



Young Voices on Nuclear Energy's
Contribution to a Net Zero World

Tuesday, 22 June 2021
14:00 Vienna time

Welcome

Questions in the
chat panel

Participants are
muted

No certifications



Lisa Berthelot
Stakeholder Involvement Officer
IAEA Division of Nuclear Power

Webinar Objectives

Discuss pathways to decarbonization, including:

- Increased shares of renewables, nuclear and hydrogen in energy systems
- Replacement of coal by nuclear generation; and
- Designing energy policy and finance mechanisms to accelerate the introduction of low-carbon energy sources for a Net Zero World.

Engage young professionals in the discussion on the global energy transition with the use of low-carbon energy options, including nuclear.

Launch a new IAEA initiative focusing on young professionals.

Today's Topics

1. Moving away from coal: the nuclear energy option.

2. Driving energy systems to net zero with nuclear, renewables and hydrogen.

3. Energy policy, financing, and sustainable development

Opening Remarks

Henri Paillere

- Head, IAEA Planning and Economic Studies Section since February 2020.
- Over 25 years of experience in the nuclear energy sector.
- Senior Analyst and Deputy Head of the Division of Nuclear Technology Development and Economics at the OECD Nuclear Energy Agency, 2011-2019.
- Head of the Technical Secretariat for two international initiatives, the Generation IV International Forum, and the International Framework for Nuclear Energy Cooperation.
- R&D Program Manager at the Alstom Power Company and at the French Alternative Energies and Atomic Energy Commission (CEA) in various positions.



What the Agency is doing

- Support to Member States, those operating nuclear power and newcomer countries
- Analysis of NZ scenarios and trajectories compatible with the Paris Agreement and Sustainable Development Goals, what these mean for the development of nuclear power, in terms of current fleet and required build up
- Contributions of nuclear power to climate change mitigation, but also to the climate resilience of energy systems
- Economics, Financing, Technology, Safety, Waste Management, Public Acceptance, Infrastructures, Milestones...
- Partnerships with nuclear org. (e.g. OECD/NEA) and other org. (e.g. IEA) and collaborations within the UN family (e.g. UN Energy)
- **High level events (DG), webinars – reach beyond nuclear circles**



Objective COP26... and beyond (3 decades of action!)

Nuclear Energy's Contribution to a Net Zero World

- 01 The role of nuclear in clean energy transitions
- 02 Moving away from coal: the nuclear option
- 03 Driving energy systems to net zero
- 04 Adapting to climate change and extreme weather
- 05 Investments in nuclear energy post-COVID
- 06 Nuclear and sustainable development



1 Cutting Emissions for Good: What Role for Nuclear?

16 September 2020: View recording →



2 Factoring Climate Resilience Into The Design of Clean Power Infrastructures

8 June: View presentations →



3 Young Voices on Nuclear Energy's Contribution to a Net Zero World

22 June: Register here →



Are we doing enough?

Want to hear to voice of the young(er) generations



IAEA



Part 1 Moving away from coal: The nuclear energy option



Craig Jantzen

- Climate Change Policy Analyst at IAEA as a Cost-Free Expert from the UK, coordinating the Agency's COP26 preparations across departments.
- Prior work in several energy, climate and science roles across the UK Government, most recently as Head of International Science at the HMG Government Office for Science.
- PhD in Nuclear Engineering, University of Manchester, on advanced reactor materials in partnership with Rolls Royce
- Masters of Engineering and Masters of Science in Nuclear Engineering, Lancaster University.



River Bennett

- Graduate Research Assistant, University of Michigan, pursuing MS in Nuclear Engineering.
 - Supported by National Reactor Innovation Center and Fastest Path to Zero
 - Researches siting and environmental justice considerations for advanced reactors.
- Fellow at the Nuclear Innovation Alliance, Lead organizer and past participant of Nuclear Innovation Bootcamp.
- Roles in edtech and international development with focus on water and sanitation access.
- BA in Political and Social Thought, focus on Energy Policy, University of Virginia

The Coal Problem

*“...if we are serious about 1.5 degrees,
Glasgow must be the COP that consigns coal to history”*

COP26 President
Alok Sharma



Worldwide, air pollution from burning fossil fuels is responsible for about 1 in 5 deaths annually—roughly the population of New York City. (around 10.2 million premature deaths)^[1]

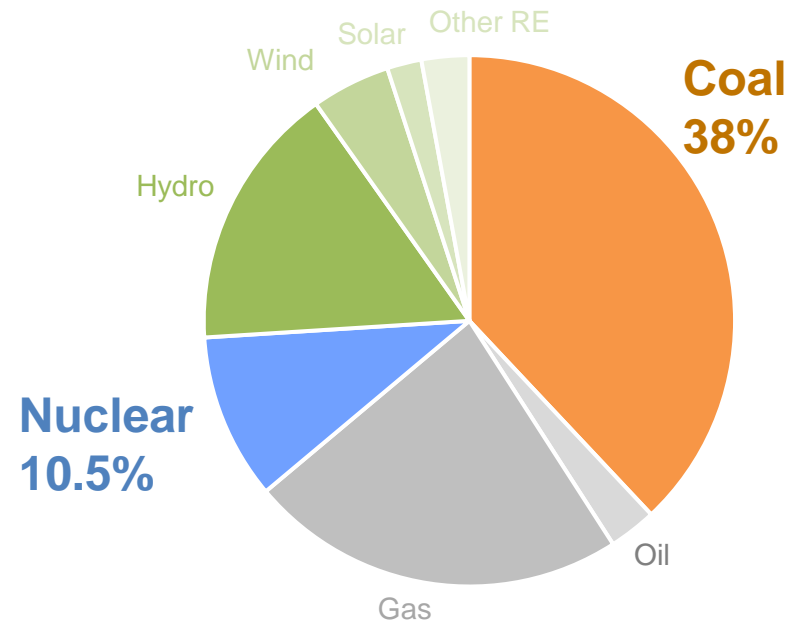
[1] Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem, Environmental Research (2021)

The Coal Problem

- Phase out of Coal is the worlds top **climate priority**
- **38% of total in 2018**, and current stated policy scenario
- Recent G7 summit showed the **difficulty of agreeing phase out of this even for advanced nations**



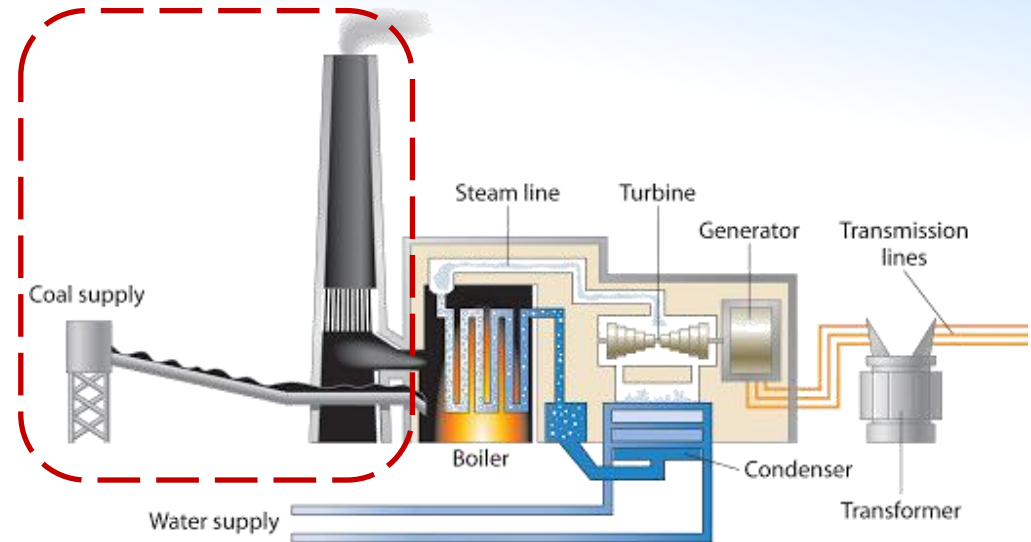
World gross electricity production, by source, 2018^[1]



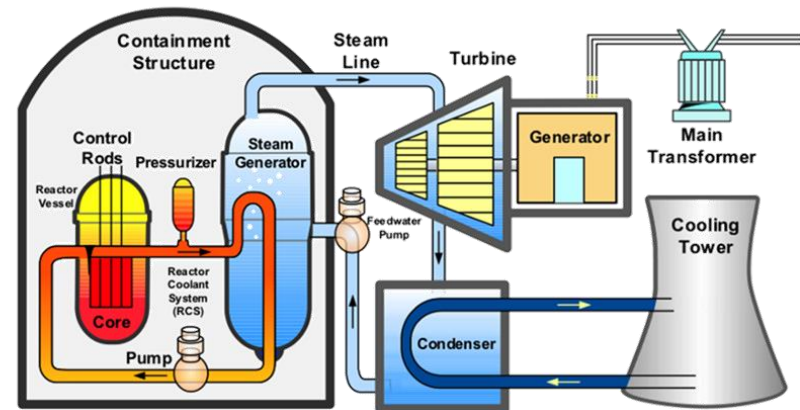
Nuclear vs Coal

- **Similar system properties:** Predictable, dispatchable/flexible, thermal power plants, dense power sources, system resilience and stability
- **Coal:** Carbon intensive, lots of other pollutants, health impacts
- **Nuclear:** Low-carbon, used for power or heat source
- **Nuclear power can be an ideal clean energy replacement for coal on the path to net zero**

Coal Plant



Nuclear Plant



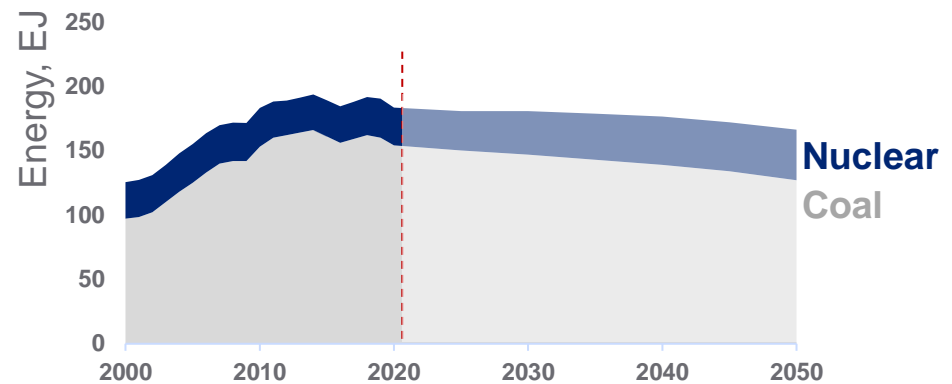
Opportunities

“Renewables and nuclear power displace most fossil fuel use in the Net-Zero Emissions by 2050 Scenario”

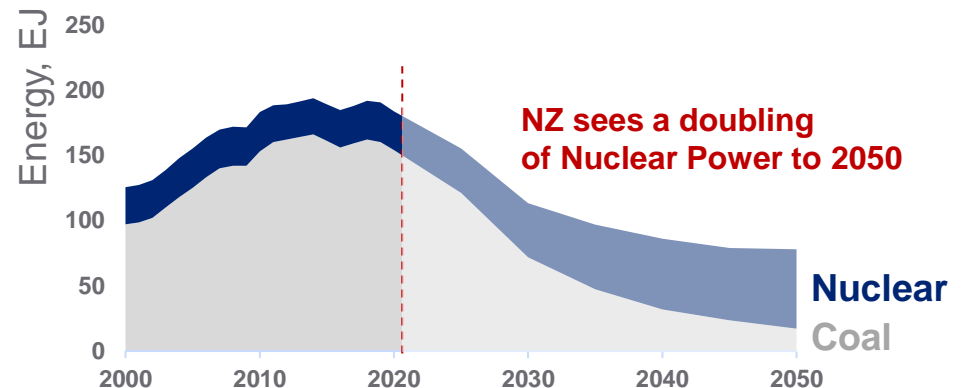
IEA Net Zero by 2050 Report

- In a net zero scenario, **nuclear works with renewables to displace coal.**
- As of 2021, of the 16 countries* pledging to phase out coal before 2030, 50% use nuclear energy^[1]
- Currently, 32 countries are operating nuclear power plants + (7 more with plants under construction/advanced preparation). Cover around 85% of the world’s coal generation
- **A net zero world needs nuclear**

IEA STEPS Scenario^[2]



IEA Net Zero 2050 Scenario^[2]



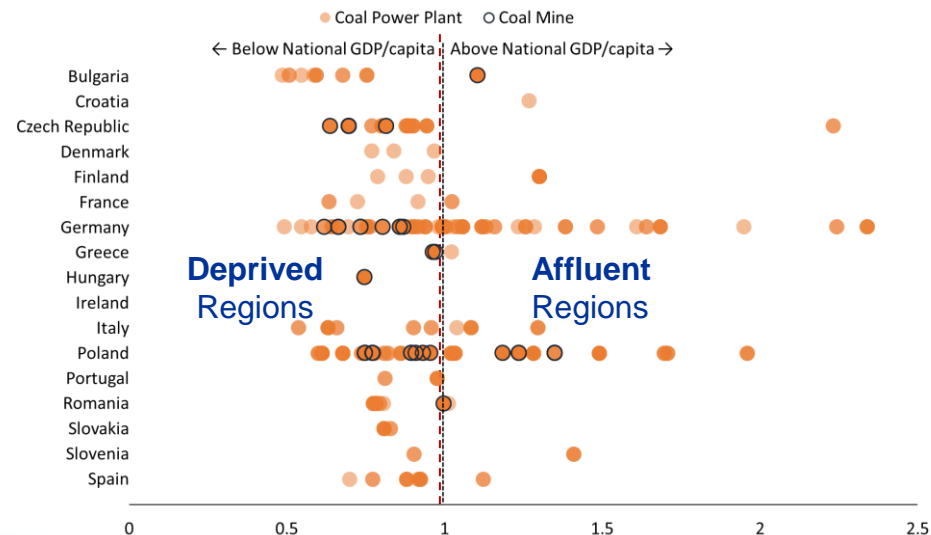
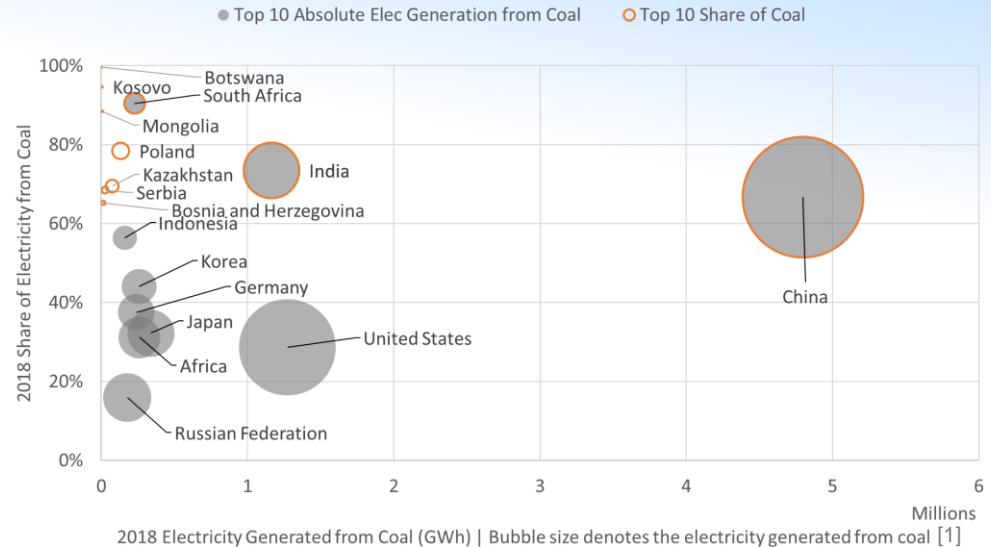
[1] [Overview: National coal phase-out announcements in Europe](#), (Europe Beyond Coal, 2021)

[2] International Energy Agency (2021), Net Zero by 2050, IEA

* with coal in their power system – some nations started with no coal in their electricity mix

Just Transition

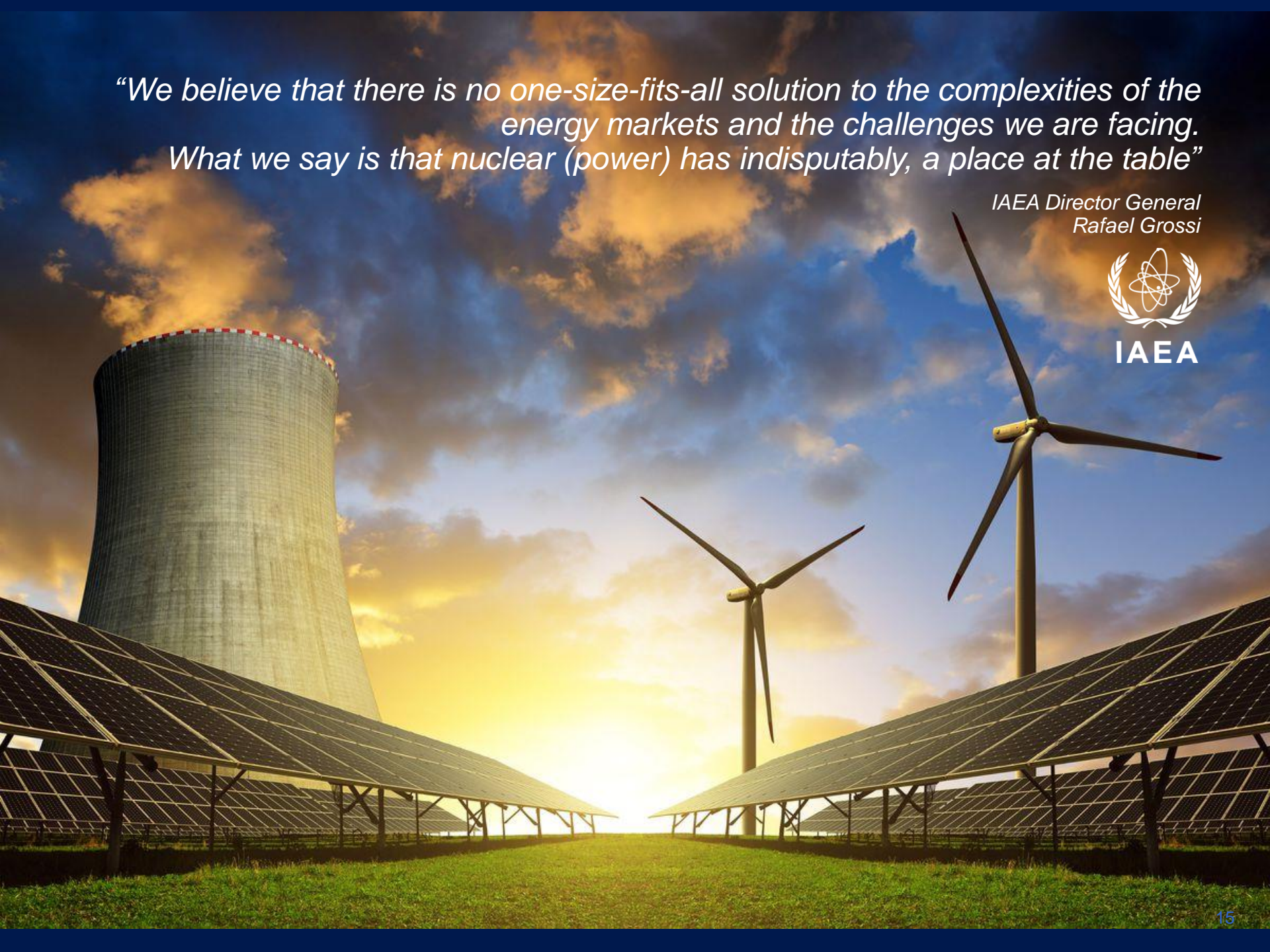
- **Rapid phase out of coal makes a ‘Just Transition’ challenging**
- **No one-size fits all system – for many nuclear energy is suitable**
- **Significant contribution to economic development**
- **Investment in nuclear energy is estimated to produce much larger economic benefits (compared to other energy technologies)**^[3]



[1] IEA (2021), "World energy balances", IEA World Energy Statistics and Balances (database, June 2021)
 [2] IEA (2021), "World energy balances", IEA World Energy Statistics and Balances (database, June 2021)
 [3] Building Back Better: How Big Are Green Spending Multipliers? IMF Working Paper WP/21/87, International Monetary Fund (2021)

“We believe that there is no one-size-fits-all solution to the complexities of the energy markets and the challenges we are facing. What we say is that nuclear (power) has indisputably, a place at the table”

*IAEA Director General
Rafael Grossi*



IAEA Young Voices on Nuclear Energy's Contribution to a Net Zero World

PART 1: Moving away from coal: the nuclear energy option

River Bennett, Graduate Researcher (Nuclear Engineering)

*National Reactor Innovation Center (U.S.) +
Fastest Path to Zero (University of Michigan)*



A Brief history of nuclear technology:



Do we need nuclear energy?



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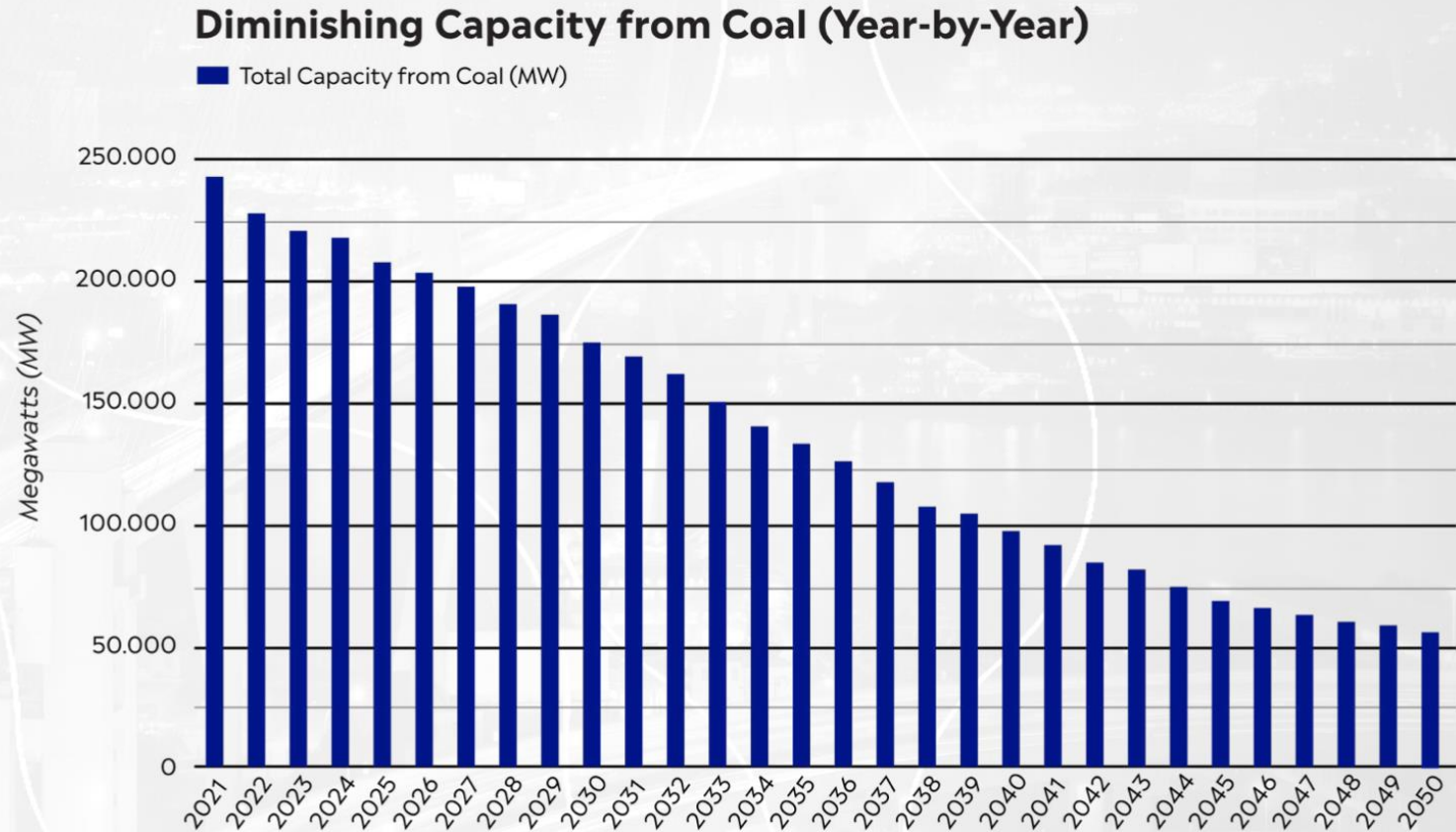
The 7 reasons why nuclear energy is not the answer to solve climate change



FASTEST PATH TO ZERO
UNIVERSITY OF MICHIGAN

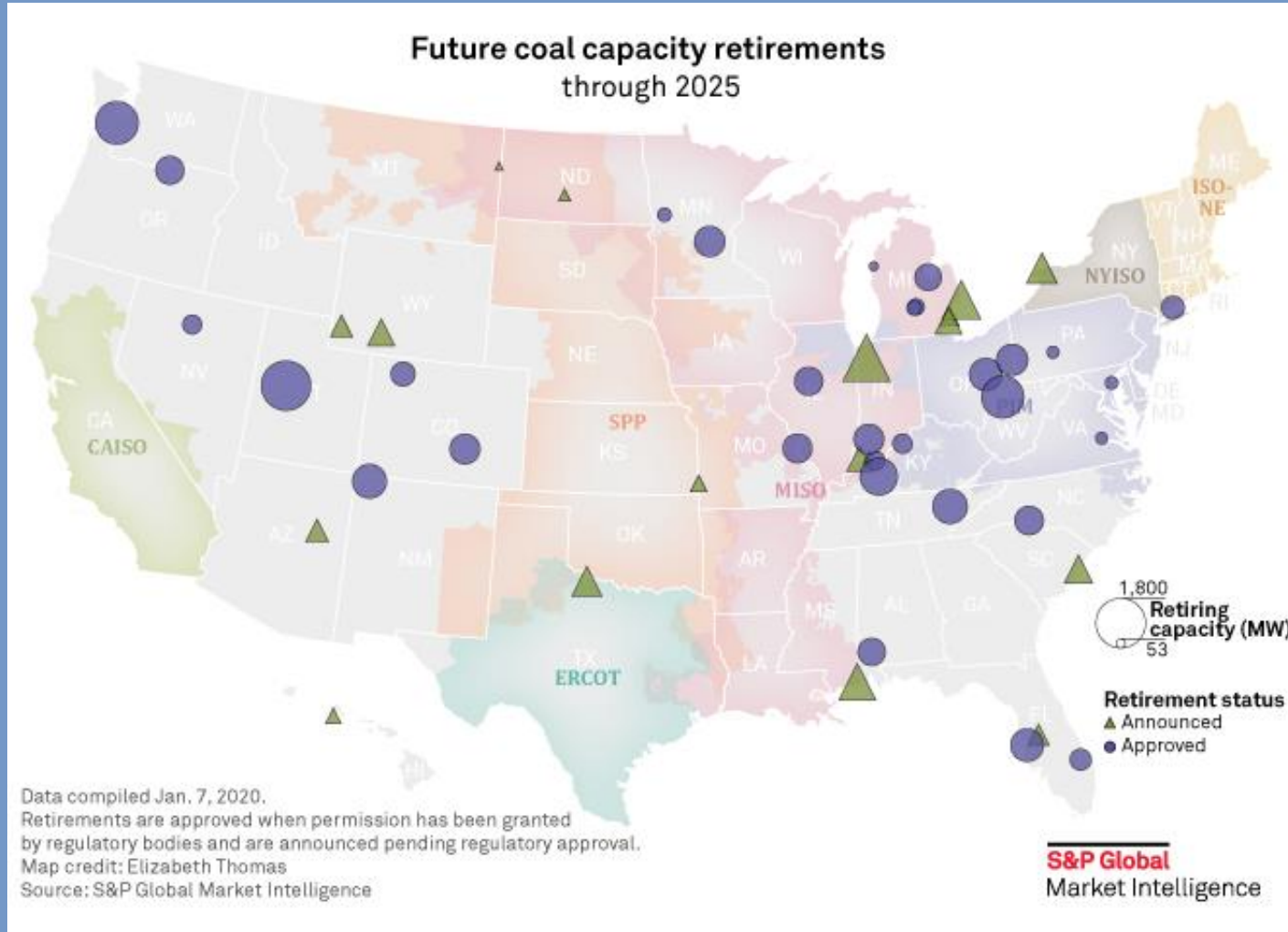
Power plant closures present a compelling opportunity

Figure 1: Diminishing Capacity of Coal in the U.S. Annually through 2050



Source: GlobalData 2020

Power plant closures present a compelling opportunity



Communities and Workers as protagonists



Naughton Power Plant, Wyoming (wyofile.com)

Case Study 1: UAMPS + NuScale Carbon Free Power Project



Case Study 2: Rocky Mountain Power + TerraPower



Thank you!

River Bennett, Graduate Researcher (Nuclear Engineering)

National Reactor Innovation Center (U.S.) +

Fastest Path to Zero (University of Michigan)

riverb@umich.edu



Part 1 Moving away from coal: The nuclear energy option



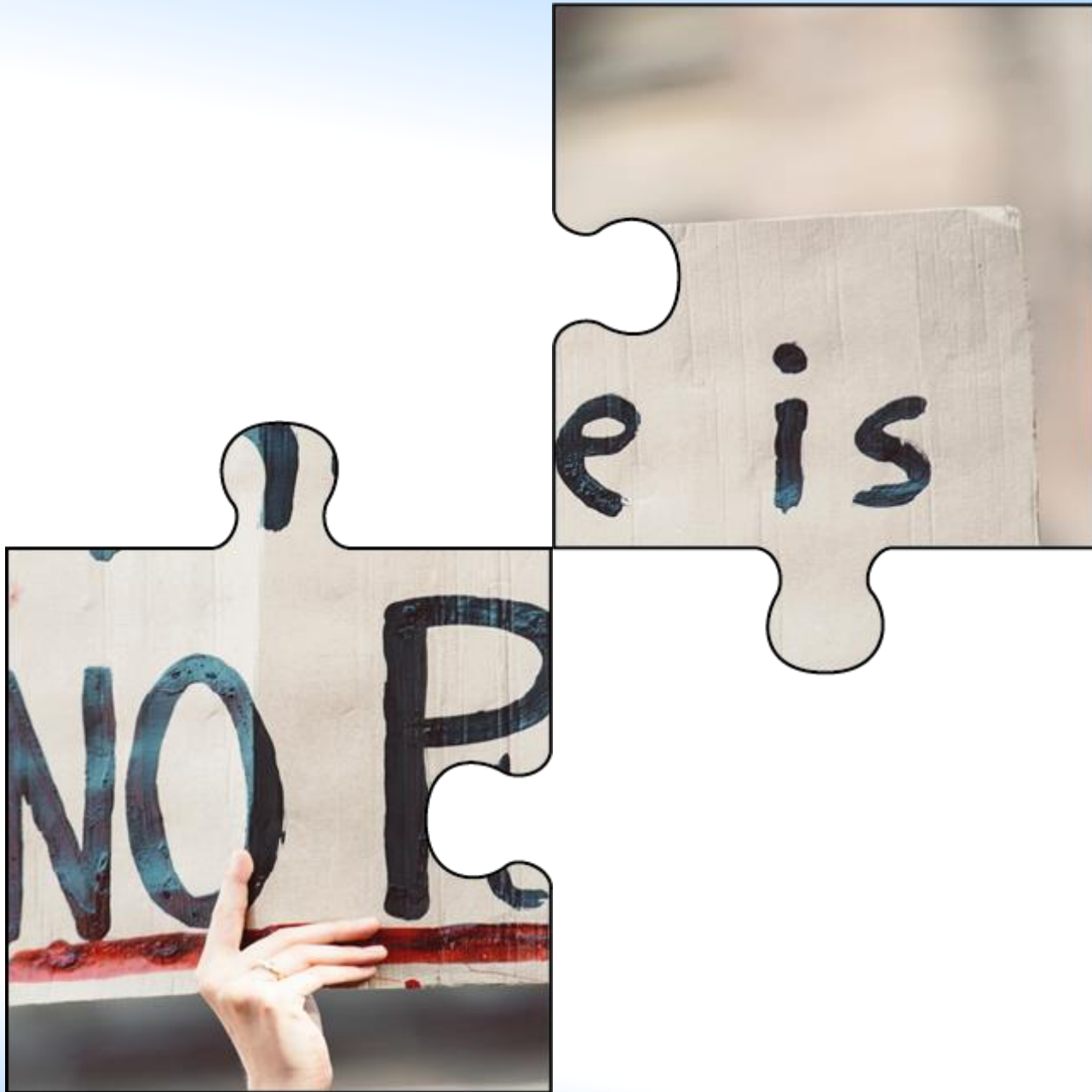
Craig Jantzen



River Bennett



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Part 2 Driving energy systems to net zero with nuclear, renewables and hydrogen



Ed Bradley

- Team Leader NPP Operation & Engineering Support in the IAEA Division of Nuclear Power.
- Experience in management, oversight and technical support of nuclear power and research reactor facilities.
- Previously design engineer and project manager for ANSTO, in Australia, and in US commercial nuclear power industry as reactor engineer at Oyster Creek NPP, and as shift- and system-engineer at Three Mile Island Unit-1. Worked as Senior Reactor Operator at the 3000 MW DOE Savannah River Site L-reactor.
- BS in Mechanical Engineering, Carnegie Mellon University, technical certifications and qualifications.



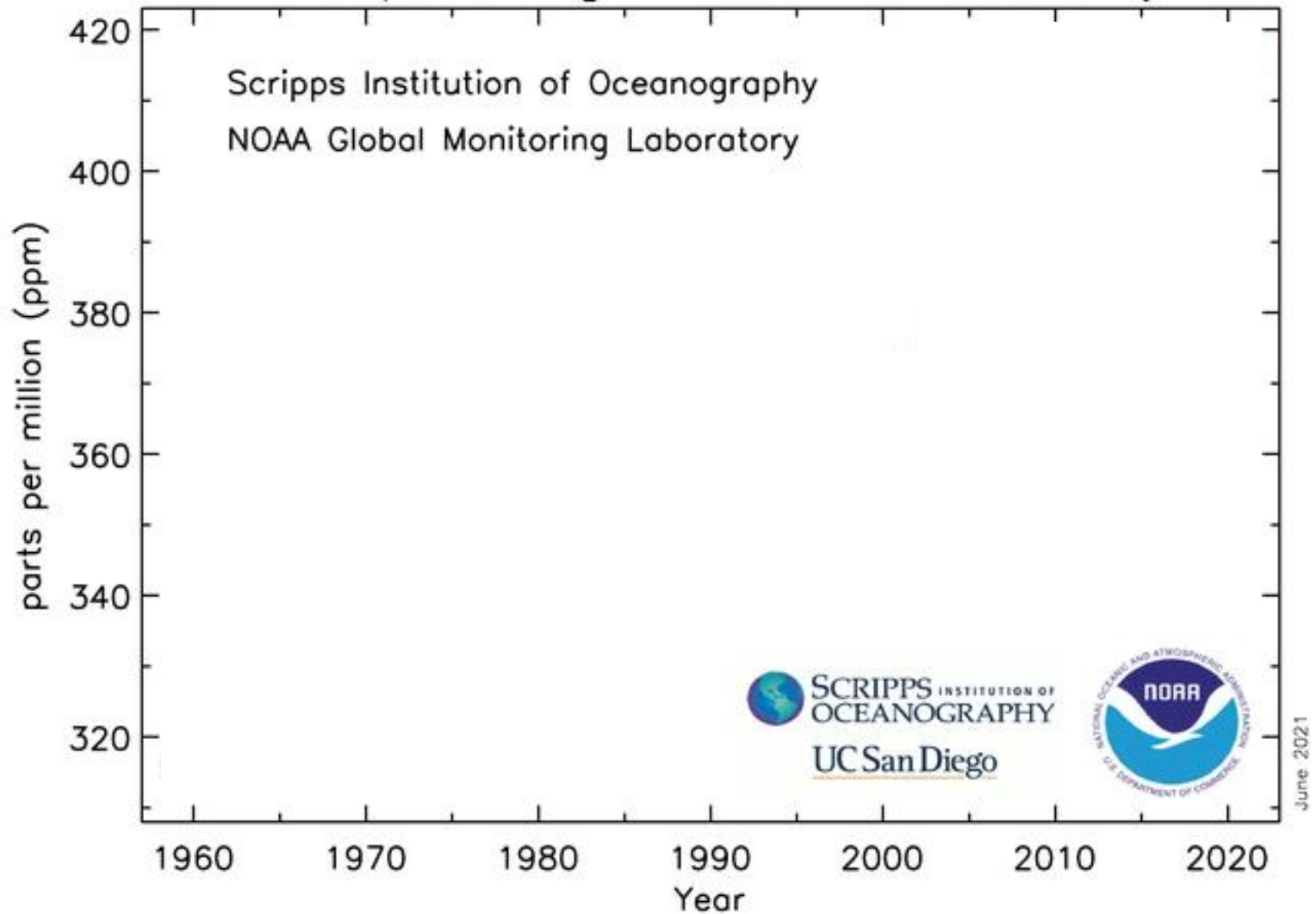
Alice Cunha da Silva

- Key Account Engineer for Latin America, Westinghouse, and manages Westinghouse Brazil Office.
- Member of COP 26 Nuclear Delivery Team
- International Organizations Chair of IYNC, member of WIN Brazil executive committee, Theme co-lead at Women in Engineering Committee of the World Federation in Engineering Organizations, and Communication and Education Chair of the Latin America Section of American Nuclear Society.
- Bachelors in Nuclear Engineering and M.B.A. in Project Management, Federal University of Rio de Janeiro, and M.B.A, University of Bordeaux.
- Youngest member of the Brazilian Association of Nuclear Energy Board, won the 2015 WNU Nuclear Olympiad with final stage at IAEA, TEDx Speaker.

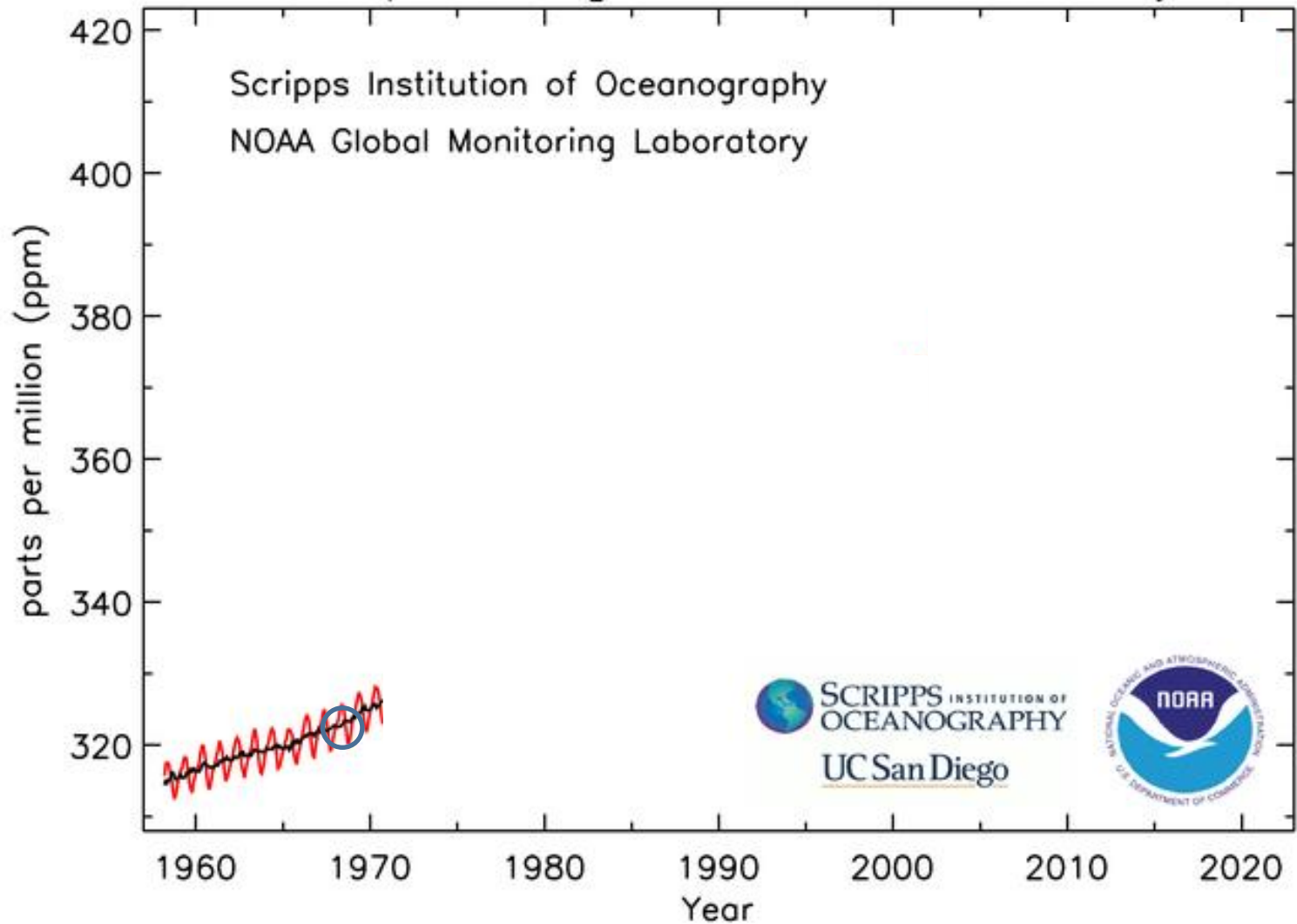
...a Net Zero World



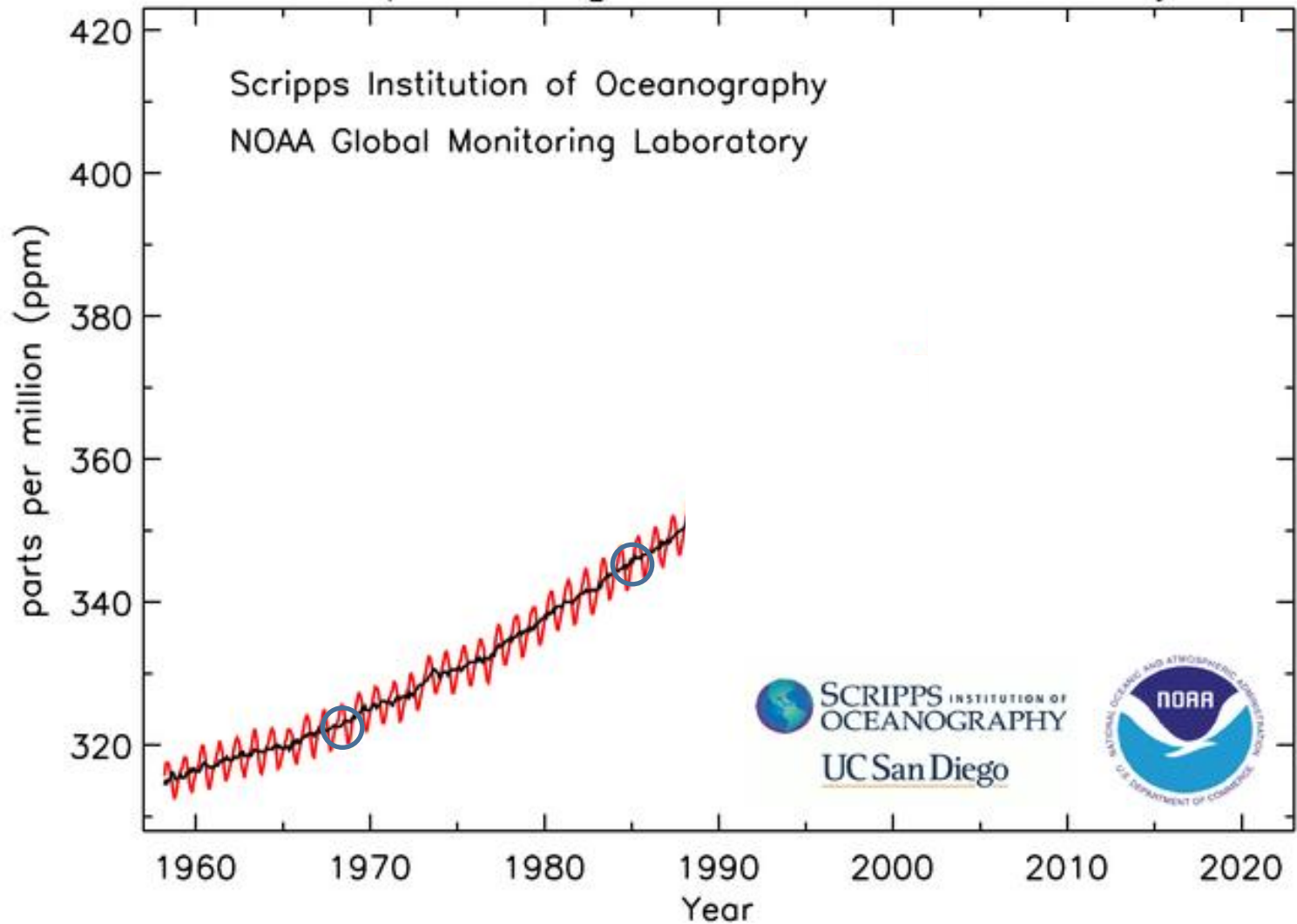
Atmospheric CO₂ at Mauna Loa Observatory



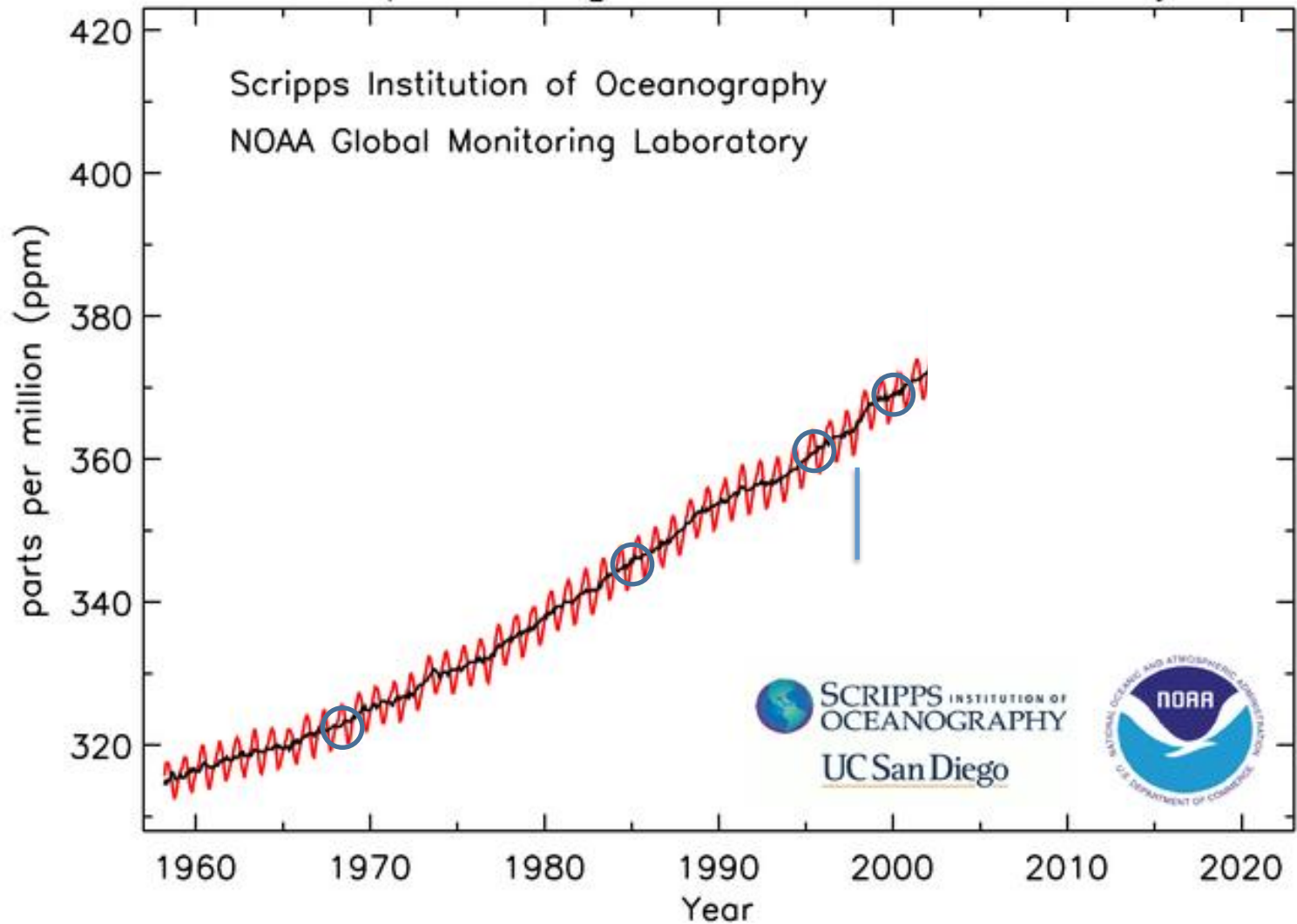
Atmospheric CO₂ at Mauna Loa Observatory



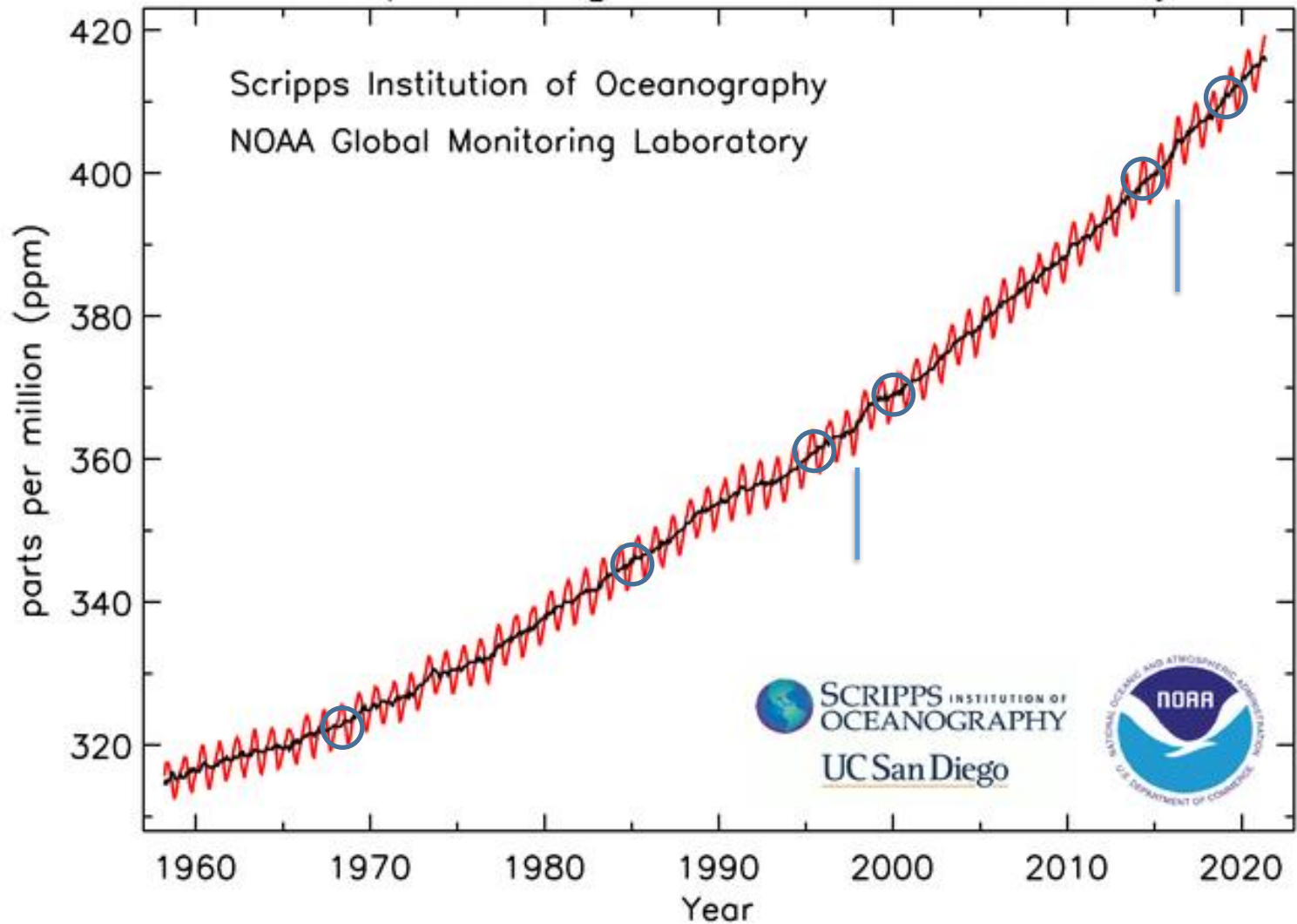
Atmospheric CO₂ at Mauna Loa Observatory



Atmospheric CO₂ at Mauna Loa Observatory



Atmospheric CO₂ at Mauna Loa Observatory



Driving systems to net zero with nuclear, renewables & hydrogen



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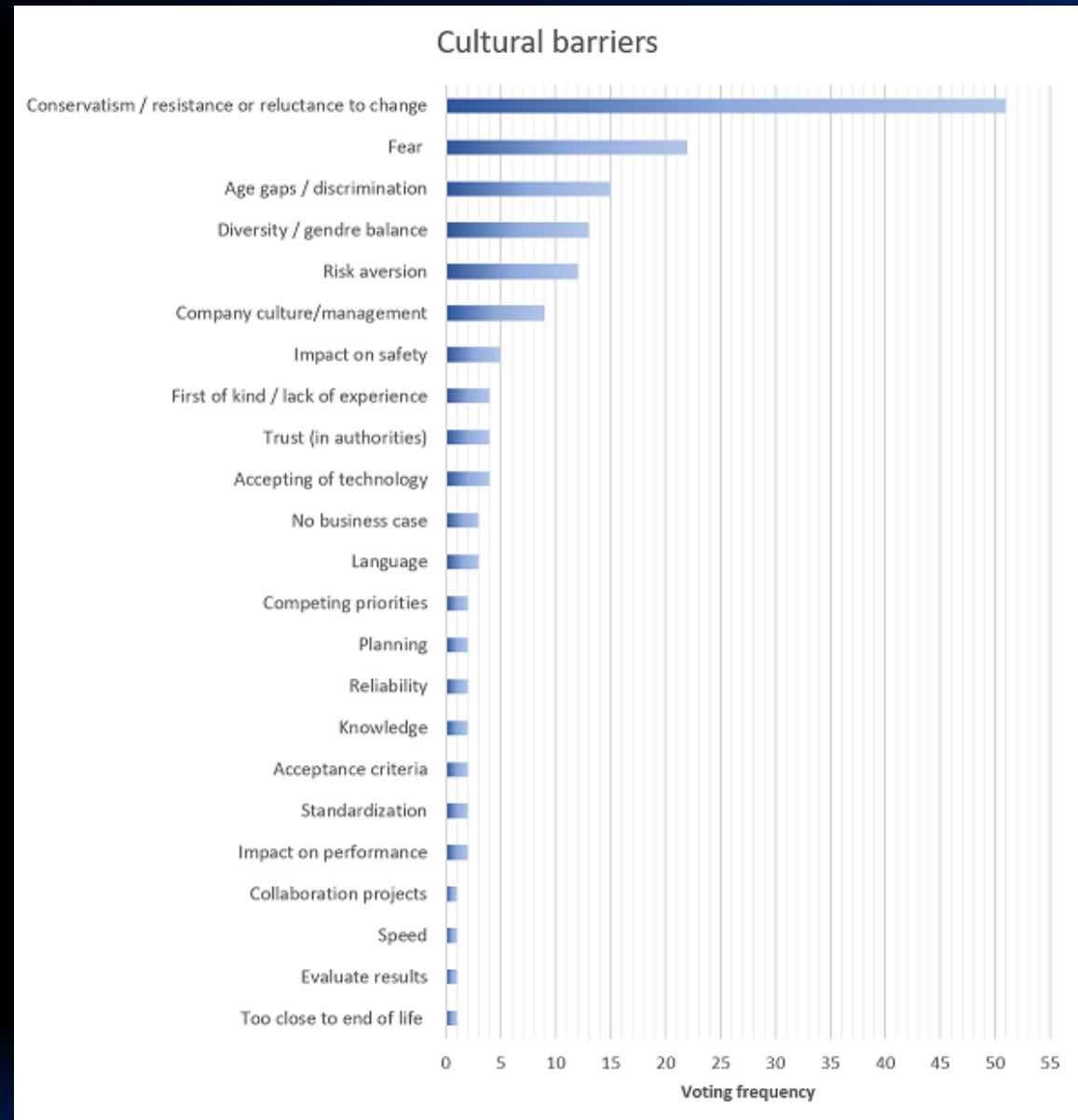
- Inclusive



- Inclusive
- Innovative



- Inclusive
- Innovative
- Disruptive



IAEA Young Voices on Nuclear Energy's Contribution to a Net Zero World



Driving energy systems to net zero with nuclear, renewables and hydrogen

Alice Cunha da Silva
Brazil

Tweet

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[Nuclear Institute Young Generation Network](#)

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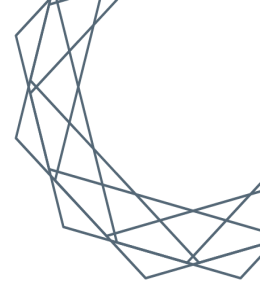
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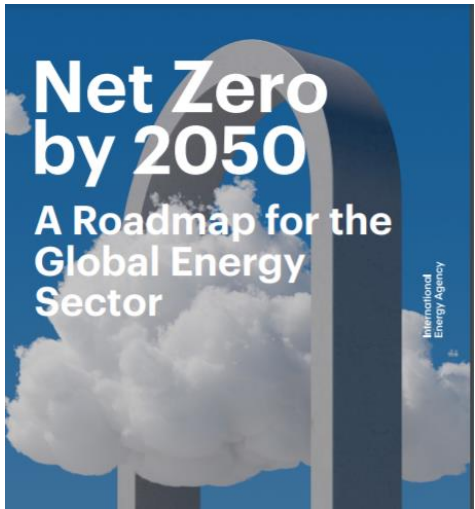
[NIYGN](#)

Web

nuclearinst.com/YGN



Driving energy systems to net zero with Nuclear, Renewables and Hydrogen



- Nuclear Cogeneration
 - Desalination
 - H₂production
 - District heating
 - Industrial processes heating
- Hybrid Energy Systems

Nuclear Power Considerations:

- Lifetime extensions;
- Pace of new construction;
- Advances in nuclear power technology



Besides Climate Change we also face many other global challenges like diseases, hunger, poverty, inequality more. Access to energy plays an essential role in solving these issues. Net zero needs because, in combination with renewables, Nuclear allows those in energy poverty to have a route to abundance while still pursuing a sustainable and Net Zero Future.




Young Generation Network @COP26

Vision
To have a clean, sustainable and abundant low carbon future for all.


Mission
To accelerate the ability of the world to achieve Net Zero by 2050, by driving collaboration between nuclear and renewable technology

“
We face global challenges that range from disease to hunger, poverty, inequality and more. Access to energy plays an essential role in solving these issues. With its density, small footprint and as a source of clean energy production, Nuclear is the solution to fight both climate change and energy poverty at the same time.

#NetZeroNeedsNuclear




Alice Cunha da Silva
COP26 Delivery Team Member




“
There's no longer a debate about it. The question now is how quickly the young generation mobilises to influence legislators and other climate activists. We must get on the streets to fight for this proven solution which promises to secure a happy, healthy and abundant future for ourselves and generations to come.

#NetZeroNeedsNuclear



Arun Khuttan
COP26 Delivery Team Lead



“
For constant, reliable, clean energy nuclear comes out top in my eyes. It can be combined with renewables to meet our NetZero carbon targets and ensure we preserve the places we love from the devastating effects of climate change.

#NetZeroNeedsNuclear



Hannah Paterson
YGN Vice-Chair and International Liaison



“
Millions are dying prematurely due to pollution and we are consistently not meeting our climate targets. Nuclear power is needed now more than ever as it utilizes the smallest land footprint, requires the least amount of material throughput, and produces clean power reliably.

#NetZeroNeedsNuclear



Matthew Mairinger
COP26 Delivery Team Member



“
Climate change and biodiversity loss are currently the biggest threats to our planet. These challenges are hard enough as it is. By excluding Nuclear power, the second largest source of low-carbon electricity in the world, we are setting ourselves up to fail.

#NetZeroNeedsNuclear



Miguel Trenkel-Lopez
COP26 Delivery Team Member



“
Net Zero requires new Nuclear, along with Renewables and other clean energy systems, deployed on a scale and at a pace unlike anything we've seen before. It's time for us to come together and embrace this exciting challenge, but we need to act now to protect our future.

#NetZeroNeedsNuclear



Neil Calder
COP26 Delivery Team Member



“
We need to get to Net Zero as fast as possible while meeting rising energy demands, and Nuclear, alongside Renewables, is imperative to that. We all want to achieve the same thing - fight climate change - and we need to unite and work together to ensure a clean, low-carbon and happy future for ourselves and future generations.

#NetZeroNeedsNuclear



Saralyn Thomas
YGN Marketing & Communications Lead



“
Our future is rich with countless opportunities, possibilities, and exciting unknowns! As young people we are lucky that we still have time to influence minds towards the positive, nuclear-inclusive options that are a must if we are to achieve Net Zero. But the urgency is real. It's time to get inspired and drive the change we want to see and be, because by 2050 the future won't be ours anymore.

#NetZeroNeedsNuclear



Sophie Zienkiewicz
COP26 Delivery Team Member



“
We face a global climate crisis that requires the rapid decarbonisation of the energy industry. We are running out of time to make changes that will prevent a climate change catastrophe. This challenge cannot be met by any one source alone. Nuclear is safe, it's reliable and it's low carbon.

#NetZeroNeedsNuclear



Vicki Dingwall
COP26 Delivery Team Member





#NetZeroNeedsNuclear Campaign

Nuclear societies call for COP26 to support nuclear

02 June 2021



Over 100 nuclear societies around the globe have called for world leaders to "follow the science" and recognise that nuclear energy output must at least double by 2050 to meet global net-zero targets. The call comes ahead of the 26th UN Climate Change Conference of the Parties (COP26) being held in Glasgow from 1-12 November this year.



(Image: Nuclear for Climate)

Save Our Climate - Acknowledge that Net Zero Needs Nuclear at COP26



Nuclear Institute Young Generation Network started this petition to John Kerry (United States Secretary of State) and 3 others

To donate visit our webpage - www.netzeroneedsnuclear.com

3,605 have signed. Let's get to 5,000!



- Najib ÇAOUI signed 6 hours ago
- Byamukama Abdul signed 14 hours ago

Thanks to your support this petition has a chance at winning! We only need 1,395 more signatures to reach the next goal - can you help?

Take the next step!

NetZeroNeedsNuclear.com

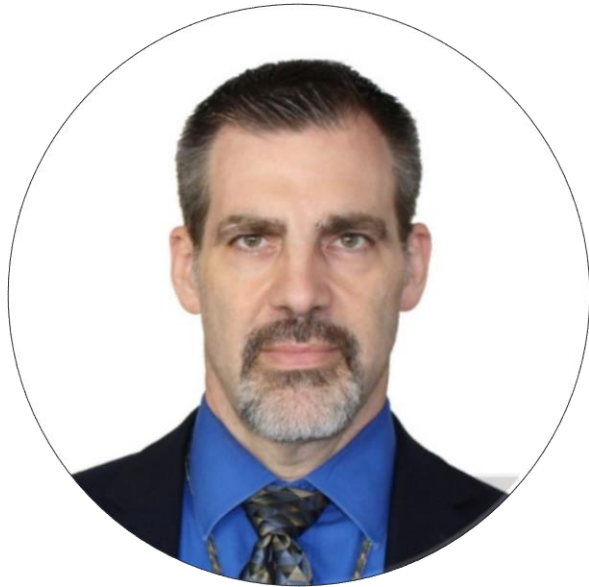
Contact:

alicecs@poli.ufrj.br

cunha1a@westinghouse.com



Part 2 Driving energy systems to net zero with nuclear, renewables and hydrogen



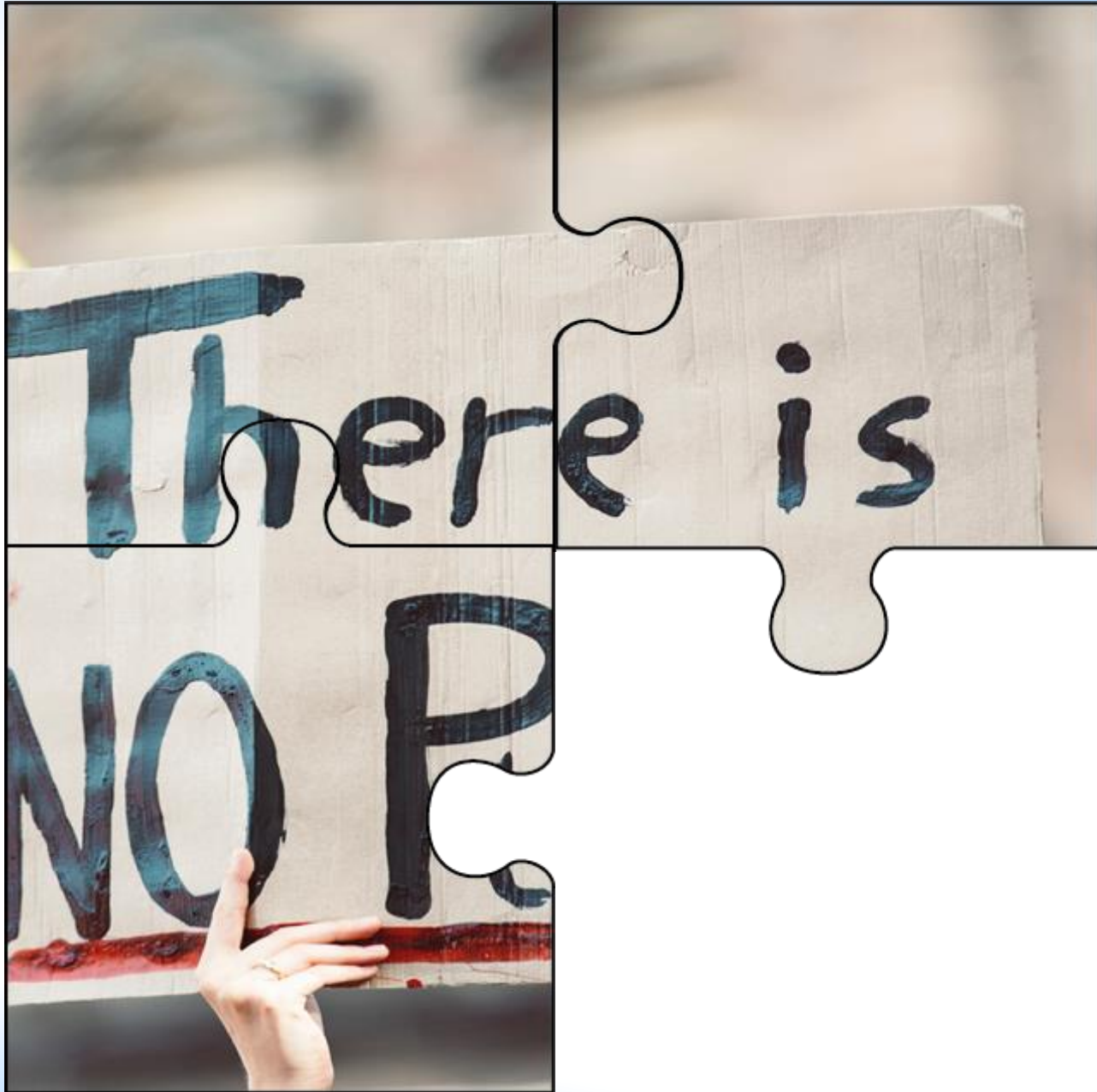
Ed Bradley



Alice Cunha da Silva



IAEA



Part 3 Energy policy, financing and sustainable development



Denis Subbotnitskiy

- Energy Data Analyst, IAEA Planning and Economic Studies Section.
 - Economics and financing of energy programmes and projects, and topics related to climate change and sustainable development.
 - Regular contributor to IAEA Climate Change and Nuclear Power report
 - Co-Organizer of the IAEA Coordinated Research Project on Economic Appraisal of Small Modular Reactors (SMR)
- Working in international development since 2011, with UNIDO, FAO and IAEA, focus on energy economics, energy efficiency, climate-friendly energy technologies and quality monitoring of international development projects.
- VP United Nations Nuclear Young Generation 2018-2020.



Nancy Mberia

- Technical officer, Nuclear Power and Energy Agency in Kenya.
- Academic background in economics.
- Technical studies and drafting policies on and strategies for the different infrastructure issues within the country's nuclear power programme.
- Contributes to Kenya's energy planning process and development of national energy plans within an established multiagency framework.
- Interests in sustainable policy formulation, energy resource exploitation, energy mix creation and carbon emission reduction.

Energy Policy

We need a green planet – but the world is on red alert
UN Secretary-General A. Guterres, 2021 Leaders Summit on Climate

- **International efforts to combat climate change are accelerating:**
 - Countries **announcing pledges** to achieve net zero emissions over the next decades
 - **COP26 in Glasgow, UK:** nationally determined contributions (NDCs)
- **Recognition of climate crisis** as a great challenge of our times becomes a mainstream
 - Policies – key instrument to bring the world on track to limit global warming to 1.5 °C

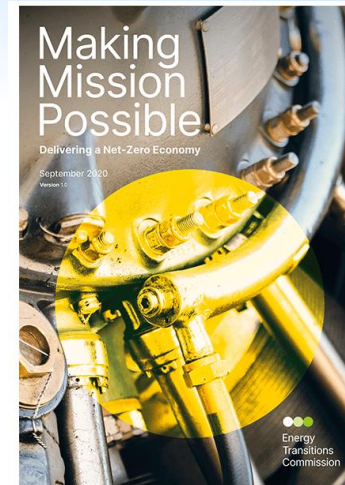


International
Energy Agency



Financing

- Transition to **net zero world by 2050**:
 - Up to US\$2 trillion per year: 1% to 1.5% of global GDP (*ETC Report, 2020*)
- More resources to become available to decarbonize **global energy system**
 - Falling short: G7 summit in 2021 acknowledged that 2009 target to provide US\$100 billion to developing countries per year to cut emissions was not met
- Allocation of resources for energy transition through new financing mechanisms
 - Nuclear: issues of **access to green and climate financing**



GREEN
CLIMATE
FUND



gef GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET



Sustainable Development

- Nuclear as **part of the solution** for climate crisis:
 - *Hydropower and nuclear, the two largest sources of low-carbon electricity today, provide an essential foundation for transitions (IEA, 2021)*
- **Recognition** of nuclear as a sustainable energy source
 - EU taxonomy for sustainable activities (2020) – originally nuclear was not included
 - 2021: discussion on inclusion through a Delegated Act
- Nuclear technology – not only power:
 - **9 out of 17 SDGs** – direct contribution of nuclear science and technology
 - Nuclear is and will remain a part of discussion on sustainable future



LAW

Sustainable finance taxonomy - Regulation (EU) 2020/852



Young Voices on Nuclear Energy's Contribution to a Net Zero World

PART 3: Energy policy, financing and sustainable development

IAEA Webinar | 22nd June 2021

Presenter:

Nancy Mberia

Nuclear Power and Energy Agency, Kenya

Energy policy, financing and sustainable development



Energy policy

- Sustainable, adequate, affordable, competitive, secure, reliable energy supply



Financing

- High capital intensity
- Long construction periods (sensitive to interest rates, construction delays, cost overruns, inflation)
- Need for innovative financing structures



Sustainable development

- Protection and conservation of the environment – focus on clean energy sources
- Ensure access for all (UN SDG 7)



Successful implementation of nuclear power projects

Thank you for your attention.

Part 3 Energy policy, financing and sustainable development



Denis Subbotnitskiy



Nancy Mberia

Q&A



River Bennett



Craig Jantzen



Alice Cunha da Silva



Nancy Mberia



Thank you!



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Young Voices on Nuclear Energy's
Contribution to a Net Zero World

Tuesday, 22 June 2021
14:00 Vienna time

There is
NO Planet B

