POLICY NOTE

G20 AND THE NUCLEAR RENAISSANCE

Anton Khlopkov, Center for Energy and Security Studies
Manpreet Sethi, Centre for Aerospace Power and Strategic Studies

WORKSTREAM 2
SAFEGUARDING ENERGY SECURITY AND RESILIENCE

T20 U.S.
An informal engagement of global think tanks

2026

G20 and the Nuclear Renaissance

Anton Khlopkov, *Director of Center for Energy and Security Studies (CENESS); Chair of the Advisory Board for the Master Program on Strategic Studies at St. Petersburg State University*
Manpreet Sethi, *Distinguished Fellow at the Centre for Aerospace Power and Strategic Studies (CAPSS), New Delhi; Senior Research Advisor, Asia Pacific Leadership Network (APLN)*[1]

ABSTRACT

Amid growing baseload electricity demand, driven primarily by expanding use of artificial intelligence, electric vehicles, and other emerging energy-intensive technologies in manufacturing and service industries of developing economies, interest in nuclear energy as a sustainable, green energy source is increasing. Key expertise in the nuclear energy industry is concentrated among some G20 countries, which lead in the number of reactors in operation, under construction, and available for export. Indeed, G20 states have a pivotal role to play in global nuclear energy development.

Each country determines its own approach to developing a nuclear energy program – one may choose to establish comprehensive national capabilities, while another may accept dependence on foreign technology and personnel. The construction of a nuclear power plant typically involves hundreds of companies, and supply chains may involve more than a dozen countries. Therefore, while acknowledging this diversity of national approaches, G20 countries should support efforts to strengthen the resilience and sustainability of global nuclear supply chains to create an enabling environment for the continued development of the global nuclear energy sector. This would also involve the creation of favorable financial conditions, including the involvement of international financial institutions, given that nuclear energy is a highly capital-intensive sector.

Besides its interconnectedness in supply chains, the nuclear energy sector is also globally interdependent in terms of perception. An accident in one country has far-reaching impacts on the industry and public sensitivity practically everywhere. Therefore, ensuring the highest safety standards at nuclear installations is a shared global responsibility. Also of critical significance is cooperation with the International Atomic Energy Agency (IAEA), as the key specialized mechanism for international standard-setting and verification in the nuclear field.

The promise of nuclear renaissance can be realized only when nuclear suppliers and consumers are as cognizant of their responsibilities as the opportunity. The G20 comprises both categories of states and also has the potential to fulfill aspirations of others across the globe. The policy brief will examine the current level of interest in nuclear energy, highlight the requirements for its development, identify the challenges, and offer recommendations on how the G20 can support safe and sustainable global development of nuclear energy. The recommendations include facilitating sustainable financing of nuclear power projects, prioritizing nuclear safety and security in the construction and operation of nuclear power plants and nuclear fuel cycle facilities, ensuring disruption-free nuclear supply chains, and strengthening the IAEA. The G20 can act as a forum to forge consensus on these issues to strengthen global nuclear governance.

[1] The authors are grateful to Anna Belolipetskaia, CENESS Research Associate, for her assistance in drafting the policy brief.

DISCLAIMER: This policy solution is independently authored and peer-reviewed. The views expressed are those of the authors and do not necessarily reflect the position of their institutions or the informal T20 summit secretariat.

THE CURRENT ENERGY CHALLENGE AND SOLUTIONS

Global development, which manifests in, among other things, expanding industries, urbanization, and technological innovation, serves as a testament to human progress. This advancement rests on a continuously growing demand for energy, particularly electricity supplies, as emerging energy-intensive technologies, such as artificial intelligence, data centers, and electric vehicles, gain traction and become more integrated into today's economic processes.

According to the International Energy Agency (IEA), global electricity consumption is expected to increase by 3.6% annually in the years leading up to 2030, which is twice the rate observed over the previous decade.[2] For example, in 2024, data centers consumed an estimated 415 TWh of electricity; this figure is projected to more than double by 2030, reaching 945 TWh, and is expected to rise further to approximately 1,200 TWh by 2035.[3] Existing baseload capacity is insufficient to meet such demand. Nor can the environment afford this with increased exploitation of traditional fossil fuels. Therefore, alternative ecologically sustainable energy sources that can provide reliable electricity have to be the focus. Expanding renewable sources of electricity generation complements the current sources, but by themselves they cannot provide a baseload source of electricity at least until reliable and powerful electricity storage solutions are available. This is where nuclear energy gains prominence.

The current geopolitical turmoil in Europe and the Middle East further underscores the need to plug national energy security vulnerabilities. Instability in global energy markets, resulting in the disruption of traditional supply chains and rising energy prices, is prompting countries to diversify their energy mix away from vulnerable fossil fuel supplies. The intent, as it did once before in the 1970s, is to pursue long-term solutions in national nuclear energy programs.

One of the most compelling features of nuclear power is its reliability. Nuclear power plants (NPPs) are significantly more resilient to fuel disruptions or varying weather conditions and can continue to provide stable output regardless of the time of day. Energy produced by NPPs is also low-carbon, helping mitigate the challenges of climate change. As reported by the International Atomic Energy Agency (IAEA), since the 1970s, nuclear power has helped avoid the emission of more than 70 gigatons of carbon dioxide, with current annual avoided emissions exceeding 1 gigaton.[4] Illustratively, a single 1 GW nuclear reactor can avoid burning roughly 2 to 3 million tons of coal (depending on coal quality and plant efficiency) annually, thereby preventing the emission of about 6 million tons of carbon dioxide,[5] while bringing green energy to the grid. It should also be recognized that human deaths and injuries across the coal supply chain are far greater – roughly 800 to 1,000 times more deaths per unit of electricity produced – than in the nuclear supply chain. Fine particulate air pollution and underground mining accidents are the primary reasons for this.[6]

Together, these factors have driven significant growth in the nuclear industry. As of August 2026, 417 reactors are in operation worldwide, with 78 reactors under construction. Last year,

---

[2] International Energy Agency, *Electricity 2026* (Paris: International Energy Agency, 2026), 15, https://www.iea.org/reports/electricity-2026.
[3] International Energy Agency, *Energy and AI* (Paris: International Energy Agency, 2025), 86, https://www.iea.org/reports/energy-and-ai.
[4] International Atomic Energy Agency, *Climate Change and Nuclear Power 2022* (Vienna: International Atomic Energy Agency, 2022), 2, https://www.iaea.org/sites/default/files/iaea-ccnp2022-body-web.pdf.
[5] International Energy Agency, *Sustainable Recovery* (Paris: International Energy Agency, 2020), 54, https://www.iea.org/reports/sustainable-recovery.
[6] For more on this see https://www.statista.com/statistics/494425/death-rate-worldwide-by-energy-source/.

NPPs generated more than 2,600 TWh,[7] accounting for approximately 9% of global electricity generation.[8] According to the IAEA estimates, the total global nuclear operating capacity could increase from the current 380 GW to between 561 GW and 992 GW over the next 25 years.[9] These figures correspond to expected changes in nuclear power's share in global electricity generation to 7.2%–12.5% by 2050.[10,11]

This will be enabled not only by large-scale nuclear power plants, but also by innovative small- and medium-sized nuclear reactors that will offer advantages of greater flexibility in size, number, or addition of modules, and siting, such as placement in remote regions. While more than 90 SMR designs are currently at various stages of development worldwide, [12] the only two currently operational SMRs are located in G20 countries: in Russia (Akademik Lomonosov floating NPP, equipped with two KLT-40S reactor units) and China (HTR-PM with two units in Shandong Province). It is worth noting that SMRs still need to demonstrate their commercial viability by offering competitive prices for the generated electricity per kilowatt-hour. SMRs also have strong potential to power ships with zero operational emissions.

The renewed momentum in the nuclear sector is visible not only in countries that already have national nuclear programs and attendant industries, but also in several new countries entering the space. According to the IAEA, 37 countries operate nuclear power plants, while 20 others have expressed interest in including nuclear power in their energy mix.[13] As concerns and insecurities following the 2011 Fukushima incident have gradually eased, and countries have regained confidence in the reliability of NPPs, a number of states are revisiting their earlier decisions to stall or phase out nuclear energy from their energy mixes. Such examples can be observed worldwide: the EU has admitted that Europe's earlier reduction in nuclear reliance was a strategic miscalculation[14]; Japan has restarted 15 reactors since 2011, including one of the units at the world's largest Kashiwazaki-Kariwa NPP in early 2026[15]; and in Southeast Asia and the Middle East, many countries are keen to exploit nuclear energy as a way of fulfilling their net zero commitments.

---

[7] "Power Reactor Information System (PRIS) Database," International Atomic Energy Agency, accessed July 30, 2026, https://pris-stats.iaea.org/world-statistics.
[8] "Reactor Database Global Dashboard," World Nuclear Association, accessed July 30, 2026, https://world-nuclear.org/nuclear-reactor-database/summary.
[9] International Atomic Energy Agency, *Energy, Electricity and Nuclear Power Estimates for the Period up to 2050*, Reference Data Series No. 1, IAEA-RDS-1/45 (Vienna: International Atomic Energy Agency, 2025), 19, https://www-pub.iaea.org/MTCD/publications/PDF/p15942-25-02880E_RDS-1-45_web.pdf.
[10] Ibid., 23.
[11] International Atomic Energy Agency, *Energy, Electricity and Nuclear Power Estimates for the Period up to 2060*, Reference Data Series No. 1, IAEA-RDS-1/46 (Vienna: International Atomic Energy Agency, 2026), 9, https://www-pub.iaea.org/MTCD/Publications/PDF/p16057-RDS-1-46_web.pdf.
[12] International Atomic Energy Agency, *Considerations on Decommissioning in the Design of Small Modular Reactors*, Technical Reports Series No. 499 (Vienna: International Atomic Energy Agency, 2026), 5, https://www-pub.iaea.org/MTCD/publications/PDF/p15933-DOC-010-499_web.pdf.
[13] International Atomic Energy Agency, *International Status and Prospects for Nuclear Power 2025: Report by the Director General*, GOV/INF/2025/8-GC(69)/INF/4 (Vienna: International Atomic Energy Agency, 2025), 3, https://www.iaea.org/sites/default/files/gc/gov-inf-2025-8-gc69-inf-4_0.pdf.
[14] Forrest Crellin and Gianluca Lo Nostro. Reducing Europe's nuclear energy sector was 'strategic mistake', EU chief says. 10 March 2026, https://www.reuters.com/sustainability/boards-policy-regulation/reducing-nuclear-energy-strategic-mistake-eu-chief-says-2026-03-10/ .
[15] "Nuclear Power in Japan," World Nuclear Association, last updated April 21, 2026, https://world-nuclear.org/information-library/country-profiles/countries-g-n/japan-nuclear-power.

NUCLEAR ENERGY IN G20 COUNTRIES

In 1960, only 15 nuclear power units were in operation in four current G20 countries.[16] By 1970, this number had jumped to 90 operating reactors across 15 countries. The number of new units connected to the grid during that period reached double-digit figures annually: the year 1974 alone brought 26 new power units to electricity grids.[17] Between 2016 and 2025, 60 nuclear units were commissioned, including 6 and 3 in 2024 and 2025, respectively.[18] These numbers outpace the more modest developments observed in the preceding years. Importantly, the group of NPP-operating states is also growing: another G20 country is set to join it, as the first unit of the Akkuyu NPP is expected to be commissioned in Türkiye by the end of 2026.[19]

Reflecting on the present and future of the nuclear industry, the role of G20 states is indispensable since the group comprises countries possessing key technologies, expertise, and industrial capabilities in the nuclear energy sector, as illustrated by the following statistics:

- G20 countries host 333 operating nuclear power units, or approximately 80% of the world's fleet.[20,21]
- 60 commercial nuclear power reactors were connected to the grid globally between 2016 and 2025, including in non-G20 states. All of these projects involved technologies, designs, or major industrial participation from G20 states. 85% of these reactors were built both domestically and abroad by three countries – China, Russia, and the Republic of Korea.
- Nuclear power reactors are currently under construction in 17 countries, of which 10 are G20 states,[22] with all remaining units under construction elsewhere being built using designs and technologies originating from G20 states or with substantive participation from their industries.
- As regards the nuclear fuel cycle, almost 100% of global uranium enrichment capacity is controlled by G20 states or companies based in or affiliated with these countries, though they account for only around 40% of annual global uranium production.[23]

Given the above facts and statistics, there is no denying that G20 countries will be central to the future of nuclear energy. The grouping comprises both categories of states: nuclear suppliers and consumers. For the promise of a nuclear renaissance to be realized, both must be cognizant of their responsibilities, even as they use the opportunity to be a nuclear buyer or seller.

RECOMMENDATIONS

The global expansion of nuclear energy requires a shared understanding of responsibilities, as well as recognition of associated challenges. Each country defines its own approach to developing its nuclear energy program: some may establish comprehensive national capabilities, while others accept dependence on foreign technology and personnel. Regardless of the approach pursued, the construction of an NPP typically involves hundreds of companies from more than a

[16] France, the UK, the U.S. and the USSR (Russia).
[17] N. L. Char and B. J. Csik, "Nuclear Power Development: History and Outlook. Events Have Changed the Global Prospects for Nuclear Power," *IAEA Bulletin* 29, no. 3 (1987): 19-20.
[18] PRIS Database.
[19] "Rosatom Presented Nuclear Solutions for Türkiye's Energy Future at NPPES 2026," Akkuyu Nuclear, July 2, 2026, https://akkuyu.com/en/news/rosatom-presented-nuclear-solutions-for-t-rkiye-s-energy-future-at-nppes-2026.
[20] Excluding temporarily suspended reactors as of July 2026.
[21] PRIS Database.
[22] Ibid.
[23] "Uranium Production by Country," World Nuclear Association, last updated January 20, 2026, https://world-nuclear.org/information-library/facts-and-figures/uranium-production-by-country.

dozen countries, making international cooperation and a stable and resilient supply chain crucial for further development of the interconnected global nuclear energy sector.

The G20 format that brings together both the nuclear suppliers and consumers has the potential to contribute to the resilient and sustainable global nuclear energy industry. The recommendations below offer specific ideas to the G20 states in this regard.

1. **Facilitating Sustainable Financing**. A nuclear power plant is a highly capital-intensive project. To illustrate, the four 1 GW nuclear units at the Kudankulam NPP in India are together estimated to cost approximately $14.5 billion.[24] In this context, the relevance of external support for nuclear power projects, particularly in developing countries, becomes critical. One way of overcoming this challenge and creating favorable financing for nuclear projects is through external institutions, such as international development banks and other international financial institutions. In this context, it is a welcome development that a landmark partnership agreement was signed in 2025 between the IAEA and the World Bank Group. This aims at strengthening institutional cooperation in nuclear knowledge development within the financial institution to be able to take informed decisions on nuclear project financing, supporting the operation of existing nuclear power fleets and facilitating the development of small modular reactors.[25] Ongoing efforts to expand the number of participating financial institutions, particularly multilateral development banks, should be encouraged and supported, as they can broaden opportunities for states interested in the peaceful applications of nuclear technology and help translate such aspirations into real projects.

2. **Prioritizing Nuclear Safety and Security**. Nuclear safety and security should remain the highest priority in the construction and operation of NPPs. Actions that could undermine these principles or compromise international confidence in nuclear energy should be avoided; the taboo against attacks on NPPs and nuclear fuel cycle facilities must be restored, and this principle should be strongly upheld in the current and potential future military crises. As history has demonstrated, nuclear energy is a sector of significant public sensitivity, where an accident in one country can have serious repercussions for the nuclear industry worldwide. Conversely, successes and achievements pave the way for further advancements globally. G20 countries should also continue to exchange experiences and best practices in the field internationally, as nuclear safety and security represent a shared responsibility.

3. **Ensuring Disruption-Free Supply Chains**. As indicated earlier, establishing and maintaining resilient, uninterrupted supply chains is essential to the sustainable development of the nuclear industry. This is in fact also closely connected to the safe and secure operation of NPPs as highlighted above. The G20 should collaborate to ensure disruption-free nuclear supply chains. Restrictive measures targeting individual states or groups of states, including unilateral sanctions adopted in circumvention of the UN Security Council, create additional risks, challenges and vulnerabilities for the global nuclear industry and its long-term prospects, including to global economic competitiveness of nuclear energy.

---

[24] "Parliament Question: Expansion of Nuclear Power Capacity", Press Information Bureau, Department of Atomic Energy, Government of India, July 30, 2026, https://www.pib.gov.in/PressReleaseDetail.aspx?PRID=2291840&reg=5&lang=1.

[25] "IAEA and World Bank Group Collaborate to Advance Nuclear Energy for Development," International Atomic Energy Agency, July 8, 2026, https://www.iaea.org/newscenter/news/iaea-and-world-bank-group-collaborate-to-advance-nuclear-energy-for-development.

4. **Strengthening the IAEA**. As the IAEA remains the key specialized multilateral international standard-setting and verification mechanism in the field of nuclear energy, it is fundamentally important to create enabling conditions for the Agency to carry out its mandate. Accordingly, the international community, including G20 countries, should maintain stable cooperation with the IAEA and support its operations, including through continuous and regular financial support. With the anticipated expansion of nuclear power programs, including to newcomer nations, the role of the IAEA will be even more critical. Nations share a collective responsibility to help the Agency overcome its budgetary constraints.

This set of recommendations is not exhaustive. But it lists important, tangible steps the G20 can take to strengthen global nuclear governance and contribute to the safe, sustainable, and accessible spread of nuclear energy. Interest in nuclear energy is currently on an upward trajectory. But as the past has shown, its promise can be jeopardized by one incident or accident anywhere in the world. It is in everyone's interest that utmost care is taken while making use of this opportunity. Given the presence of leading nuclear suppliers, as well as consumers in G20, the grouping should take the lead in upholding the highest standards of nuclear safety, security, and safeguards even as nuclear cooperation flourishes across nations.