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# NON-PROLIFERATION, NUCLEAR TECHNOLOGY AND PEACEFUL USES: EXAMINING THE ROLE AND IMPACT OF EXPORT CONTROLS

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## I. INTRODUCTION

The 1968 Treaty on the Non-Proliferation of Nuclear Weapons (Nuclear Non-Proliferation Treaty, NPT) is based on a delicate balance between commitments to achieve nuclear disarmament, prevent the further proliferation of nuclear weapons and facilitate the sharing of nuclear technology, material and equipment for peaceful uses. The Nuclear Suppliers Group (NSG) is an informal group of states that voluntarily agrees on guidelines for the implementation of export controls on goods and technologies in the areas of nuclear fuel cycle technologies and nuclear weapons. The NSG participating governments argue that such conditions of supply help ensure that transfers of nuclear-related items are not 'diverted to unsafeguarded nuclear fuel cycle or nuclear explosive activities'.[1] They reason that by providing predictability for both suppliers and recipients they reduce trade impediments and enable peaceful nuclear cooperation. The NSG therefore plays a crucial role in supporting the implementation of key non-proliferation provisions of the NPT.

Developing states regularly criticize export controls and supply-side controls more broadly. These states argue that such controls infringe their rights to access technology for peaceful uses and constitute a violation of the obligation to facilitate relevant transfers and exchanges enshrined in the NPT. Most recently, this criticism has been voiced in United Nations General Assembly resolutions on 'Promoting international cooperation on peaceful uses in the context of international security' submitted by China—itself an NSG participating government—and adopted with increasing support in 2021, 2022 and 2024.

[1] Nuclear Suppliers Group, 'What is the NSG?', [n.d.].

## SUMMARY

**The 1968 Treaty on the Non-Proliferation of Nuclear Weapons (Nuclear Non-Proliferation Treaty, NPT) aims to achieve nuclear disarmament, prevent nuclear weapons proliferation and promote the peaceful use of nuclear technology. Maintaining a balance among these different objectives has long been a contentious issue in the context of the NPT. To support these aims, the Nuclear Suppliers Group (NSG) has developed guidelines for export controls. NSG participating governments highlight the NSG's growing role as a public goods provider and enabler of peaceful nuclear trade. However, developing states have criticized the use of export controls as infringing on their right to access nuclear technology for peaceful uses. This criticism has been given a new forum in the discussions around three consecutive United Nations General Assembly resolutions on 'Promoting international cooperation on peaceful uses in the context of international security'. This paper outlines the positions states have taken in these discussions and identifies steps that could be taken at the national, European Union and UN levels to facilitate dialogue around states' obligations under the NPT and the NSG's contribution to their implementation.**

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Against this background, it is particularly important to examine the role and functioning of the NSG and nuclear export control measures, and how participating governments seek to strike a balance between preventing the development and proliferation of weapons of mass destruction (WMD) and creating an environment that facilitates transfers of technology for peaceful uses. The European Union (EU) and its member states have a particularly important role to play in both facilitating and furthering discussion of these important issues. All EU member states are NSG participating governments and the European Commission participates as an observer. Moreover, through mechanisms such as the EU Partner-to-Partner (P2P) export control programme, the EU plays a leading role in promoting wider adoption of the standards on dual-use export controls outlined by the NSG and the other multilateral export control regimes.

This brief aims to contribute to discussions on the role of the NSG and nuclear export controls in enabling or inhibiting transfers of nuclear technology for peaceful uses. These are issues with a long and complex history that are perceived by states as highly sensitive. They are therefore unlikely to be resolved to the satisfaction of all NPT states parties in the near future. However, outlining and examining the positions and views of different states and stakeholders can help to identify areas of possible misunderstanding and potential cooperation, and thereby indicate ways forward towards a more constructive dialogue on these issues.

Section II provides an overview of the relevant provisions of the NPT in the areas of non-proliferation and international cooperation on the peaceful uses of nuclear science and technology, as well as the different views of states on the content and application of the relevant rights and obligations outlined in the treaty. Section III outlines the origin and functioning of the NSG and examines the role that nuclear export controls can play in supporting NPT implementation, including through the creation of an environment that facilitates the transfer of nuclear technology for peaceful uses. Section IV highlights concerns that states have raised in the UN General Assembly about the role and functioning of the export control regimes, and the imposition of supply-side controls on transfers of technology for peaceful uses. The brief concludes by outlining possible options that NSG participating governments and the EU could pursue to promote understanding of the NSG's work and support ongoing discussions on peaceful uses in appropriate forums.

## II. BALANCING THE USE OF NUCLEAR NON-PROLIFERATION TOOLS AND INTERNATIONAL COOPERATION ON THE PEACEFUL USES OF NUCLEAR SCIENCE AND TECHNOLOGY

The NPT recognizes that states have a right to access, and an obligation to facilitate exchanges of, nuclear technology, material and equipment for peaceful uses. NPT states parties are also required to demonstrate that all the nuclear activities they undertake are for peaceful purposes. A major feature of NPT states' discussions on treaty implementation has been the differing interpretations of states' right to access nuclear technology for peaceful purposes, and the relationship with the non-proliferation objectives pursued by the NPT. The question of how the use of export controls, as one measure to prevent nuclear proliferation, supports or undermines the provisions of the treaty has been one element of this debate.

### Facilitating transfers of nuclear technology for peaceful uses

Article IV of the NPT states that all parties to the treaty have 'the inalienable right . . . to develop research, production and use of nuclear energy for peaceful purposes without discrimination'. It also provides that all states parties 'undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy'. The treaty further encourages states parties that are 'in a position to do so' to work bilaterally or in cooperation with international organizations to advance the 'development of the applications of nuclear energy for peaceful purposes' with particular attention to the 'needs of the developing areas of the world'.[2]

Nuclear cooperation for peaceful purposes can extend to both nuclear power and non-power applications. Cooperation on nuclear power applications relates, for instance, to activities to develop or improve the use of nuclear power to produce electricity. Providing access to nuclear science and technology can also enable states to make use of nuclear non-power applications to 'improve health care, reduce poverty and hunger, and mitigate the

[2] International Atomic Energy Agency (IAEA), Text of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), INFCIRC/140, 22 Apr. 1970.

impact of climate change', among other things.[3] For instance, the use of radiation in plant mutation breeding or to control insect populations can increase food production. Radiation and radioisotopes have many applications in the medical field for diagnosis and therapy. Nuclear techniques are also used for environmental purposes, such as to detect and analyse pollutants and identify water resources.[4]

Either bilaterally or through the International Atomic Energy Agency (IAEA), states have established instruments to fund, implement and facilitate technical assistance and cooperation to promote the benefits of nuclear science and technology for peaceful uses, including in developing states. Relevant examples include the '123 Agreements', which establish a framework for peaceful nuclear cooperation between the USA and other countries or groups of countries, and the agreements that the EU, through the European Atomic Energy Community (Euratom), has concluded with non-EU member states to define cooperation on the peaceful uses of nuclear energy.[5] The USA has 25 123 agreements covering 49 countries, as well as the IAEA and Euratom. Through these agreements, the United States and its partners decide, for instance, to cooperate on civil nuclear energy development, the use of radioisotopes in industry, agriculture and medicine, and advanced research on nuclear science, among other things.[6] Such cooperation occurs through the exchange of experts, the provision of technical assistance and the transfer of material and equipment. These agreements are a tool for facilitating nuclear-related cooperation but they are also intended to advance US foreign and economic policy interests.[7]

Euratom has concluded bilateral nuclear cooperation agreements with Argentina, Australia, Canada, Japan, Kazakhstan, Ukraine, Uzbekistan and the USA.[8] These agreements provide a framework for cooperation on the peaceful uses of nuclear energy in various fields, such as healthcare, agriculture and industrial applications. Activities undertaken through these agreements include transfers of nuclear or nuclear-related material, equipment and related technologies, exchanges of experts, sharing of technical information and providing access to partners' research projects.[9]

The IAEA was created before the entry into force of the NPT. Nonetheless, under the treaty, the IAEA is tasked with verifying compliance with NPT non-proliferation provisions through the administration of international safeguards. In addition, in accordance with its statute, the IAEA 'seeks to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world'. The IAEA therefore plays an important role in fostering international cooperation on the peaceful uses of nuclear technology and in supporting the implementation of Article IV of the NPT.[10] For instance, one of the IAEA's flagship activities is the Technical Cooperation (TC) programme.[11] The TC programme supports states' efforts to address their development priorities by leveraging the benefits of nuclear science and technology for peaceful uses across various sectors, such as healthcare and nutrition, food and agriculture, and water and the environment.[12] This involves the implementation of capacity building and training, as well as procurement of relevant technologies and activities to strengthen nuclear safety and security.[13]

[3] Kirsten, I. and Zarka, M., *Balancing the Three Pillars of the NPT: How Can Promoting Peaceful Uses Help?*, EU Non-Proliferation and Disarmament Paper, no. 79, May 2022, pp. 2, 6.

[4] World Nuclear Association, 'The many uses of nuclear technology', updated 10 Jan. 2025.

[5] US Department of Energy, '123 Agreements for Peaceful Cooperation', updated 12 Dec. 2024; and European Commission, 'Euratom safeguards', [n.d.].

[6] See e.g. Agreement for Cooperation between the Government of the United States of America and the Government of India Concerning Peaceful Uses of Nuclear Energy, Washington, DC, 10 Oct. 2008; Agreement for Cooperation between the Government of the United States of America and the Government of the United Arab Emirates, Message from the President of the United States transmitting the text of a proposed agreement for cooperation between the government of the United States of America and the Government of the United Arab Emirates concerning peaceful uses of nuclear energy, 21 May 2009; and US Department of State, Bureau of International Security and Nonproliferation, '123 Agreements', Fact sheet, updated 3 Feb. 2025.

[7] US Department of State, Bureau of International Security and Nonproliferation (note 6).

[8] European Commission, 'Nuclear safety: A global engagement', [n.d.].

[9] 'Agreement for cooperation in the peaceful uses of nuclear energy between the European Atomic Energy Community (Euratom) and the Government of the Republic of Uzbekistan', *Official Journal of the European Union*, L 269, 21 Oct. 2003; and 'Agreement for cooperation in the peaceful uses of nuclear energy between the European Atomic Energy Community (Euratom) and the Government of the Argentine Republic', *Official Journal of the European Union*, L 269, 30 Oct. 1997.

[10] International Atomic Energy Agency (IAEA), 'The Statute of the IAEA', Article II, Objectives; and Kirsten and Zarka (note 3).

[11] International Atomic Energy Agency (IAEA), 'About the TC programme', [n.d.].

[12] International Atomic Energy Agency (IAEA), *Prospects and Achievements of the IAEA Technical Cooperation Programme in the 21st Century: Overview and Future Prospects* (IAEA: Vienna, 2024).

[13] Krause, M., 'The IAEA's Technical Cooperation programme: Delivering results for peace and development', International Atomic Energy Agency (IAEA), Aug. 2023.

The TC programme is complemented by other initiatives to promote the peaceful application of nuclear science and technology. In 2010, the IAEA launched the Peaceful Uses Initiative to mobilize 'extrabudgetary contributions' to 'support technical cooperation projects and other unfunded projects of the IAEA in the areas of peaceful application of nuclear technology'.[14] In 2022, a group of states parties to the NPT launched the Sustained Dialogue on Peaceful Uses (SDPU) at the 10th NPT Review Conference.[15] The SDPU does not involve the creation of a new funding mechanism, but aims to bring together key stakeholders, such as policymakers, the private sector and representatives of the development community, to increase awareness of how nuclear science and technology can support sustainable development and to create additional opportunities for cooperation in this field.

Nuclear supplier states, especially western states, have highlighted the range of efforts and funding already available to promote peaceful nuclear cooperation activities, including the initiatives implemented by the IAEA.[16] Some, such as the USA, have argued that Article IV does not provide an unconditional right for states to access nuclear technology transfers and cooperation, and that this should be subject to an assessment by the supplier state of whether these activities are in line with the non-proliferation aims and objectives of the NPT.[17] In the past, France has argued that the right of states to access nuclear technology for peaceful purposes applies only to non-sensitive items and noted that this might be an area where the balance of NSG rules should be reviewed to avoid 'unduly stringent rules on the transfer of non-sensitive equipment'.[18]

Developing states, particularly those which are part of the Non-Aligned Movement (NAM), regularly request NPT states parties to do more to facilitate the sharing of nuclear technology for peaceful uses, both bilaterally and by maintaining their financial support to the IAEA TC programme. In this context, NAM states regularly argue that Article IV requires states to facilitate the 'fullest possible exchange of equipment' and that states have a right to 'access to training opportunities, research, access to scientific, technical and material support, without discrimination'.[19]

## Demonstrating that nuclear programmes are exclusively for peaceful purposes

The NPT forbids non-nuclear weapon states (NNWS) from acquiring, developing or seeking assistance to manufacture nuclear weapons. Under the NPT, NNWS undertake to conclude a safeguards agreement with the IAEA for the purpose of verifying compliance with the treaty and 'with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices'. The treaty specifies that the safeguards it requires shall be implemented in a way that avoids 'hampering' states parties' 'economic or technological development' or 'international co-operation in the field of peaceful nuclear activities'.[20]

Before the entry into force of the NPT, item-specific safeguards agreements with the IAEA applied, covering 'specified nuclear material, facilities and equipment'.[21] Since 1971, the standard form of safeguards agreement concluded with the IAEA has been a comprehensive safeguards agreement (CSA).

[14] International Atomic Energy Agency (IAEA), 'Peaceful Uses Initiative (PUI)', [n.d.].

[15] 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 'Facilitating dialogue to support enhanced peaceful uses cooperation as envisioned under Article IV of the Treaty on the Non-Proliferation of Nuclear Weapons', Working Paper submitted by Canada, Japan, the Republic of Korea, the United Kingdom of Great Britain and Northern Ireland and the United States of America, NPT/CONF.2020/WP.46/Rev.2, 26 Aug. 2022.

[16] Preparatory Committee for the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 'Addressing "Vienna issues": The Comprehensive Nuclear-Test-Ban Treaty; compliance and verification; export controls; cooperation in the peaceful uses of nuclear energy; nuclear safety; nuclear security; and discouraging withdrawal from the Treaty on the Non-Proliferation of Nuclear Weapons', NPT/CONF.2026/PC.II/WP.11, 28 May 2024; Blalock, S., Statement by the United States, Main Committee III, The Tenth Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 9 Aug. 2022; Scheinman, A. M., Statement by the United States, Main Committee II, The Tenth Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 8 Aug. 2022; and European Union, Main Committee III statement, 10th Review Conference of the Parties to the Treaty on the Non-proliferation of Nuclear Weapons, New York, 1–26 Aug. 2022.

[17] Ford, C., 'NPT Article IV: Peaceful Uses of Nuclear Energy', Statement to the 2005 Review Conference of the Treaty on the Non-Proliferation of Nuclear Weapons, 18 May 2005.

[18] Preparatory Committee for the 2005 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 'Strengthening the nuclear non-proliferation regime', Working paper submitted by France, NPT/CONF.2005/PC.III/WP.22, 4 May 2004.

[19] UNODA, 'General reflection by the Non-Aligned Movement States Parties to the Treaty on the Non-Proliferations of Nuclear Weapons', 2 Aug. 2024.

[20] International Atomic Energy Agency (note 2), articles I–III.

[21] Liou, J., 'Legally bound: Safeguards agreements and protocols', *IAEA Bulletin*, vol. 63, no. 3 (Oct. 2022).

Under a CSA, a state 'undertakes to accept, and the IAEA has the right and obligation to apply, safeguards on all source material or special fissionable material in all peaceful nuclear activities within the State's territory, under its jurisdiction or carried out under its control anywhere, for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices'. CSAs are also referred to as 'full scope' safeguards agreements.[22]

States with a CSA or other type of safeguards agreement in place can also voluntarily extend the scope of such agreements through the negotiation of an additional protocol with the IAEA. The Model Additional Protocol was approved by the IAEA Board of Governors in 1997 to address weaknesses in the IAEA safeguards system, as exposed by the discovery of clandestine nuclear weapon programmes in Iraq and the Democratic People's Republic of Korea. An additional protocol strengthens the IAEA's ability to detect undeclared nuclear activities and materials by expanding its access to relevant information and locations within a state.[23] In states that have not concluded an additional protocol, the IAEA is unable to confirm that all nuclear material, beyond what has been declared, is being used for peaceful activities.[24] Currently, 182 states have a CSA in place with the IAEA, 142 of which also have an additional protocol in place. A further 13 states have signed an additional protocol but have not yet ratified it.[25]

The sensitive nature of the items shared and the activities implemented as part of the various assistance or cooperative frameworks outlined above can also require measures aimed at ensuring that the benefits of these activities remain exclusively peaceful. For instance, a state entering into a 123 Agreement with the USA is required to comply with a number of non-proliferation requirements, such as physical security standards and IAEA safeguards.[26] Bilateral agreements with Euratom also provide that nuclear transfers between parties are subject to various conditions.[27] The eligibility for and sources and format of technical assistance provided by the IAEA is mainly governed by 'The Revised Guiding Principles and General Operating Rules to Govern the Provision of Technical Assistance' (INFCIRC/267).[28]

Although there may be an 'inherent linkage' between the access of NNWS to nuclear technology for peaceful purposes and their obligation to conclude a CSA with the IAEA, this is not an explicit requirement for receiving technical assistance from the agency.[29] However, INFCIRC/267 and other relevant documents outline a set of conditions that must be met in order to ensure the peaceful nature of the cooperation and gain access to the support provided by the IAEA. These include the application of safety and physical protection standards and 'project- and technology-specific safeguards conditions and peaceful use obligations', particularly in cases where technical assistance may cover one or more of the four technological areas identified as sensitive in INFCIRC/267.[30] However, these sensitive areas do not cover all nuclear material and equipment, dual-use nuclear items and related knowledge that might be provided in the context of such technical assistance activities.[31]

Some nuclear supplier states, particularly those which are part of the 'Vienna Group of Ten', have regularly argued that 'new supply arrangements for the transfer of source or special fissionable material or equipment or material especially designed or prepared for the processing, use or production of special fissionable material' to NNWS 'should require, as a necessary precondition' both acceptance of full-

[22] International Atomic Energy Agency (IAEA), 'IAEA safeguards glossary', 2022 edition, Vienna, 2022, p. 11.

[23] International Atomic Energy Agency (IAEA), 'Additional protocol', [n.d.].

[24] International Atomic Energy Agency (IAEA), *Annual Report, 2023* (IAEA: 2024), p. 107; and Jonas, D. S., Carlson, J. and Goorevich, R. S., 'The NSG decision on sensitive nuclear transfers: ABACC and the additional protocol', *Arms Control Today*, Nov. 2012.

[25] International Atomic Energy Agency (IAEA), Status list, 'Conclusion of Safeguards Agreements, Additional Protocols and Small Quantities Protocols', Status as of 31 Dec. 2024.

[26] US Department of State, Bureau of International Security and Nonproliferation (note 6).

[27] See e.g. 'Agreement for cooperation in the peaceful uses of nuclear energy between the European Atomic Energy Community (Euratom) and the Government of the Republic of Uzbekistan' (note 9); and 'Agreement between the Government of the Republic of South Africa and the European Atomic Energy Community (Euratom) for cooperation in the peaceful uses of nuclear energy', *Official Journal of the European Union*, L 204, 31 July 2013.

[28] International Atomic Energy Agency (IAEA), 'The Revised Guiding Principles and General Operating Rules to Govern the Provision of Technical Assistance by the Agency', INFCIRC/267, Mar. 1979; Krause (note 13); and International Atomic Energy Agency (IAEA), 'Policy basis' [n.d.].

[29] US Government Accountability Office (GAO), *Strengthened Oversight Needed to Address Proliferation and Management Challenges in IAEA's Technical Cooperation Program* (Mar. 2009), p. 17.

[30] International Atomic Energy Agency, INFCIRC/267 (note 28); IAEA, 'Standard Basic Assistance Agreement (SBAA) between the recipient Government and the UNDP'; IAEA, 'Revised Supplementary Agreement concerning the provision of technical assistance by the International Atomic Energy Agency'; and US GAO (note 29), pp. 17, 21.

[31] US GAO (note 29), p. 23

scope IAEA safeguards and an additional protocol.[32] Other states have resisted adopting an additional protocol, citing political and economic concerns. For example, Brazil has argued that concluding an additional protocol represents an unnecessary burden on NNWS, particularly while the implementation of nuclear weapon states' disarmament obligations under the NPT remains insufficient.[33] Argentina, Brazil, the Brazilian–Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) and the IAEA have instead signed the so-called Quadripartite Agreement.[34] This agreement consolidates the systems for the application of the safeguards in force in both countries and provides for joint inspections by the IAEA and ABACC. The NAM states argue that the NPT only requires nuclear material to be subject to IAEA full-scope safeguards. They add that interpretations of the application of safeguards should not be used to impose restrictions on the right to peaceful use by developing states.[35]

### Ensuring that transfers of nuclear technology are exclusively for peaceful uses

Article III(2) of the NPT prohibits states from transferring 'source or special fissionable material' or 'equipment or material especially designed or prepared for the processing, use or production of special fissionable material' to NNWS for peaceful purposes unless these items are subject to the safeguards required by the treaty.[36] Soon after the NPT's entry into force, a group of nuclear supplier states came together as the Zangger Committee to harmonize their interpretation of Article III(2). These states agreed on a list of items, the export of which would trigger safeguards as a condition of supply (a 'trigger list').[37]

The work of the Zangger Committee was later complemented by the establishment of the NSG, an informal group of nuclear supplier states seeking to coordinate export controls on nuclear-related items to reduce the risk that these could be diverted to unsafeguarded or nuclear weapon-related activities, while maintaining a level playing field among participants in the nuclear trade.[38] The NSG was established in 1974, largely in response to India's first nuclear test explosion. India's test marked the first time that an NNWS had exploded a nuclear weapon since the establishment of the NPT and exposed major gaps in supplier states' controls on international transfers of nuclear material and technology.[39]

Many nuclear supplier states that are also members of the NSG regularly stress the role of export controls and the NSG guidelines as tools for preventing nuclear proliferation and creating the necessary conditions to enable the trade in nuclear and nuclear-related material for peaceful uses (see section III).[40] In contrast, many NNWS parties to the NPT, particularly developing states, have questioned the legitimacy of the NSG as a 'cartel' of states that seeks to deny them access to nuclear technology.[41] For instance, members of the NAM have criticized limitations or restrictions on nuclear transfers for peaceful purposes as discriminatory and 'inconsistent' with the provisions of Article IV of the NPT.[42] Furthermore, they have argued that 'proliferation concerns' would be better addressed 'through multilaterally negotiated, universal, comprehensive and non-discriminatory

[32] Preparatory Committee for the 2026 Review Conference of the Parties to the NPT (note 16); and 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 'Addressing "Vienna issues": The Comprehensive Nuclear-Test-Ban Treaty; compliance and verification; export controls; cooperation in the peaceful uses of nuclear energy; nuclear safety; nuclear security; and discouraging withdrawal from the Treaty on the Non-Proliferation of Nuclear Weapons', NPT/CONF.2020/WP.3/Rev.1, 20 June 2022.

[33] Jonas, Carlson and Goorevich (note 24).

[34] Jonas, Carlson and Goorevich (note 24).

[35] 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 'The inalienable right to develop research, production and uses of nuclear energy for peaceful purposes', Working paper submitted by the members of the Group of Non-Aligned States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons', NPT/CONF.2020/WP.25, 24 Nov. 2021.

[36] Schmidt, F., 'NPT export controls and the Zangger Committee', *Nonproliferation Review*, vol. 7, no. 3 (Sep. 2000).

[37] Zangger Committee, 'History', [n.d.]. The Zangger Committee currently has 39 members. The EU is a permanent observer. However, substantive technical work on reviewing the control lists, including the trigger list, has largely moved to the NSG.

[38] Goorevich, R., 'Development of the Nuclear Suppliers Group and the philosophy of nuclear export controls', Nuclear Suppliers Group Transparency Seminar, New York, 15 Oct. 2009.

[39] Stewart, I. and Sultan, A., 'India, Pakistan and the NSG', King's College, London, 10 June 2019.

[40] Preparatory Committee for the 2026 Review Conference of the Parties to the NPT (note 16); and Scheinman (note 16).

[41] Hibbs, M., 'A more geopoliticized Nuclear Suppliers Group', Carnegie Endowment for International Peace, 14 Dec. 2017.

[42] Preparatory Committee for the 2026 Review Conference of the Parties to the NPT, 'The inalienable right to develop research, production and uses of nuclear energy for peaceful purposes', Working paper submitted by the members of the Group of Non-Aligned States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, NPT/CONF.2026/PC.II/WP.25, 26 June 2024.

agreements'.[43] NAM states have also criticized the use of 'certain unilateral, politically motivated restrictions and/or limitations imposed on developing countries', in a clear reference to the use of sanctions.[44] NAM states have also called for the 'elimination of constraints inconsistent with the requirements of the Treaty' as a means of ensuring the full implementation of states' obligations to facilitate transfers of nuclear technology for peaceful uses. Finally, some of these states have criticized what they see as double standards in the way nuclear suppliers have applied their own guidelines. For instance, Pakistan has long criticized what it perceives as special treatment afforded to India by NSG participants.[45]

States that participate in both the NSG and the NAM as members or observers have often shown sympathy for the concerns raised by developing countries about the use of nuclear export controls and the role of the NSG. For instance, South Africa has consistently stressed the need to maintain a balance among the different aspects of the NPT.[46] Brazil maintains the position that nuclear safety and security measures, which refer to measures to prevent accidents or malicious use of nuclear material, respectively, should not be imposed as a condition of technical cooperation on nuclear activities, hamper transfers of nuclear material for peaceful purposes or undermine the priorities of the IAEA TC programme.[47] Both Argentina and Brazil, in their recent roles as chairs of the NSG, have highlighted 'the need to balance non-proliferation and international security objectives with the potential impact on states' technological and industrial development'.[48]

China is arguably the NSG participating government that, especially in recent years, has aligned itself most with the criticisms expressed by NAM states on the relation between export controls and nuclear cooperation for peaceful purposes. Both during the last NPT Review Conference and in the most recent preparatory meetings, China has stressed the complementarity between non-proliferation measures and the peaceful uses of nuclear energy, and how the increased use of export controls as a geopolitical tool risks undermining international cooperation for peaceful purposes.[49]

## III. EXAMINING THE ROLE OF THE NUCLEAR SUPPLIERS GROUP AND NUCLEAR EXPORT CONTROLS

Export controls on the trade in special nuclear materials, items required for nuclear fuel cycle activities and nuclear weapons, have been part of nuclear non-proliferation efforts since the inception of the NPT. The NSG is the main multilateral instrument setting standards on how export controls can prevent transfers of material, equipment, software and technology to NNWS from contributing to the proliferation of nuclear weapons by coordinating export controls and conditions of supply. The NSG is an informal arrangement between supplier states to coordinate and harmonize controls on transfers of nuclear and nuclear-related items.[50] The NSG is neither a treaty nor legally binding on the participating governments but a multilateral export control regime that establishes common guidelines to be implemented by each participating government through its national system of export controls. The group has grown from seven states at its inception to 48 states in 2025. The European Commission and the Zangger Committee are permanent observers. It is the multilateral export

[43] Preparatory Committee for the 2026 Review Conference of the Parties to the NPT (note 42).

[44] Preparatory Committee for the 2026 Review Conference of the Parties to the NPT (note 42).

[45] United Nations, General Assembly, 'Promoting international cooperation on peaceful uses in the context of international security', Report of the secretary-general, A/77/96, 13 June 2022, p. 51.

[46] South African national statement to Main Committee III, 'Peaceful uses of nuclear energy', 8 Aug. 2022.

[47] 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 'Peaceful uses of nuclear energy', Working paper submitted by Brazil, NPT/CONF.2020/WP.72, 19 Aug. 2022; Statement by the Delegation of Brazil, Cluster 3: Peaceful Uses, Second Preparatory Committee of the 11th Review Conference of the NPT, Geneva, 22 July–2 Aug. 2024; and Statement by the Delegation of Brazil, Cluster 3: Peaceful uses of nuclear energy, 1st Session of the Preparatory Committee for the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Vienna, 31 July–11 Aug. 2023.

[48] Brockmann, K. and Héau, L., 'The multilateral export control regimes', *SIPRI Yearbook 2024: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2024).

[49] 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 'Peaceful uses of nuclear energy', Working paper submitted by China, NPT/CONF.2020/WP.31, 29 Nov. 2021; Permanent Mission of the People's Republic of China to the UN, 'Statement by HE Ambassador Li Song on the peaceful uses of nuclear energy at the Tenth NPT Review Conference', 8 Aug. 2022; 'Remarks by Chinese Delegation on peaceful uses of nuclear energy at the First Meeting of the Preparatory Committee for the 2026 NPT Review Conference'; and 'Statement by Sun Xiaobo, Director-General of the Department of Arms Control of the Foreign Ministry of China, at the General Debate of the Second Session of the Preparatory Committee for the 2026 NPT Review Conference', Geneva, July 2024.

[50] Nuclear Suppliers Group, 'Participants', [n.d.].

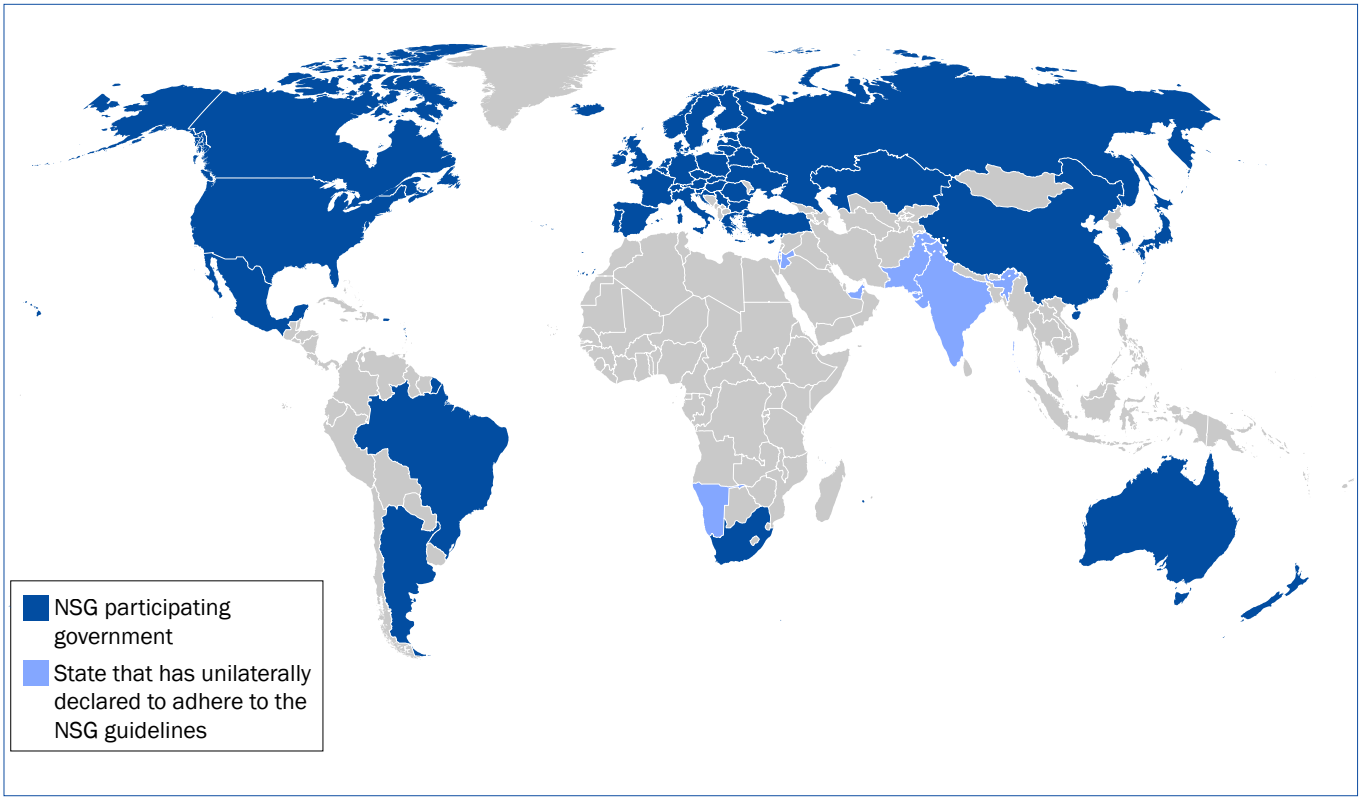


**Figure 1.** NSG participating governments in 2025

NSG = Nuclear Suppliers Group.

control regime with the widest participation (see figure 1).[51] Another six states have officially informed the IAEA that they are unilaterally adhering to the NSG guidelines.[52] There is no collective decision making on licensing applications. Implementation and enforcement of export controls rest entirely with the participating governments and take place at the national level.

## The origins and functioning of the NSG

The NSG specifically builds on the work of the Zangger Committee from 1971–74, which initially created the list of items that trigger a safeguards requirement to help states parties interpret the scope of Article III(2) of the NPT.[53] Initially, the NSG guidelines only included a control list of items, the scope of which was slightly beyond that of the trigger list.[54] In 1992, the NSG guidelines were expanded to include a dual-use list that would cover transfers of 'nuclear-related dual-use equipment, material, and technology . . . that could make a significant contribution to an unsafeguarded nuclear fuel cycle or nuclear explosive activity'.[55] In the same year, the NSG also established an information exchange, an exchange of denial notifications and a requirement that recipients of trigger list items should have a full-scope safeguards agreement in place.[56] This expansion recognized the shortcomings of only applying controls to transfers of trigger list items, following the revelation of a clandestine nuclear weapon programme in Iraq.[57] It also followed the recommendation made by the 1990 NPT Review Conference to 'require, as [a] necessary condition for the transfer of relevant nuclear supplies' that NNWS accept IAEA safeguards' (i.e. full-scope or

[51] Nuclear Suppliers Group (note 50).

[52] The states that have declared to the IAEA that they will unilaterally adhere to the NSG guidelines are India, Israel, Jordan, Namibia, Pakistan and the United Arab Emirates.

[53] Zangger Committee (note 37).

[54] Nuclear Suppliers Group, 'Aim of the guidelines', [n.d.].

[55] International Atomic Energy Agency (IAEA), 'Communication received from the Permanent Mission of the Argentine Republic to the International Atomic Energy Agency on behalf of the participating governments of the Nuclear Suppliers Group', INFCIRC/539/Rev.8, 28 July 2022.

[56] Brockmann and Héau (note 48).

[57] Anthony, I. et al., *Reforming Nuclear Export Controls: The Future of the Nuclear Suppliers Group*, SIPRI Research Report no. 22 (Oxford University Press: Oxford, 2007), p. 22; and International Atomic Energy Agency (note 55).

comprehensive safeguards) that apply to 'all their current and future nuclear activities'.[58] Since 2011, the NSG guidelines have also included an explicit reference to the conclusion of an IAEA additional protocol as a condition for supplying enrichment and reprocessing equipment, material and technology.[59] The guidelines also refer to the adoption of 'a regional accounting and control arrangement for nuclear materials, as approved by the IAEA Board of Governors' as an appropriate alternative form of safeguards in an apparent reference to the Quadripartite Agreement mentioned above.[60]

The NSG has grown and become institutionalized as a working body in which states collectively undertake extensive coordination, technical work and information sharing, in areas where there are no similar forums available. The NSG plenary is the main decision-making body of the regime where the participating governments take all the decisions by consensus, be they procedural, administrative or changes to control lists and public national practice documents. The programme of work of the NSG is implemented by various subsidiary bodies that fulfil different functions. The Consultative Group (CG) is the main working level body where proposals related to the NSG guidelines and the control lists are coordinated and discussed before being presented to the plenary for a formal decision. The Technical Experts Group is the main forum for discussions on technological developments and technical aspects of the control lists. It makes recommendations to the CG on all technical questions referred to it by the CG or plenary. The NSG also has a Licensing and Enforcement Experts Meeting and an Information Exchange Meeting where case studies, illicit procurement and circumvention attempts, and denials, among other things, can be shared and discussed. Finally, the Permanent Mission of Japan to the International Organizations in Vienna acts as the NSG Point of Contact and provides practical and administrative support, such as receiving and distributing NSG documents and meeting schedules.

### The NSG as a public goods provider

The NSG has gradually shifted from primarily providing resources and forums for participating governments to making some of these resources available to all states and providing more opportunities for dialogue and input into parts of its work. This is embodied in the efforts made by the NSG—as well as the other regimes—to provide public goods in the form of guidelines, outreach and other resources to all states.

The NSG publishes its guidelines, control lists and national practices documents for anyone to use, adopt in or adapt to their national export control system. It also constantly reviews and updates these documents—a task that requires resource-intensive technical work, expertise, sharing of experiences and cases, and the drafting of good practice documents. The NSG also supplements the publication of updates to its control list with a brief explanation for each individual change.[61]

While the NSG is not an instrument of the NPT or the IAEA, its guidelines and control lists have been referenced, more or less explicitly, by both, as well as by other relevant instruments. The 1990 NPT Review Conference recommended that NPT states parties coordinate on the export of items not identified in Article III(2) and the Final Document of the 2010 NPT Review Conference stipulates in action 36 that NPT states parties should 'make use of multilaterally negotiated and agreed guidelines and understandings in developing their own national export controls'. Both these points have been interpreted by NSG participants and a growing number of other states to reference the NSG and its guidelines and control lists.[62]

The NSG guidelines also complement other key international non-proliferation instruments, such as UN Security Council Resolution 1540 on the non-proliferation of WMD. Specifically, the resolution provides 'that all States shall take and enforce effective measures to establish domestic controls to prevent the proliferation of nuclear . . . weapons and their means of delivery, including by establishing appropriate controls over related materials'.[63] In order to comply with Resolution 1540, an increasing number of states outside of the NSG have unilaterally incorporated its

[58] Schmidt, F., 'Nuclear export controls: Closing the gaps', vol. 46, no. 2 (Mar. 2005); and International Atomic Energy Agency (note 55), p. 2.

[59] International Atomic Energy Agency (IAEA), 'Communication received from the Permanent Mission of Kazakhstan to the International Atomic Energy Agency regarding Certain Member States' Guidelines for the Export of Nuclear Material, Equipment and Technology, INFCIRC/254/Rev.14/Part 1a, 18 Oct. 2019.

[60] Jonas, Carlson and Goorevich (note 24).

[61] See e.g. the 2024 comparison table and explanation of changes. NSG, 'Explanation and comparison table of changes to the guidelines for nuclear transfers and annexes A, B and C of the guidelines for nuclear transfers', INFCIRC/254/Part 1', [n.d.].

[62] International Atomic Energy Agency (note 55).

[63] United Nations Security Council Resolution 1540, 28 Apr. 2004.

guidelines and control lists into their national export control systems. The guidelines and control lists created and maintained by the NSG have become de facto international standards for states participating in the nuclear trade, beyond the membership of the NSG. In 2015, the NSG chair reported that 15 NSG outreach partners had fully harmonized their export control systems with the guidelines and control lists and 79 UN member states had adopted nuclear control lists.[64] The work of the NSG is also intrinsically linked with the IAEA through regular exchanges, and the NSG guidelines and control lists are published by the IAEA as Information Circular 254 in three-year cycles.[65] In addition, the NSG guidelines have been referenced in the IAEA's Model Additional Protocol and used by many countries to define the scope of bilateral nuclear agreements.[66]

The NSG updates its control lists annually in an effort to keep nuclear export controls in line with technological developments and at appropriate levels, and as an exercise in burden sharing among the participating governments. The alternative—that each state individually monitor and review all technological developments in the nuclear and other fields—would put significant strain on the capacities of the best resourced export control systems and authorities. For export control authorities with more limited resources, it would probably be impossible to consistently monitor and assess technological developments and update control lists and guidance accordingly. Conversely, a centralized system of export control coordination at a wider international level, for example through the UN, but which would presumably also adopt the consensus principle, would struggle even more to collectively assess technological developments and take timely decisions on controls. Abandoning the consensus principle would similarly result in more divergences in implementation of the non-binding standards provided by export control guidelines.

The NSG has also sought to enable states to use the public goods provided more easily. The NSG chair, and the chairs of its subsidiary bodies, undertake an annual programme of bilateral outreach missions to applicants, non-participant nuclear suppliers and other interested states. The NSG representatives also participate in and present the work of the NSG during export control-focused international events, such as the Asian Export Control Seminar, the EU Export Control Forum and similar regional forums, as well as side events to NPT meetings. The NSG is in the process of reinvigorating collective outreach activities, which it had held occasionally up until 2014.[67] Such collective outreach activities are similar to those undertaken by the Missile Technology Control Regime (MTCR) and the Wassenaar Arrangement and could potentially benefit from applying good practices developed by these regimes. These efforts seek to target interested states that are implementing the guidelines and control lists provided by these regimes or are interested in doing so.[68] They also aim to provide an opportunity to present the resources these regimes produce to non-participants and assist them with how best to use the resources. The NSG has also periodically held outreach meetings for companies in the nuclear sector in participating states.

### Balancing transparency and confidentiality

There is an understandable need for confidentiality attached to the work of the NSG, particularly where it relates to discussing specific illicit procurement attempts and enforcement cases. Nonetheless, there is an expectation of transparency linked to a body with limited membership that encourages non-participating states to follow its guidelines and adopt its control lists. Conveying information that increases understanding of the rationale behind changes to the control lists, which are of a technical nature and related to developments in nuclear technology, or making this information more accessible, can help to strengthen implementation of the controls adopted.

The NSG currently uses a number of tools to share such information. The outreach activities implemented by the NSG plenary and subsidiary group chairs are important elements of continuously representing, explaining and reporting on the work of the NSG.

[64] Grossi, R. M. and Goorevich, R., Presentation to a side event at the 2015 Review Conference of the Nuclear Non-Proliferation Treaty, New York, 6 May 2015, p. 12.

[65] International Atomic Energy Agency (note 59).

[66] Statement by HE Ambassador Rafael Mariano Grossi, Delegation of the Argentine Republic, Main Committee II, Review Conference of the Parties to the Treaty on Non-Proliferation of Nuclear Weapons, New York, May 2015.

[67] National licensing official, Statement during a side-event to the 2nd Session of the Preparatory Committee for the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 'International cooperation on peaceful uses', 26 July 2024.

[68] Missile Technology Control Regime, 'MTCR Expert Groups', [n.d.]; and Wassenaar Arrangement, 'Outreach', updated 1 Dec. 2023.

In addition, the NSG web presence, in particular its website, provides extensive background information, access to all official documents, major announcements and news, brochures, explanatory videos and answers to frequently asked questions in five of the six UN languages and German. It also provides contact details for the national contact points of all participating governments.

The public statement issued at the conclusion of the annual plenary meeting also serves useful communication purposes, despite being largely repetitive in content. However, this instrument has been increasingly politicized in the current difficult geopolitical context, and on several occasions since 2022, participating governments have not been able to agree on the issuing of such a document. Some NSG chairs in this period have sought to make up for this by providing additional information on the 'Chair's corner' page of the NSG website, which they can largely use at their own discretion.

## The impact of export controls on nuclear trade for peaceful uses

The NSG guidelines stipulate that suppliers should facilitate access to nuclear material for peaceful uses in nuclear energy and encourage use of the international commercial market where there are no overriding proliferation risks. The NSG does not collect or publish data on approvals or denials of export licences by participating governments for items covered by the NSG control lists. The most recent version of INFCIRC/539, published in 2022 and submitted by the Argentinian NSG chair, notes that 'few NPT parties have been refused items that are listed on the NSG Control Lists' and 'almost all refusals by NSG participants of applications for export licences have concerned States with unsafeguarded nuclear programmes.'[69]

The EU publishes aggregated data on EU member states' approvals and denials of licences for exports of dual-use items. In January 2025, it expanded the level of detail provided by publishing more information on the categories and destinations of exports.[70] The EU does not publish the number of denials issued broken down by control list category but it does report the total number of licence denials. In 2022, EU member states issued 813 export licence denials across all dual-use items, which represents 0.04 per cent of the total value of extra-EU exports of goods.[71] The EU has noted that only a 'small proportion' of its exports are denied and that 'export controls are proportionate and targeted and do not hinder legitimate trade'.[72]

The trade in strategic items, including items captured by the NSG guidelines, is affected by many different factors. This makes it difficult to discern the specific impact of multilateral and national export control measures. Several studies have sought to identify the factors that determine whether states that pursue civilian nuclear power programmes are successful.[73] These studies have tended not to highlight the role of the NSG and national export control measures in preventing the successful completion of such projects. Instead, they argue that domestic political and economic factors in the state seeking to adopt the technology have the most significant impact on success, alongside external shocks such as nuclear accidents.

Finally, adoption of the NSG guidelines can be seen as contributing to the propagation of IAEA safeguards as a condition of supply and to trust-building between exporter and importer through the government-to-government assurances that are part of nuclear trade relationships. For instance, anecdotal evidence from government officials in states that have recently adopted a national strategic trade control system indicates that its establishment led to increased trade in high-technology and dual-use items.[74] This picture is supported by recent studies of trade data, which

[69] International Atomic Energy Agency (note 55), pp. 3–4.

[70] European Commission, 'Report highlights EU's approach to export controls of dual-use items', 31 Jan. 2025.

[71] European Commission, 'Staff working document, comprehensive data sets related to export controls of dual-use items for the year 2022, accompanying the document report from the Commission to the European Parliament and the Council on the implementation of Regulation (EU) 2021/821 Setting up a Union Regime for the Control of Exports, Brokering, Technical Assistance, Transit and Transfer of Dual-Use Items', 30 Jan. 2025.

[72] European Commission (note 71), p. 12; and United Nations, General Assembly (note 45), p. 77.

[73] Neumann, A. et al., 'Democratic quality and nuclear power: Reviewing the global determinants for the introduction of nuclear energy in 166 countries', *Energy Research & Social Science*, vol. 63 (May 2020); Fuhrmann, M., 'Splitting atoms: Why do countries build nuclear power plants?', *Empirical and Theoretical Research in International Relations*, vol. 38, no. 1 (2012); Brutschin, E. et al., 'Failing the formative phase: The global diffusion of nuclear power is limited by national markets', *Energy Research & Social Science*, vol. 80 (Oct. 2021); and Kim, P., 'Challenges in nuclear energy adoption: Why nuclear energy newcomer countries put nuclear power programs on hold', *Nuclear Engineering and Technology*, vol. 56, no 4 (Apr. 2024), pp. 1234–43.

[74] United Nations Interregional Crime and Justice Research Institute (UNICRI), 'Interview with Janice Dimayacyac', 1540 Compass, no. 3 (Dec. 2024), pp. 23, 26.

indicate a positive correlation between the adoption of export controls and participation in trade in high-technology and dual-use items, both as an exporter and importer.[75]

## IV. CURRENT DEBATES AROUND THE ISSUE OF PEACEFUL USES

NPT states parties were unable to agree on an outcome document at the 10th NPT Review Conference in 2022. However, the draft final document highlighted the increasing role of the peaceful application of nuclear technology in numerous fields.[76] Furthermore, the Argentinian chair of the conference sought to dedicate more attention to the implementation of Article IV, not least by leading multiple consultations and collecting different views on the topic in the run-up to the conference. The outcome of the conference highlighted 'deep disagreement' among states parties over the 'balance' between the right to peaceful use, the implementation of export controls and the application of strengthened IAEA safeguards to the nuclear activities of NNWS. [77] However, some states built on the chair's efforts to dedicate more attention to facilitating dialogue on the issue of peaceful use and launched the above-mentioned SDPU initiative.[78] In the current cycle of preparatory meetings that will lead up to the 11th NPT Review Conference in 2026, NPT states parties are also making efforts to facilitate discussions on and clarify the role of nuclear export controls and the NSG in relation to nuclear cooperation for peaceful uses.[79]

### UN General Assembly resolutions on peaceful uses

The long running discussions around the tensions and balance between states' rights and obligations under the NPT have recently gained wider prominence as a result of the UN General Assembly resolutions on 'Promoting international cooperation on peaceful uses in the context of international security', which were submitted by China in 2021, 2022 and 2024, and adopted by progressively larger margins. The three resolutions connect discussions about the implementation of aspects of the NPT with similar language that appears in the Biological and Toxin Weapons Convention (BWC) and the Chemical Weapons Convention (CWC).[80] All three treaties recognize the right of states parties to participate in the 'fullest possible exchange' of equipment, material and scientific and technical information for 'peaceful uses' or 'peaceful purposes'.

China invested considerable effort in building growing levels of support for the three resolutions and has included discussions about supporting their adoption in high-level meetings with heads of state. For example, the joint declaration that followed the Beijing Summit of the Forum on China-Africa Cooperation in September 2024, which brought together heads of state from China and 53 African countries, noted that 'the peaceful use of technology is an inalienable right conferred by international law on all countries'.[81] It also committed all signatories to support the UN General Assembly resolution on international cooperation on peaceful uses 'to ensure that developing countries fully enjoy the right to the peaceful use of science and technology'.[82]

Several states and commentators argue that these initiatives are mainly an attempt by China to highlight and delegitimize the widening set of export controls on critical technology areas, such as semiconductors and related manufacturing equipment and quantum computers, that the USA and other like-minded states

[75] Pryor, C. D. and Preble, K. A., 'Tracking the implementation of Strategic Trade Controls (STCs)', SSRN, 1 Oct. 2024.

[76] Batsanov, S., Chernavskikh, V. and Khlopkov, A., '10th NPT Review Conference: The nonproliferation and peaceful uses of nuclear energy pillars', *Arms Control Today*, Oct. 2022.

[77] Batsanov, Chernavskikh and Khlopkov (note 76).

[78] Batsanov, Chernavskikh and Khlopkov (note 76); and 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (note 15).

[79] Second Session of the Preparatory Committee for the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), 'Indicative calendar of side events organized by States Parties', 24 July 2024; and Third Session of the Preparatory Committee for the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), 'Indicative calendar of side events organized by States Parties', 22 Apr. 2025.

[80] United Nations Treaty Collection, Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, Article XI; and British Foreign and Commonwealth Office, Treaty text, Treaty Series no. 11 (1976), Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Article X.

[81] United Nations, General Assembly, 'Letter dated 22 September 2024 from the Permanent Representative of China to the United Nations addressed to the Secretary-General', A/79/379, 1 Oct. 2024.

[82] United Nations, General Assembly (note 81).

have imposed on China in recent years.[83] The USA has justified the introduction and expansion of such controls as a tool to limit transfers of technology that might advance China's military capabilities and China's military-civil fusion strategy, which aims to help the Chinese military benefit from developments in China's civilian sectors. However, US officials have also referred to the use of export controls, domestic subsidies and other policy tools as a way of staying ahead of other states in key technology areas.[84] In response, China has argued that the USA is using export controls as a tool of geopolitical competition, and has requested World Trade Organization (WTO) dispute consultations with the USA.[85]

The three General Assembly resolutions are critical of states' use of export control measures and the way the export control regimes operate. Specifically, the resolutions 'reaffirm' that states' right to benefit from access to cooperation in science and technology for peaceful uses should not be limited by the implementation of WMD-related non-proliferation measures. They also 'note with concern' that multilateral and national export control measures are infringing this right by creating 'undue' restrictions on transfers of goods and technology for peaceful purposes. The 2021 resolution tasked the UN secretary-general with collecting states' views on these issues, which were compiled in a report published in June 2022.[86] The resolutions have attracted increased support over the years: the 2021 resolution was adopted by 78 votes in favour, with 53 opposed and 32 abstentions; the 2022 resolution by 94 votes in favour, with 53 opposed and 28 abstentions and the 2024 resolution by 105 votes in favour, with 53 opposed and 24 abstentions.[87]

The 2024 resolution repeats many of the points made by its predecessors but adds more critical language about the controls that supplier states are imposing. For instance, while the 2021 and 2022 resolutions note with concern that 'undue restrictions . . . persist', the 2024 text states that they are 'increasing' and include 'unilateral coercive measures that violate international law'. The 2024 resolution also notes that 'non-proliferation control arrangements' are being used as vehicles for these efforts.[88] However, while the criticism of states' use of unilateral measures has increased, the level of change that the resolutions demand in how the export control regimes should operate has become slightly more moderated. As an example of this, the 2022 resolution emphasizes that the regimes 'should be transparent and open to participation by all states', while the 2024 version states that they should be 'transparent and inclusive, in line with their respective mandates'.

This shift in tone is mirrored in China's broader messaging around the resolutions. In 2022, China argued that there needed to be a fundamental rethink of how the export control regimes operate and called on states to 'look into the establishment of a universal, comprehensive and non-discriminatory' framework through multilateral negotiations in the General Assembly.[89] China also recommended establishing 'a Group of Governmental Experts (GGE) or an Open-ended Working Group (OEWG) within the framework of the General Assembly' to promote peaceful uses.[90] In contrast, in a 2024 position paper on peaceful uses, China does not call for a new regime but instead emphasizes that 'developing countries should be fully guaranteed their right to participate in the relevant rule-making and mechanism-building processes'.[91] The paper also drops references to a call for a new GGE or OEWG. In the text of the 2024 UN resolution, 'formulating guiding principles as appropriate' is the only additional step that states are encouraged to take to implement the resolution.

[83] See Bromley, M., Mustafić, S. and Yuan, J., 'China takes aim at the export control regimes: Targeted critique or misguided attack?', World ECR, 5 Feb. 2024.

[84] Brockmann, K., Bromley, M. and Maletta, G., 'Implications of the UN resolutions on "international cooperation on peaceful uses": Balancing non-proliferation and economic development', SIPRI Topical Backgrounder, 11 Dec. 2024.

[85] World Trade Organization, 'United States: Measures on certain semiconductor and other products, and related services and technologies', 12 Dec. 2022.

[86] United Nations (note 45).

[87] United Nations, General Assembly, 'Promoting international cooperation on peaceful uses in the context of international security', A/RES/76/234, 24 Dec. 2021; United Nations, General Assembly, 'Promoting international cooperation on peaceful uses in the context of international security', A/RES/77/96, 16 Dec. 2022; and United Nations, General Assembly, 'Promoting international cooperation on peaceful uses in the context of international security', A/RES/79/80, 10 Dec. 2024.

[88] United Nations General Assembly, A/RES/79/80 (note 87); and United Nations, General Assembly, A/RES/77/96 (note 87).

[89] United Nations (note 45), p. 20.

[90] United Nations (note 45), p. 20.

[91] Ministry of Foreign Affairs of the People's Republic of China, Working paper on UNGA Resolution 'promoting international cooperation on peaceful uses in the context of international security', updated 18 Oct. 2024.

### States views on the UN General Assembly resolutions on peaceful uses

The process of drafting, negotiating and adopting the General Assembly resolutions has opened up a new front in ongoing disagreements about whether or how states are benefiting from their NPT-related rights and honouring their commitments concerning facilitating the sharing of nuclear technology for peaceful uses. In its submission to the 2022 collection of states' views, Egypt restated its rejection of 'the call by some Member States to impose the conclusion of an additional protocol as a condition on the advancement of international cooperation in the field of peaceful uses'.[92] Similarly, Saudi Arabia noted its opposition to 'agreements outside the [NPT] framework that create obstacles to access by developing countries to technologies they need to continue on the path to sustainable development'.[93]

As in the NPT discussions, the resolutions have also raised and succeeded in combining a wider set of concerns and grievances concerning specific issues regarding implementation of NPT commitments, as well as other long-standing disagreements about the implementation of supply-side controls on transfers of dual-use items. In this context, several states, such as Cuba and Iran, have used the process to highlight long-standing concerns about US and EU sanctions and their economic effects.[94] The process has also merged disputes around the implementation of NPT obligations with long-running debates concerning the implementation of equivalent CWC and BWC obligations. These debates, particularly those concerning BWC obligations, have become more contentious in recent years, in part due to disputes concerning the sharing of vaccines and related technologies during the Covid-19 pandemic.[95]

In response to the 2021 and 2022 resolutions, many states participating in the multilateral export control regimes sought to highlight the positive role that the regimes play in building trust and confidence, and enabling transfers of technology for peaceful uses. These arguments became more pointed in 2024 as states became more willing to identify China, and China's grievances about the imposition of trade restrictions, as the driving force behind the resolutions. They also argued that the real challenge to multilateral export controls was China's policy of military-civil fusion, which aims to integrate China's civilian and defence economies to enable more effective sharing of technologies between sectors.[96]

Despite these efforts, several members of multilateral export control regimes, including NSG participating states, have either supported the three resolutions or abstained. In addition to China, Belarus, Kazakhstan, Russia and South Africa have consistently voted in favour of the resolutions, while Mexico has abstained, despite the fact that they are all NSG participating states. Jordan, Namibia, Pakistan and the United Arab Emirates have also consistently voted in favour, and India has abstained, despite having declared to the IAEA that they unilaterally adhere to the NSG guidelines. Brazil, a participating state and outgoing chair of the NSG, switched from abstaining in 2022 to voting in favour of the 2024 resolution. Conversely, Argentina, switched from abstaining in 2022 to voting against in 2024.

While the tone of the resolutions has become more tempered in their criticism of the regimes, there is little sign that the issue that many view as the ultimate driving force behind this process—China's grievances about US technology transfer controls—will dissipate in the near future. The administration of President Donald J. Trump has stated that, as part of its America First Trade Policy launched in January 2025, it will continue to use export control measures to limit transfers of advanced technologies to China.[97] Against this backdrop, and the increase in support for the resolutions, it will become more difficult for states participating in the regimes to avoid engaging with

[92] United Nations (note 45), p. 24.

[93] United Nations (note 45), p. 60.

[94] Republic of Cuba, Declaracion General De La Delegación De Cuba. Grupo De Temas No. 5 "Otras Medidas De Desarme Y Seguridad Internacional". Primera Comisión. [General statement of the delegation of Cuba, thematic debate no. 5, 'Other disarmament measures and international security'], First Committee, 79th Session of the General Assembly of the United Nations, New York, 2024; and United Nations Office for Disarmament Affairs, Statement by the Islamic Republic of Iran on L.56, 2 Nov. 2022.

[95] See Revill, J. and Garzón Maceda, M., 'Addressing the elephant in the room: Export controls decisions', eds J. Revill and M. Garzón Maceda, *Options for International Cooperation Under Article X of the Biological Weapons Convention* (UN Institute for Disarmament Research: Geneva, 2022).

[96] Kania, E. B. and Laskai, L., 'Myths and realities of China's military-civil fusion strategy', Centre for a New American Security, 28 Jan. 2021; and Permanent Mission of the Czech Republic to the United Nations, 79th Session of the General Assembly First Committee, General Debate, Statement by Ms Tatjana Jakšičová, Director of Control Policies Department, Ministry of Foreign Affairs, New York, 8 Oct. 2024.

[97] The White House, 'America First Trade Policy', 20 Jan. 2025.

the substance of the criticism that has emerged in the General Assembly and other forums.[98]

## V. CONCLUSIONS AND RECOMMENDATIONS

The use of multilateral and national export control measures to fulfil or achieve states' rights or obligations under the NPT is both well established and highly contentious. Many states continue to see the content and application of these controls as limiting the ability of developing countries to gain access to nuclear technologies for peaceful uses, and preventing fulfilment of supplier states' obligation to facilitate the sharing of nuclear technology for peaceful purposes. However, the standards that the NSG adopts, and which a growing number of states beyond the NSG participants apply through their domestic export controls, play a key role in facilitating the trade in nuclear technologies for peaceful uses. Moreover, as highlighted above, the NSG is a multilateral export control regime in which participating governments agree on common guidelines that they are then responsible for implementing and enforcing at the national level. These states maintain their prerogative on export control decisions and the NSG does not make any collective determination on licensing applications or impose any country-based restrictions—meaning much of the criticism would more appropriately be directed at individual state's practices than the NSG.

These arguments, which have become both more complex and more politicized in recent years, are unlikely to be resolved in the near future. Steps could be taken at the individual state, EU or UN level to facilitate a more inclusive dialogue around how best to balance states' obligations under the NPT, and to examine the role of the NSG and the implementation of its guidelines. This dialogue could also help to strengthen channels for facilitating transfers of nuclear technology for peaceful uses.

### De-couple the different complaints and grievances on peaceful uses and address each through appropriate and existing channels

States' discussions on peaceful uses in the General Assembly and the NPT process have increasingly combined issues that are not all relevant to nuclear export controls and the NSG, or that could be more appropriately addressed through other initiatives or channels. For instance, bilateral trade disputes, such as the one related to US restrictions on transfers of certain dual-use items and technology to China, are already being addressed through the WTO dispute resolution mechanism. Concerns related to the humanitarian consequences of sanctions measures are being tackled in the context of UN Security Council Resolution 2664, which establishes humanitarian exemptions for the asset freeze measures imposed by UN sanctions. Rather than bringing these different concerns and disputes together in a single process, states should seek, to the extent possible, to address them separately through the most appropriate and relevant channels.

### Conduct more detailed analyses of the role of different factors in impeding the sharing of nuclear technology for peaceful uses

Discussions around facilitating the sharing of nuclear technology for peaceful uses could be supported by more detailed research on the role export controls and other factors play in this area. One element of this discussion could be an assessment of how well the current mechanisms for enabling the sharing of nuclear technology for peaceful purposes are working. This could include an assessment of the obstacles they have faced and the extent to which new initiatives, such as the above mentioned SDPU, and other projects could complement existing activities. Detailed case studies of these programmes, conducted by states or research institutes, could explore the role of export control measures in either enabling or hindering their implementation.

### Initiate a wider and more inclusive discussion on how to facilitate the sharing of technology for peaceful uses

The momentum generated by the Pact for the Future creates the potential to engage diplomats working on non-proliferation, disarmament and development issues in a wider and more inclusive discussion on how to address relevant challenges. The newly adopted EU Council Decision in support of the 2026 NPT Review Conference could provide the means to facilitate some of these discussions. For instance, the decision foresees the organization of various regional meetings that could also address 'access to the benefits of peaceful

[98] Brockmann, Bromley and Maletta (note 84).

uses of nuclear technology, including for the attainment of the Sustainable Development Goals'.[99]

### Share more detailed information on the content and implementation of domestic export control measures

Sharing non-sensitive information on how national export controls are implemented could help to dispel misconceptions about the ways in which controls on dual-use items, including nuclear technologies, are applied in practice, and the impact that export controls have on such trade. Some nuclear supplier states already publish individual or, in the case of the EU, collective data on the content and implementation of their controls on transfers of nuclear technology and dual-use items more broadly. These reports can help to clarify the concerns of states when applying export controls and, in certain cases, the volume of exports that are approved and denied. Additional information that it might be useful to share includes details of some of the complexities around regulating the trade in dual-use goods in order to help clarify the difficulties associated with trying to identify the scope and impact of controls on the trade in nuclear-related technology.

[99] Council of the European Union, 'Council Decision 2025/646 of 27 March 2025 in support of facilitating a successful outcome of the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons', *Official Journal of the European Union*, L 2025/646, 28 Mar. 2025.

### Expand provision of NSG public goods and ensure openness to dialogue and outside inputs

NSG participating governments should explore ways to make the group more proactive and transparent in sharing outputs, creating opportunities for substantive input from non-participants and improving communication channels. For instance, they could build on past collective outreach activities of the NSG and exchange information about good practices and experience with the MTCR and the Wassenaar Arrangement. Such activities would enable more direct engagement by non-participating states, such as seeking questions and feedback on specific control list items and changes. States participating in the NSG and other regimes should also facilitate and encourage more active engagement with relevant events by the regimes' formal representatives, such as chairs or heads of secretariats where applicable. These could include meetings connected to WMD-related treaties, and outreach and capacity-building activities conducted by participating states or like-minded partners such as the EU. NSG participating governments could also review the guidance materials and resources the group currently provides and consider both updating and expanding them. The NSG participating governments could summarize major developments, progress with the current chair's agenda and the recent work of subsidiary groups in periodic transparency reports.

## ABBREVIATIONS

| | |
|---|---|
| ABACC | Brazilian–Argentine Agency for Accounting and Control of Nuclear Materials |
| BWC | Biological and Toxin Weapons Convention |
| CG | Consultative Group |
| CSA | Comprehensive safeguards agreement |
| CWC | Chemical Weapons Convention |
| EU | European Union |
| Euratom | European Atomic Energy Community |
| GGE | Group of Governmental Experts |
| IAEA | International Atomic Energy Agency |
| INFCIRC | Revised Guiding Principles and General Operating Rules to Govern the Provision of Technical Assistance |
| MTCR | Missile Technology Control Regime |
| NAM | Non-Aligned Movement |
| NNWS | Non-nuclear weapon states |
| NPT | 1968 Treaty on the Non-Proliferation of Nuclear Weapons (Nuclear Non-Proliferation Treaty) |
| NSG | Nuclear Suppliers Group |
| OWEG | Open-ended working group |
| SDPU | Sustained Dialogue on Peaceful Uses |
| TC | Technical Cooperation |
| UN | United Nations |
| WMD | Weapons of mass destruction |
| WTO | Chemical Weapons Convention |

## ERRATUM

Figure 1 in a previous version of this paper omitted Argentina's status as a participating government in the NSG. Argentina should have been shaded blue.

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## A EUROPEAN NETWORK

In July 2010 the Council of the European Union decided to support the creation of a network bringing together foreign policy institutions and research centers from across the EU to encourage political and security-related dialogue and the long-term discussion of measures to combat the proliferation of weapons of mass destruction (WMD) and their delivery systems. The Council of the European Union entrusted the technical implementation of this Decision to the EU Non-Proliferation Consortium. In 2018, in line with the recommendations formulated by the European Parliament the names and the mandate of the network and the Consortium have been adjusted to include the word 'disarmament'.

## STRUCTURE

The EU Non-Proliferation and Disarmament Consortium is managed jointly by six institutes: La Fondation pour la recherche stratégique (FRS), the Peace Research Institute Frankfurt (HSFK/ PRIF), the International Affairs Institute in Rome (IAI), the International Institute for Strategic Studies (IISS–Europe), the Stockholm International Peace Research Institute (SIPRI) and the Vienna Center for Disarmament and Non-Proliferation (VCDNP). The Consortium, originally comprised of four institutes, began its work in January 2011 and forms the core of a wider network of European non-proliferation and disarmament think tanks and research centers which are closely associated with the activities of the Consortium.

## MISSION

The main aim of the network of independent non-proliferation and disarmament think tanks is to encourage discussion of measures to combat the proliferation of weapons of mass destruction and their delivery systems within civil society, particularly among experts, researchers and academics in the EU and third countries. The scope of activities shall also cover issues related to conventional weapons, including small arms and light weapons (SALW).

**www.nonproliferation.eu**

## EU Non-Proliferation and Disarmament Consortium

*Promoting the European network of independent non-proliferation and disarmament think tanks*

FONDATION pour la RECHERCHE STRATÉGIQUE

**FOUNDATION FOR STRATEGIC RESEARCH**

**www.frstrategie.org**

PRIF Peace Research Institute Frankfurt — HSFK Hessische Stiftung Friedens- und Konfliktforschung

**PEACE RESEARCH INSTITUTE FRANKFURT**

**www.hsfk.de**

iai Istituto Affari Internazionali

**INTERNATIONAL AFFAIRS INSTITUTE**

**www.iai.it/en**

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**INTERNATIONAL INSTITUTE FOR STRATEGIC STUDIES**

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