

## World Nuclear Association contribution to the COP 30 Presidency Roadmap on the Transition Away from Fossil Fuels in a Just, Orderly and Equitable Manner

### **What are the most critical barriers — whether physical, economic, financial, institutional, technological or social— preventing a transition away from fossil fuels?**

One of the most critical barriers to moving away from fossil fuels is that decarbonization is uneven across the economy. Electricity can replace fossil fuels in many uses, and rapid electrification is essential, but some of the biggest energy-consuming sectors are much harder to electrify. Heavy industry, high-temperature manufacturing, shipping, aviation, and parts of water and chemical production all rely today on fossil fuels not just for power, but for heat and continuous operation. That means the transition is constrained not only by the availability of clean electricity, but by the lack of scalable alternatives in these “hard-to-abate” sectors.

This is where nuclear energy can play a particularly important role. Nuclear can provide alternatives to fossil fuels in those areas by supplying process heat for heavy industry and manufacturing, where continuous high-temperature energy is needed. It can support alternative propulsion for shipping, especially for routes where energy density and endurance matter. It can contribute to desalination and water production, including high-temperature applications such as thermolytic dissociation. It can also support the production of sustainable aviation fuel and other synthetic fuels by supplying the reliable, low-carbon heat and electricity needed for fuel synthesis. In that sense, nuclear is not only a source of clean electricity; it is a platform technology that can extend decarbonization into parts of the economy that are otherwise hardest to reach.

With regards transitioning away from fossil fuels in the electricity sector, a core barrier to fossil fuel phase-down is the need for reliable, scalable, clean firm power that can replace coal and gas without compromising system stability. Nuclear energy directly addresses this by providing 24/7 low-carbon electricity, independent from weather variability, with high-capacity factors, reducing reliance on fossil.

Replacing fossil fuels with renewable without including nuclear in the energy mix can lead to increasing system costs. High shares of variable renewables would require significant investment in grids, storage, flexibility, and balancing services, reducing affordability for the energy consumer. Including nuclear in the overall energy mix can lower system costs by reducing the amount of storage and overbuild required.

Nuclear generation can also replace large fossil fuel generation in providing inertia that supports frequency and voltage stability through the stored kinetic energy in its large spinning generators. This will support greater system reliability.



Fuel costs represent a much smaller share of overall generation costs for nuclear than is the case for fossil fuel alternatives. Nuclear can therefore reduce economic and financial systemic risks associated with gas or coal fuel price volatility and imported energy exposure, improving long-run affordability and macroeconomic stability for import-dependent economies.

### **What potential levers, whether economic, financial, institutional, social or technological, exist for accelerating the implementation of the transitioning away commitment?**

Policy instruments and market mechanisms should value reliability, resilience, and emissions reduction. Instruments like clean energy standards, long-term contracts for difference (CfDs), regulated asset models and capacity markets should reduce financing costs and speed delivery of new nuclear and extended operations at existing plants.

On the demand side, nuclear enables electrification and clean fuels by providing abundant low-carbon energy for hydrogen production, district heating, and high-temperature industrial processes. Linking nuclear to these demand-side and supply-side transition needs can accelerate emissions cuts beyond the electricity sector.

Finally, strengthening institutional and governance frameworks—-independent regulators, predictable siting processes, and sustained workforce development—can materially accelerate nuclear’s contribution to the broader transition.

### **What country, regional or sector roadmap experiences, best practices, and lessons learned can be shared?**

Several roadmap experiences show how nuclear can contribute to rapid decarbonization when paired with strong institutions and coherent market design:

- France and Sweden demonstrate that large-scale nuclear programs can decarbonize power systems quickly while maintaining reliability, creating long-lived low-carbon infrastructure that supports electrification.
- Ontario, Canada, successfully eliminated the use of coal for electricity generation in 2014 by upgrading its nuclear fleet, illustrates the value of life extension and refurbishment as a high-impact, lower-risk decarbonization pathway. Extending the operational life of existing reactors can deliver large volumes of low-carbon electricity faster than building entirely new systems, while sustaining skilled employment. Furthermore, Canada is planning to phase out coal-fired electricity across the entire country by 2030 through the deployment additional low carbon generation, including the refurbishment and extension of the operational life of its Candu reactors.
- United Arab Emirates’ new Barakah Nuclear Power plant provides up to 25% of UAE electricity generation, reducing the reliance on gas power generation. The successful completion of the construction of Barakah highlights project delivery lessons: standardized design, strong owner capability, clear governance, and disciplined supply-chain management can improve on-time and on-budget outcomes.

Cross-cutting best practices include prioritizing lifetime extensions; building repeatable designs; using bankable long-term revenue frameworks; investing early in workforce and supply chains;



and planning nuclear as part of a whole-system roadmap that includes renewables, grids, storage, and flexibility.

### **How can a just, orderly and equitable transition best reflect the diverse realities of countries at different stages of development and with different degrees of dependence on fossil fuels?**

A just and equitable transition must reflect countries' different starting points: energy access gaps, fiscal constraints, industrial structures, and fossil dependence.

It must also recognize that countries at earlier stages of development seek, and have the right to achieve, the higher levels of development enjoyed by other countries. While short-term solutions such as local solar power to supply nascent electricity systems or LNG stoves for clean cooking offer some immediate benefits, true development implies access to abundant, affordable 24/7 energy. Such higher levels of energy supply can power domestic appliances such as fridges and washing machines, which can benefit women in particular where responsibility for household tasks falls disproportionately to them.

Higher levels of energy supply are also essential to supporting industry and commerce, which can accelerate economic growth and providing fulfilling and fairly remunerated job opportunities.

Economic and industrial growth will also mean that countries don't just extract natural resources such as minerals, coal, oil and gas and send them to other countries for processing, but will have the opportunity to deployment in their own socioeconomic ecosystem, so that they can accelerate their own sustainable growth.

Of course, to achieve climate goals, these needs for abundant energy must be met by clean, low-carbon sources, including nuclear.

Nuclear can support differentiated pathways in several positive ways:

- For emerging and developing economies with rapidly growing demand, nuclear can provide clean, stable power that enables industrialization and electrification without locking in long-lived fossil assets—especially when paired with concessional finance, strong regulatory capacity-building, and regional cooperation for training and oversight.
- For fossil-dependent economies and communities, nuclear can be part of economic diversification and transition management by offering durable, high-skill employment and local procurement opportunities. Repowering coal sites with nuclear (where feasible) can reuse grid connections and retain parts of the energy workforce, supporting orderly transition.
- For advanced economies focusing on increasing electrification, nuclear can provide the clean firm backbone that reduces exposure to gas price spikes and improves resilience to climate-driven variability, lowering economic and physical systemic risks for households and industry.

Equity also depends on fair distribution of benefits. Internationally, equity can be advanced through partnerships that expand access to financing, technology, training, and regulatory



support—so that nuclear’s benefits are not limited to a small set of countries. 12 of the top 15 economies rely on nuclear energy.

In global perspective, nuclear energy can contribute positively to a just transition by enabling reliable decarbonization, supporting resilient power systems under climate stress, and providing a platform for clean electrification and clean fuels—tailored to national circumstances and backed by robust institutions.

### **Recognition by Governments and Engagement at COP31**

Given the contribution nuclear energy can make to a just transition, and broader climate goals, we welcome that the Declaration to Triple Nuclear Energy, originally launched at COP28, now has the support of 38 countries. Additionally, similar declarations have been signed by members of the global finance community, and large energy users/

We would like to offer our support for the addition on an item on the COP31 Presidential Agenda reflecting on these tripling nuclear initiatives.

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