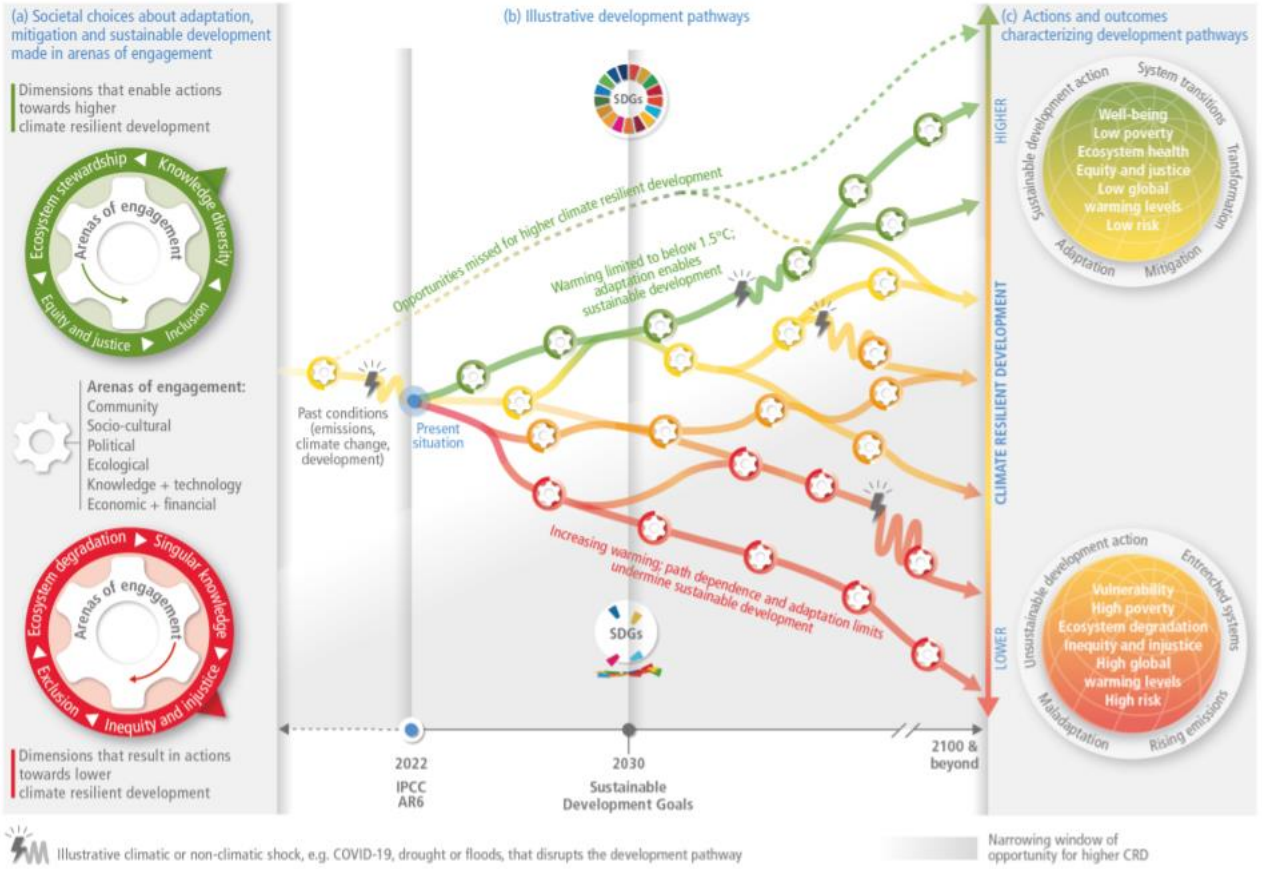


CO_2 emissions must decline over next 30 years.

IEA: World Energy Outlook 2020

BP Energy Outlook 2020/IPCC

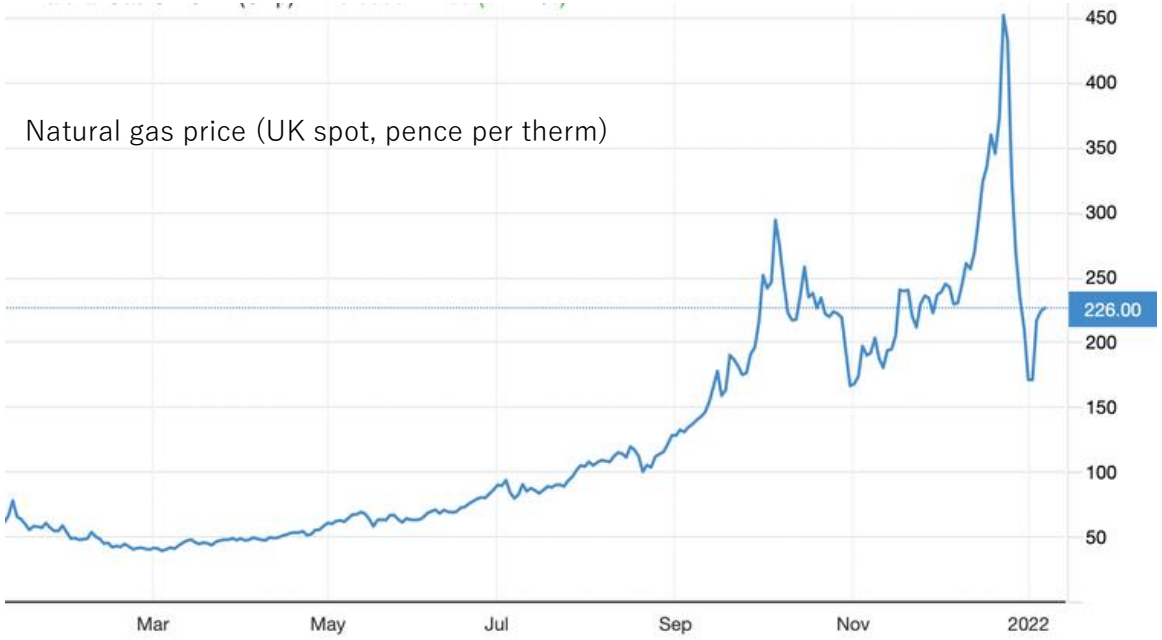
There is a rapidly narrowing window of opportunity to enable climate resilient development



Source: https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

Energy has taken a front row seat in global geopolitics

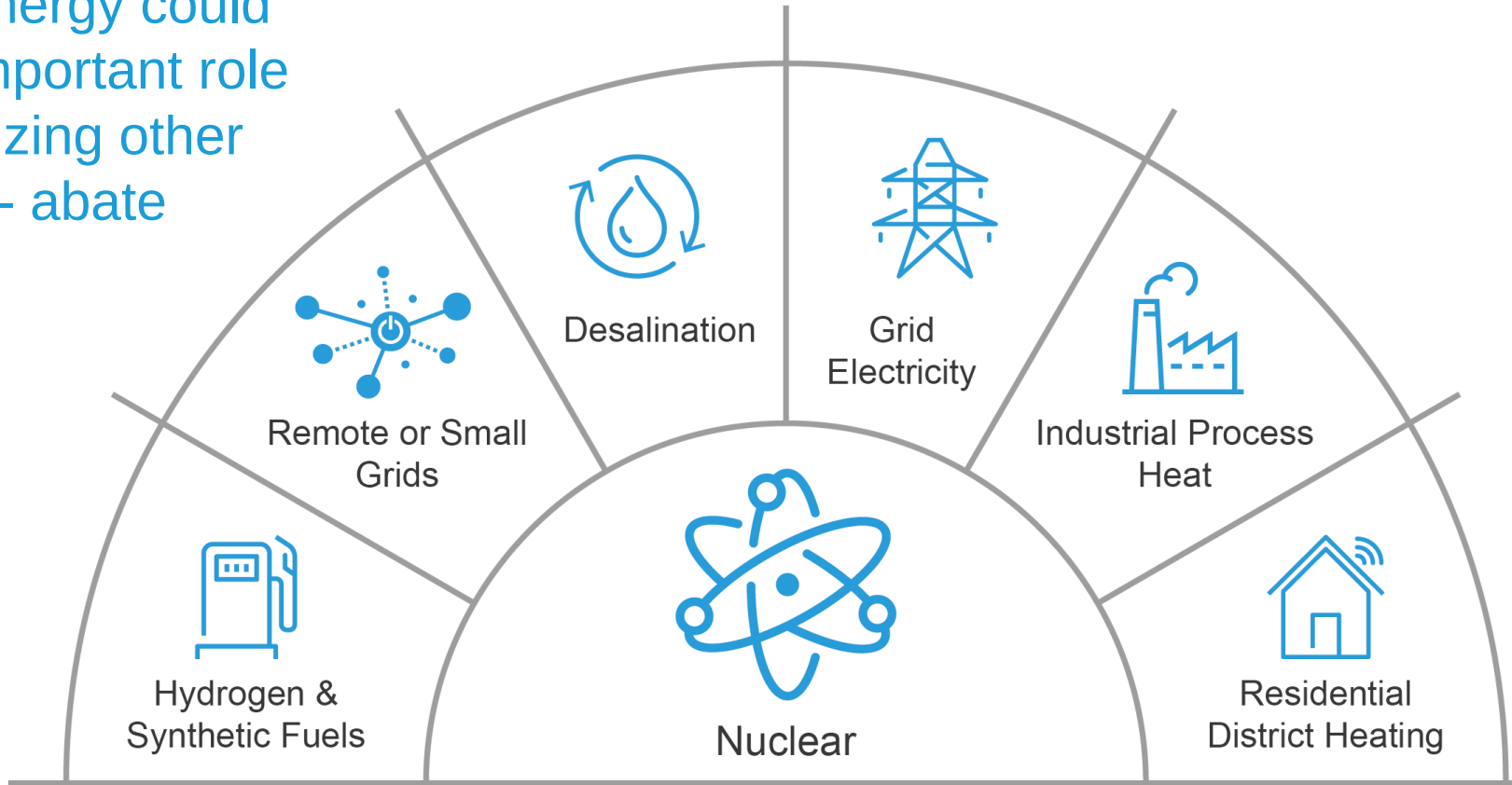
Natural Gas Crisis



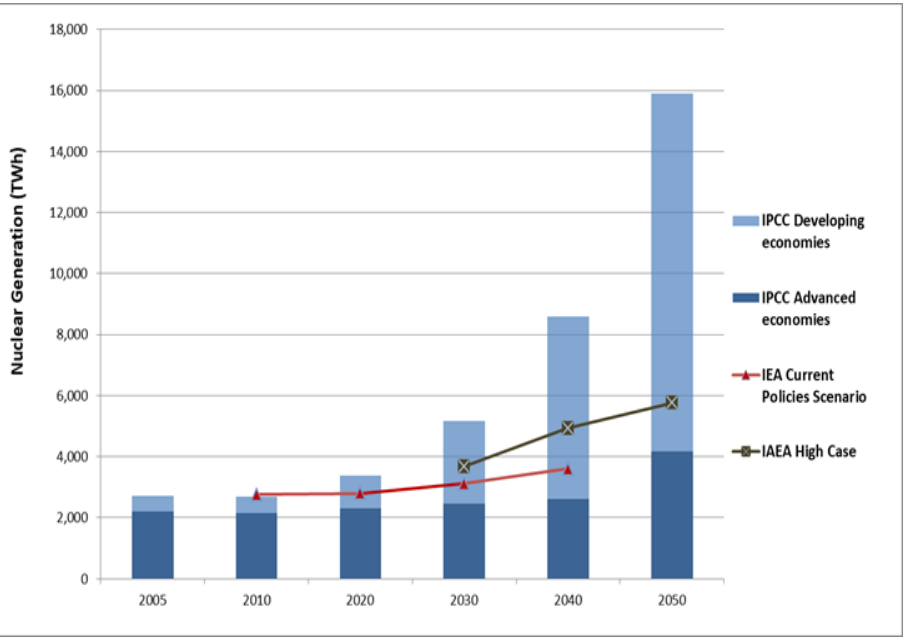
Ukraine war

WORLD NUCLEAR ASSOCIATION

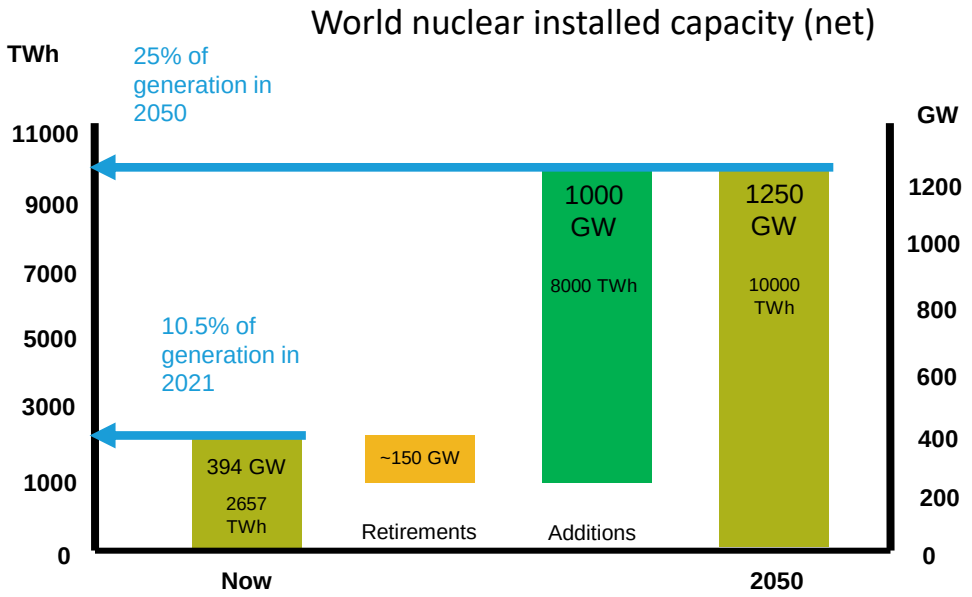
As the only low-carbon source that can produce electricity and heat, nuclear energy could play an important role decarbonizing other difficult-to- abate sectors



Nuclear energy needs to grow significantly for electricity decarbonization



Data Source: IPCC Special report on the impacts of global warming of 1.5 °C, 2018, IEA World Energy Outlook 2019, IAEA Electricity and Nuclear Power Estimates for the Period up to 2050, 2020



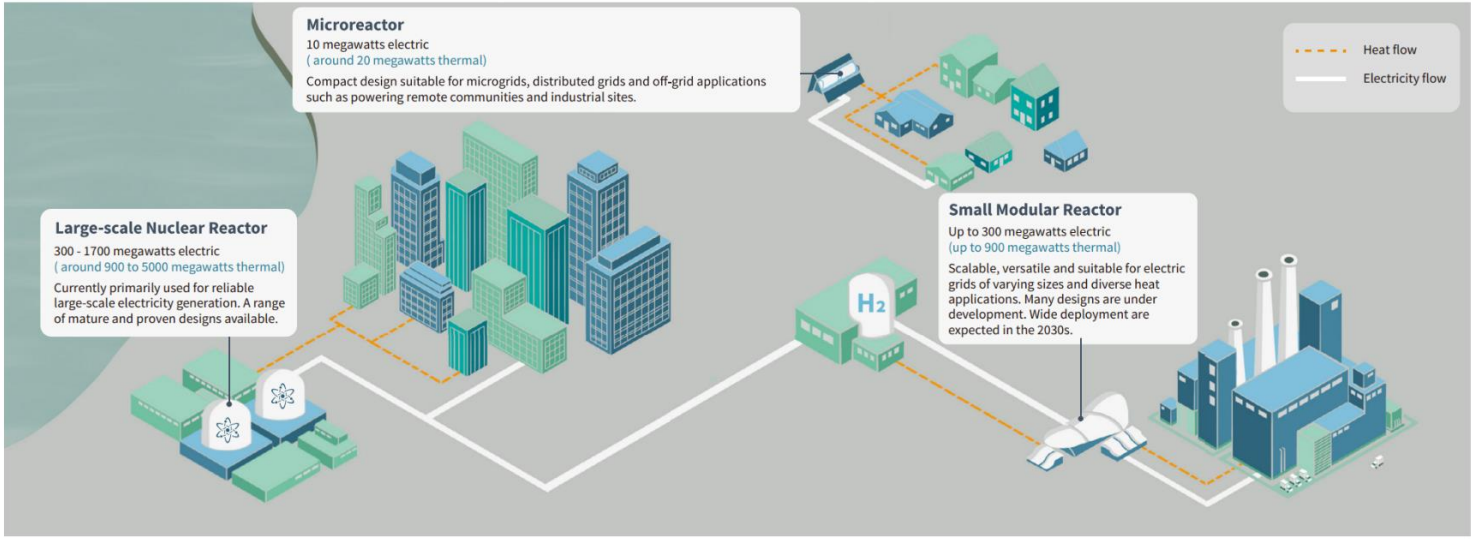
Source: WNA Harmony Program 2021

WORLD NUCLEAR ASSOCIATION

NUCLEAR POWER

Nuclear power is an important source of low-carbon electricity and heat that contributes to attaining carbon neutrality

UNECE



ELECTRICITY GENERATION

Nuclear power plants can produce reliable 24/7 electricity or operate flexibly as required. Dispatchable electricity sources are essential for keeping the costs of the overall system low.

HYDROGEN

Nuclear power can be used to produce low-carbon hydrogen via several process:

- Low-temperature electrolysis - using nuclear electricity
- Steam electrolysis - using nuclear heat and electricity
- Thermochemical process - using nuclear heat at above 600 C

PROCESS HEAT FOR INDUSTRY

High-temperature heat from nuclear plants can be transformative in decarbonising hard-to-abate sectors.

DISTRIC HEATING

Nuclear plants are a proven source of heat for urban district heating that have operated successfully in a number of countries.

Raising Awareness
Recognise that nuclear power is a source of low-carbon energy and heat that can help decarbonise energy systems

Promoting Acceptance
Develop policies that instil confidence and facilitate the wider application of nuclear power to decarbonise electricity and energy intensive industries

Incentivising Finance
Develop financing frameworks that instil confidence and incentivise affordable public and private investment in support of new nuclear power projects

Source: UNECE, 2021 https://unece.org/sites/default/files/2021-08/Nuclear%20power%20brief_EN_0.pdf

Countries are looking at nuclear for climate and energy security goals

Nuclear makes a comeback in the Netherlands

Nuclear Policies 15 December 2021

The Netherlands' new coalition government has placed nuclear power at the heart of its climate and energy policy. Some EUR500 million (USD564 million) has been earmarked to support new nuclear build in the period to 2025.

South Bohemia Nuclear Park founded

01 June 2022

Share

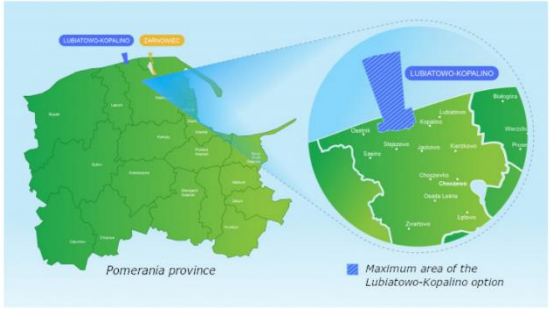
A development of small modular reactors (SMRs) at the Czech Republic's Temelín nuclear power plant would be known as the South Bohemia Nuclear Park, according to a memorandum to set up the park signed by the utility ČEZ, the South Bohemian government, and the UJV Rez research organisation.

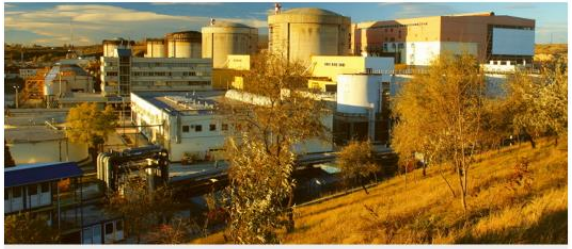
Poland narrows down nuclear sites

22 December 2021

Share

The seaside towns of Lubiatowo and Kopalino in Poland's Choczewo municipality have been named as the preferred location for the country's first large nuclear power plant.



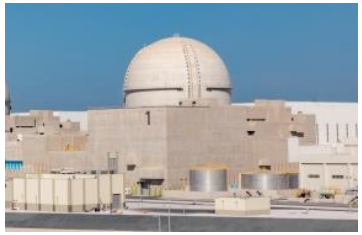


First contract signed for Cernavoda completion

A year-long, CAD8.4 million (USD6.6 million) contract will see Canada's Candu Energy prepare the licensing basis for two new Candu pressurised heavy water reactors at Romania's Cernavoda nuclear power plant. The signing was celebrated by the governments of Romania and Canada, as well as the USA.

WORLD NUCLEAR ASSOCIATION

Lots of excitement about new nuclear projects, large and small

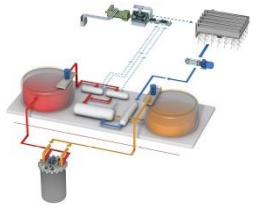


Barakah 1 & 2 - UAE
APR-1400
In operation

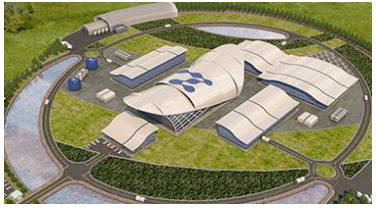
Fuqing 5 - China
Hualong One
In operation

Shin Hanul 1 - Korea
APR-1400
In operation

Nuward , France
300-400 MWe PWR
Under Development



Natrium, US
345 MWe SFR
MS storage
Under Development



NuScale, US
77 MWe PWR
Design Licensed

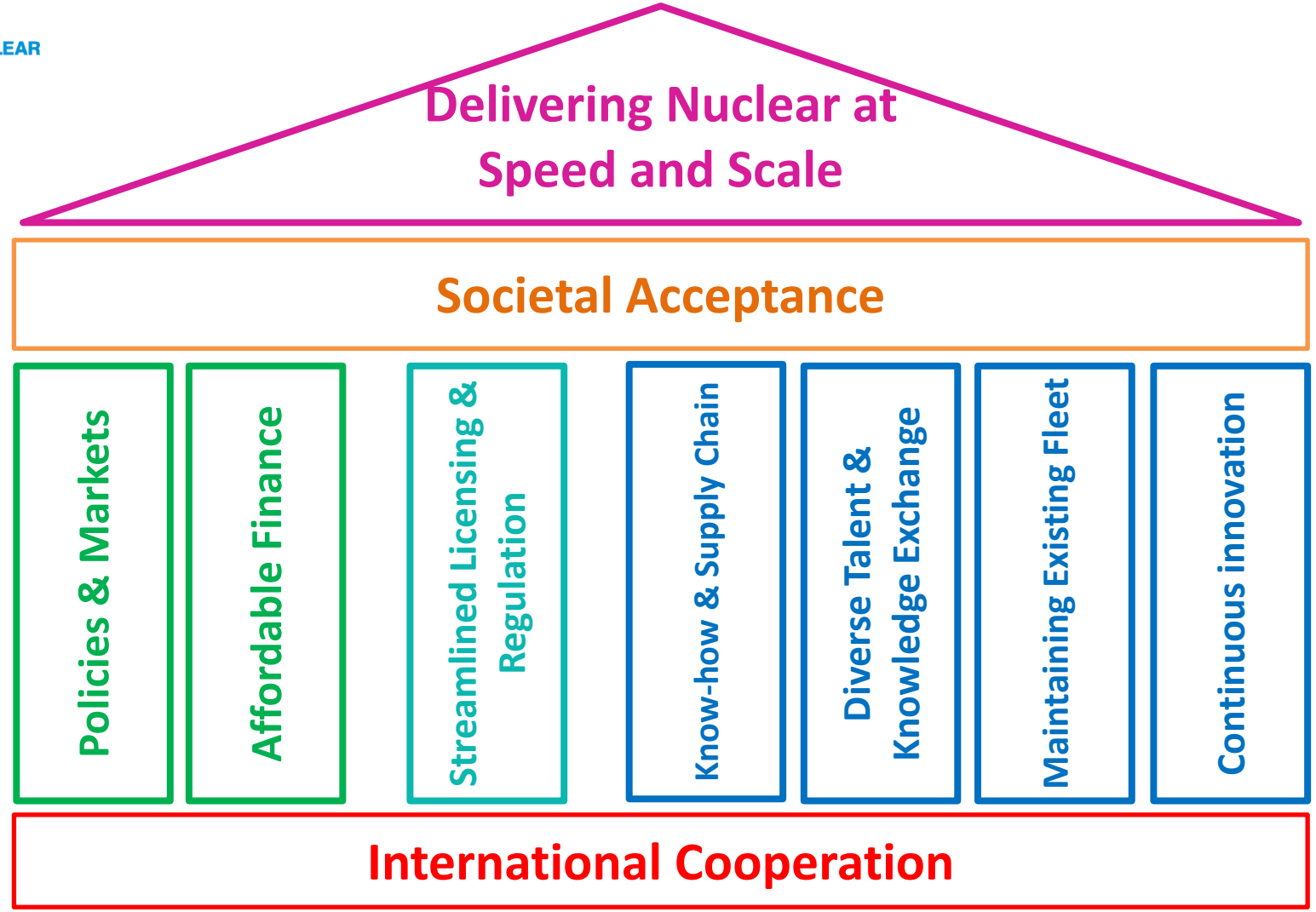
HTR-PM, China
2x110 MWe HTGR
Under Commissioning

Terrestrial, Canada, US, UK
190 MWe IMSR
Under Development

BWRX300, US
300 MWe BWR
Under Review

Aurora/Oklo, US
1.5 MWe Heatpipe FNR
Under Review

WORLD NUCLEAR ASSOCIATION



WORLD NUCLEAR ASSOCIATION

Engaging with governments for better policymaking

UNECE

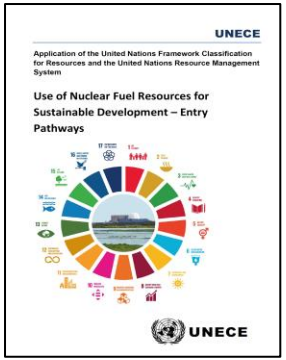
NICE Future
Nuclear Innovation: Clean Energy Future
An Initiative of the Clean Energy Ministerial

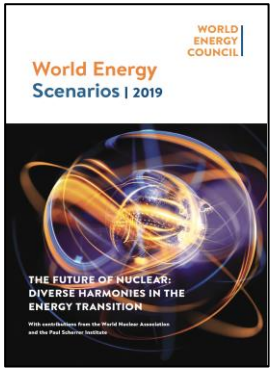
ASEAN Centre for Energy
One Community for Sustainable Energy

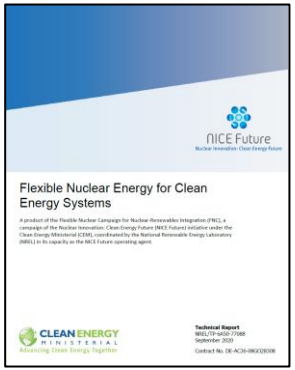
WORLD ENERGY COUNCIL

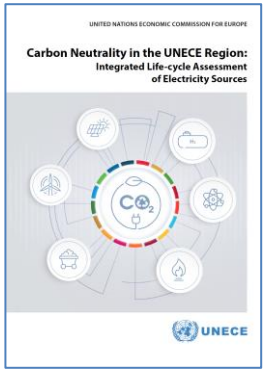
INTERNATIONAL MONETARY FUND

African Union









Media & policymakers are paying attention

Nuclear Energy Carbon Emissions Lowest Among Electricity Sources, UN Reports

UN organization: Climate goals cannot be achieved without nuclear power.

Europe must support nuclear energy

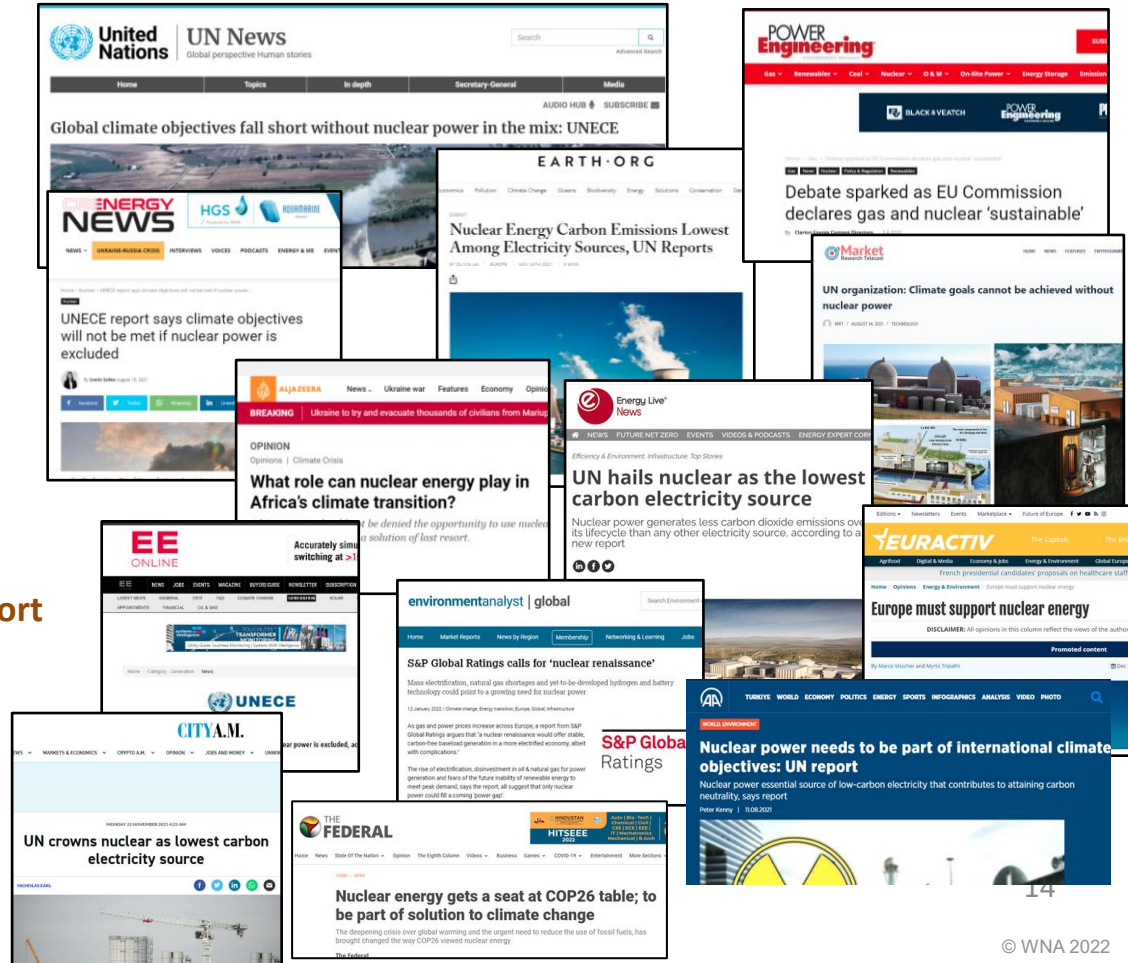
Global climate objectives fall short without nuclear power in the mix: UNECE

S&P Global Ratings calls for 'nuclear renaissance'

Nuclear power needs to be part of international climate objectives: UN report

UN Report 'Nuclear Energy Is An Indispensable Tool For Meeting Sustainable Development Goals'

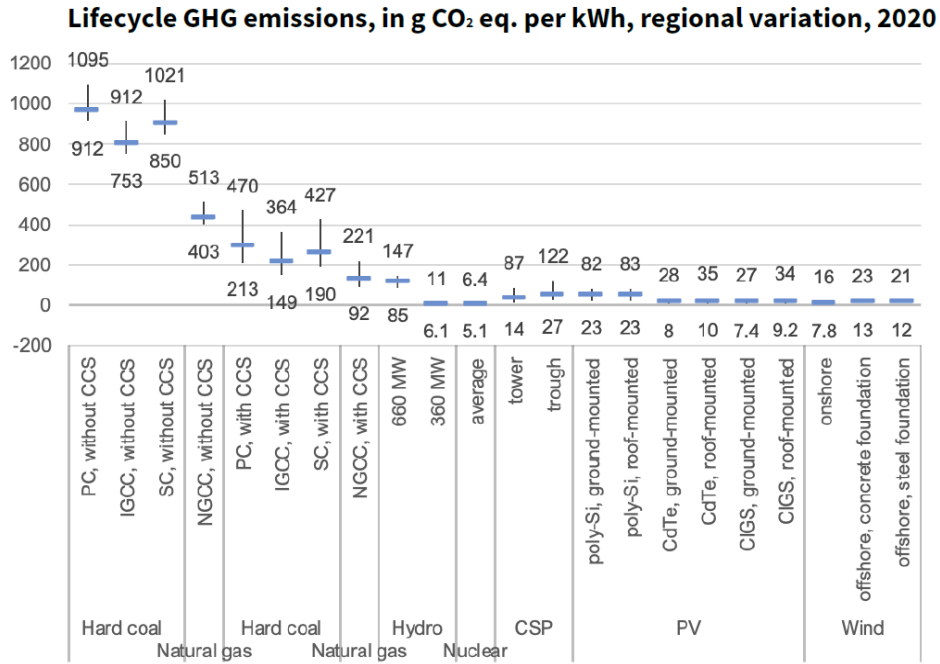
Nuclear energy gets a seat at COP26 table; to be part of solution to climate change



WORLD NUCLEAR ASSOCIATION

Essential for ESG and climate financing to recognize nuclear energy as a sustainable energy source

Lifecycle greenhouse gas emission ranges for the assessed technologies



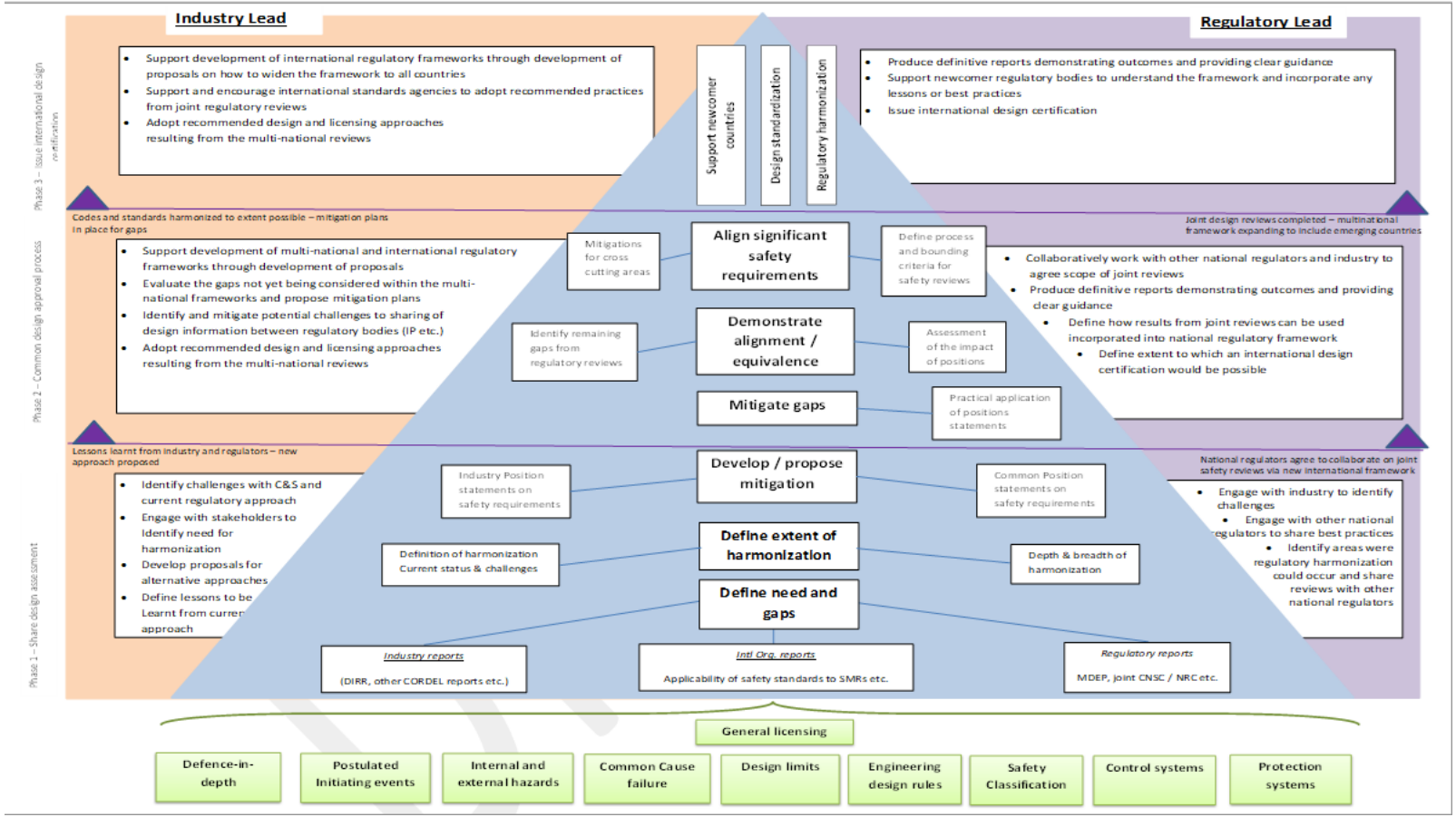
WORLD ECONOMIC FORUM

IFRS
International Financial Reporting Standards

NGFS
Central Banks and Supervisors Network for Greening the Financial System

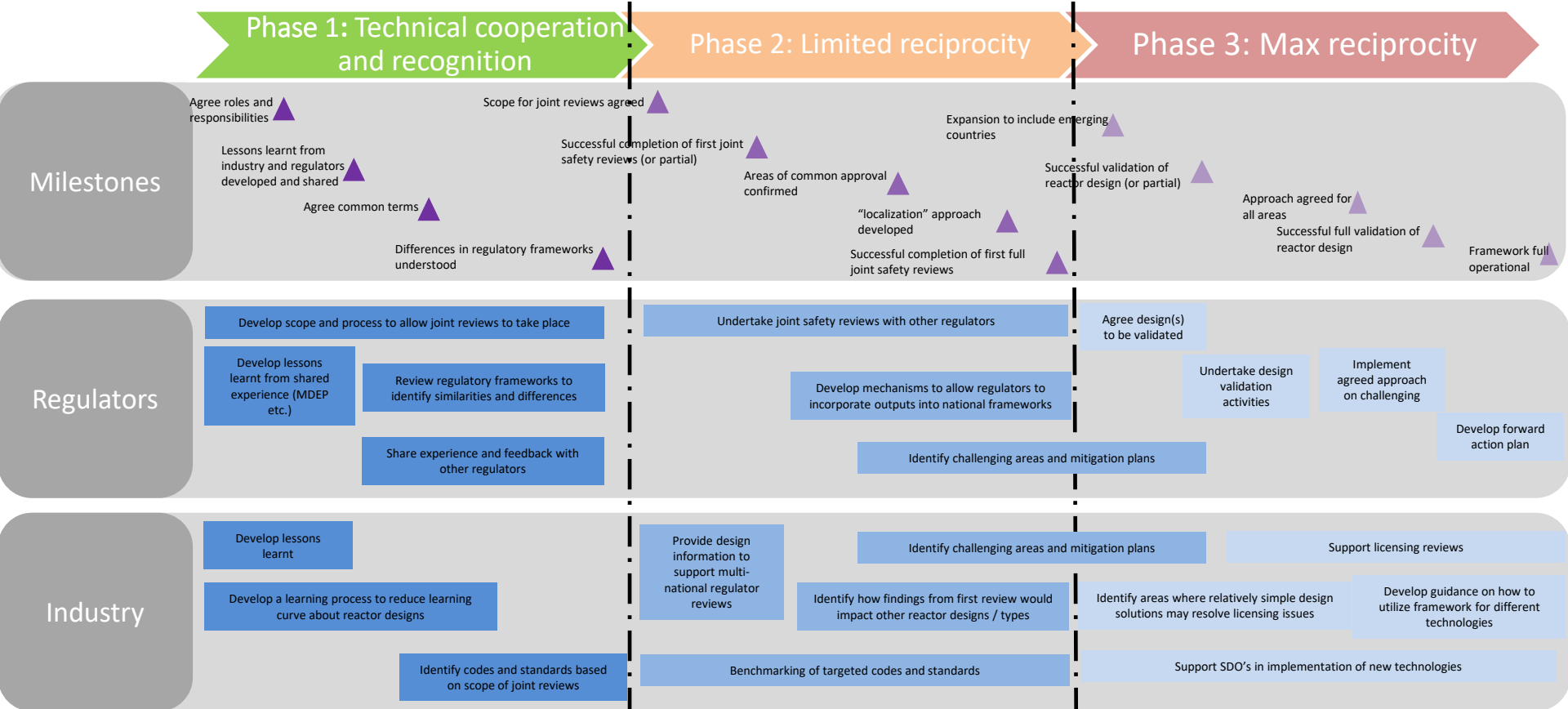
IOSCO
International Organization of Securities Commissions

Streamlining international licensing and regulation



WORLD NUCLEAR ASSOCIATION

Governments, regulators and industry working together



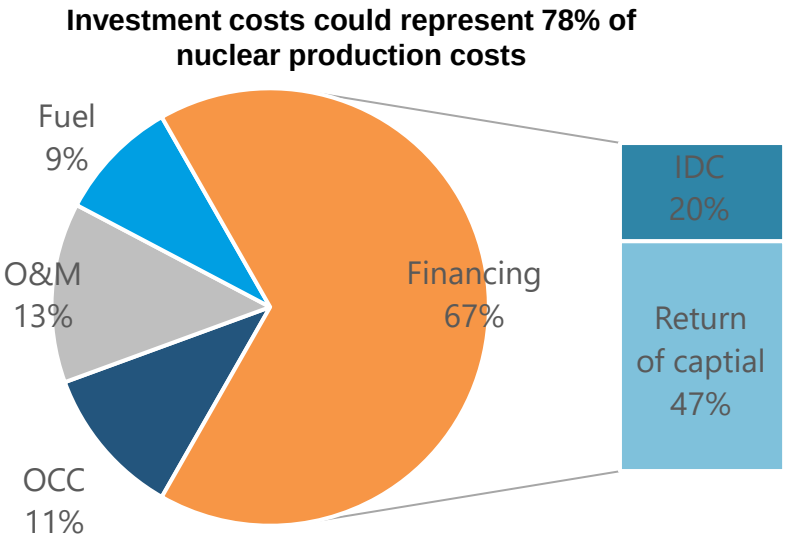
WORLD NUCLEAR ASSOCIATION

There is a small window of opportunity for nuclear energy to deliver on promises with the urgency and at the scale needed

The global nuclear sector must work together…

- to accelerate the **cost-effective** deployment of nuclear projects
- to transform **nuclear regulatory** frameworks
- to **sustain** and **enhance** global nuclear capabilities for nuclear supply chain, R&D, operation and regulation
- to bring **disruptive technologies** to deployment on a **global** basis

Government support needed to instil confidence and incentivise long term planning and investment



Source: NEA, 2020 https://www.oecd-nea.org/jcms/pl_30653
Note: Calculations based on OCC of USD 4 500 per kilowatt of electrical capacity (/kW_e), a load factor of 85%, 60-year lifetime and 7-year construction time at a real discount rate of 9%.

- Unlocking **low-cost finance** for nuclear projects
- Streamlining the **nuclear licensing and regulatory frameworks**
- **Level playing field (policies & markets)** with other low-carbon technologies

WORLD NUCLEAR ASSOCIATION

The Harmony programme is a global initiative of the nuclear industry coordinated by World Nuclear Association.

Nuclear energy offers a golden opportunity to build a cleaner, more equitable world, in which everyone has access to clean abundant affordable energy and a high quality of life.

Sama.BilbaoyLeon@world-nuclear.org

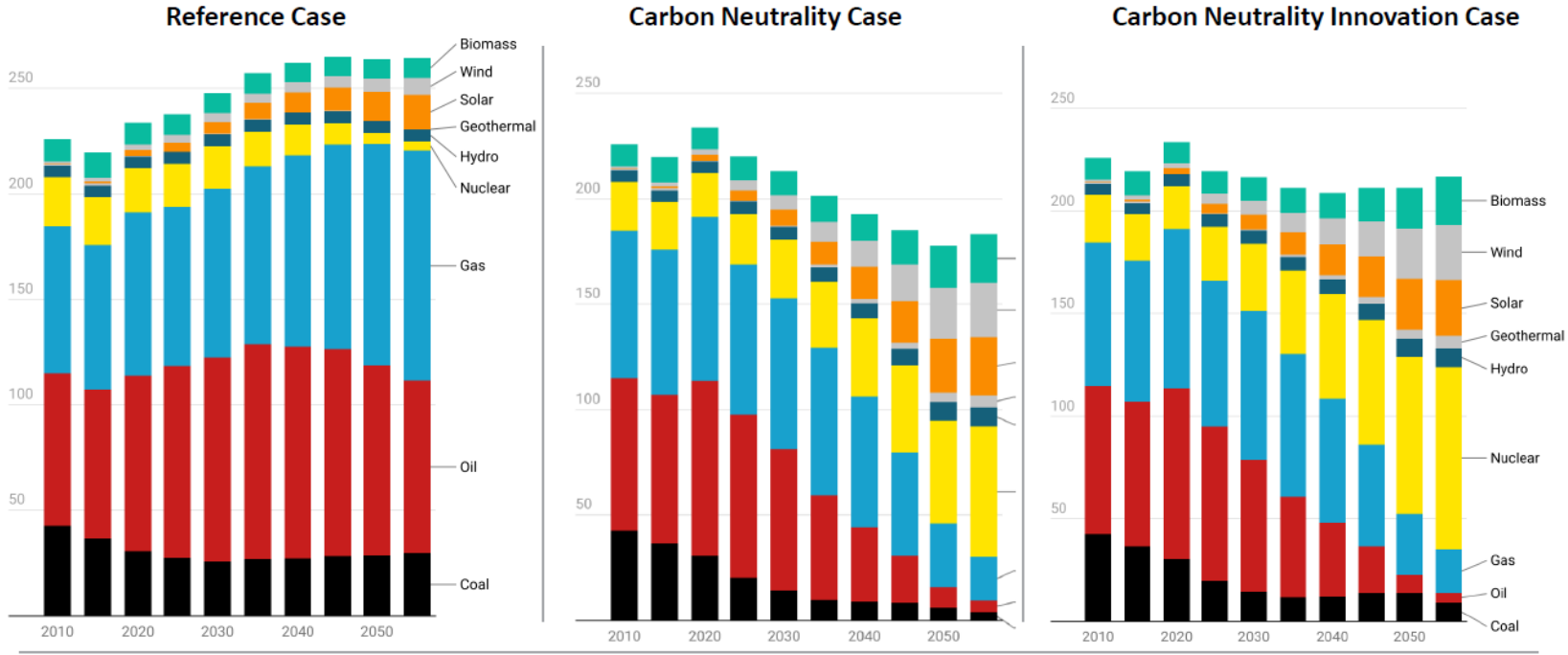
WORLD NUCLEAR ASSOCIATION

Nuclear energy offers a great opportunity to decarbonize the entire economy

UNECE

UNECE Total Primary Energy Supply [EJ]

Reference, Carbon Neutrality, Carbon Neutrality Innovation



Note: preliminary data from UNECE Carbon Neutrality project