

# Reinforcing Global Nuclear Non-Proliferation: The Case for the Fissile Material Cut Off Treaty

Kian E. Jamasbi<sup>1</sup>

This paper provides a critical evaluation of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), focusing on its legal authority and the differing treatment of nuclear and non-nuclear states. It analyzes specific NPT articles and the International Atomic Energy Agency (IAEA) Safeguard Agreements, considering challenges in nuclear governance such as issues with Iran, the AUKUS trilateral security pact, and various working papers from the 2026 NPT review cycle. The paper supports the European Union's urging of the Conference on Disarmament (CD) to begin negotiations for a Fissile Material Cut Off Treaty (FMCT), emphasizing its importance for reinforcing global nuclear non-proliferation. It proposes a strategic shift from the Conference on Disarmament to a United Nations (UN) General Assembly mandate, drawing comparisons with the Treaty on the Prohibition of Nuclear Weapons (TPNW). The paper concludes with practical considerations meant to strengthen the international nuclear non-proliferation regime.

## Table of Contents

I.	Establishing Legal Foundations.....	3
	A. The Law of Treaties.....	3
	B. The Law of Customs.....	4
	C. Widely Adopted Treaties as Customary Law.....	5
II.	The United Nations and International Nuclear Law.....	6
	A. International Court of Justice, Advisory Opinion 1996.....	6
	B. Overturning Custom by Treaty: TPNW.....	7
III.	Implications of Nuclear Fuel Cycle.....	8

---

1. Juris Doctorate Candidate concentrating in international, comparative, and foreign law at Fordham School of Law in New York City. Earned a Bachelor of Science in Economics from University of Michigan, Ann Arbor. Author wishes to thank Charles J. Moxley, Jr. and Paolo Galizzi for their guidance.

A.	Mining & Milling.....	8
B.	Enrichment.....	8
C.	Fuel Assembly.....	9
D.	Reprocessing.....	9
E.	Dual-Use ENR Technologies.....	10
F.	Example: Iran.....	11
IV.	Treaty on the Non-Proliferation of Nuclear Weapons (NPT).....	13
A.	The First Pillar: Non-Proliferation (Article I and II).....	14
B.	Disparate Treatment and Export Control Regimes.....	15
C.	Example: Nuclear Supplier Group Violating NPT.....	16
D.	The Second Pillar (Article VI): Disarmament.....	16
V.	Balancing Article IV and III of the NPT.....	17
A.	Article IV of the NPT: Inalienable Right Without Discrimination.....	18
B.	Example: Japan’s Plutonium.....	19
C.	Article III of the NPT: IAEA Safeguards.....	19
D.	Balancing Article IV with Article III Under the NPT.....	20
E.	2000 NPT Review Conference on Article IVv. Article III.....	21
F.	Zangger Committee.....	22
G.	Example: India.....	23
VI.	Non-Peaceful, Non-Explosive Use of Fissile Material.....	23
A.	Non-Peaceful, Non-Explosive Use: The NPT.....	24
B.	Non-Peaceful, Non-Explosive Use: The IAEA.....	24
C.	Example: AUKUS.....	26
VII.	Insights from the 2023 NPT Preparatory Committee for the 2026 Review Conference...27	
A.	Working Paper 1: Zangger Committee’s Role.....	27
B.	Working Paper 22: Iran’s Emphasis on Article IV.....	27
C.	Working Paper 31: China’s Concerns About AUKUS.....	27
D.	Working Paper 38: Reflections by the Chair.....	28
VIII.	Toward a Fissile Material Cut Off Treaty (FMCT). ....	29
A.	Working Paper 4: A FMCT Proposed by the European Union.....	30
B.	The Verification Challenge of a FMCT.....	30
C.	The Scope Challenge of a FMCT.....	31
D.	Comparing State Positions to Facilitate FMCT Negotiations.....	31
IX.	Conclusion: A Future with the Fissile Material Cut Off Treaty.....	33
X.	Appendix: Comparing Positions of States on a FMCT.....	35
XI.	References and Bibliography.....	37

## I. Establishing Legal Foundations

The Charter of the United Nations<sup>2</sup> (UN) established the International Court of Justice (ICJ) as its principal judicial organ<sup>3</sup>. All UN members are *ipso facto*<sup>4</sup> parties to the Statute of the ICJ<sup>5</sup>. Article 38 of this Statute specifies the sources of international law that the ICJ uses in decision-making.<sup>6</sup> These include international conventions<sup>7</sup> (both specific and general), international custom<sup>8</sup> reflecting widely accepted practices, and general legal principles recognized globally<sup>9</sup>. Additionally, judicial decisions and scholarly articles serve as subsidiary means of determining rules of law.<sup>10</sup> Since the entry of its first case<sup>11</sup> on May 22nd, 1947, the ICJ has considered 191 cases<sup>12</sup>. It is the most competent authority on the rules of international law.

### The Law of Treaties

While Article 38 of the ICJ Statute does not explicitly establish a hierarchy among sources of international law, the placement of treaties first in paragraph 1(a) suggests an informal hierarchical order. This arrangement can be said to mirror laws pertaining to individuals.<sup>13</sup>

---

2. United Nations, *Charter of the United Nations*, 24 October 1945, 1 UNTS XVI, available in english at [un.org/en/about-us/un-charter/full-text](http://un.org/en/about-us/un-charter/full-text). The foundational treaty of the UN consisted of a preamble and 111 articles grouped into 19 chapters, establishing six principal organs: the General Assembly, Security Council, Economic and Social Council, Trusteeship Council, International Court of Justice, and the UN Secretariat. The Charter entered into force following ratification by China, France, the Soviet Union, the United Kingdom, the United States, and by a majority of signatories. Membership today includes almost all of the world's states with 193 members and 2 observers.

3. Id. at Chapter XIV, Article 92.

4. Id. at Article 93, paragraph 1.

5. Statute of the International Court of Justice, June 26, 1945, 59 Stat. 1055, 33 U.N.T.S. 933. (hereinafter: ICJ Statute). Successor to the Permanent Court of International Justice, consists of a panel of 15 judges elected by the UN General Assembly and Security Council for nine-year terms.

6. Id. at Article 38, paragraph 1. Article 38 is commonly regarded as identifying the sources of international law that are relevant to *any* international legal issue. See, Oscar Schachter, *International Law in Theory and Practice* (Martinus Nijhoff Publishers 1991) at 35-37.

7. Id. at Article 38, paragraph 1(a).

8. Id. at Article 38, paragraph 1(b).

9. Id. at Article 38, paragraph 1(c) referring to “general principles of law recognized by civilized nations” At its drafting, there existed a mentality among certain nations that some nations were more “civilized” than others; today, all states are regarded as relevant to the establishment of international law. See Sundhya Pahuja, *Decolonising International Law: Development, Economic Growth and the Politics of Universality* (Cambridge Univ. Press 2011).

10. Id. at Article 38, paragraph 1(d) where “teachings of the most highly qualified publicists of the various nations” are subsidiary means of law.

11. *Corfu Channel (United Kingdom v. Albania)*, Judgment of 9 April 1949, ICJ Reports 1949, p.4.

12. International Labour Organization, Request for Advisory Opinion, 27 November 2023, ICJ Reports 2023, p. 71.

13. Hersch Lauterpacht, *International Law: Collected Papers 86-87* (Cambridge Univ. Press 1970)

Contracts, like treaties, define rights and obligations. States are bound by the treaties they sign, akin to individuals bound by contract terms. This reflects the legal principle *lex specialis derogat generali*, which means specific and often written terms take priority over general, unwritten ones.<sup>14</sup> Thus, primacy of written agreements in international law is both intuitive and practical.

### The Law of Customs

In international law, where no treaties exist that establish specific rules, Article 38(1)(b) of the ICJ provides for the role of “international custom” as a reflection of widely accepted norms. To be recognized as customary international law, two elements are required:

1. *General Practice of States*: This requires the action to be both widely and consistently performed by numerous states. There is no specific duration for how long these practices must be followed, but their widespread and consistent nature is crucial.<sup>15</sup>
2. *Accepted as Law (Opinio Juris Sive Necessitatis)*: It is not sufficient for these actions to be merely habitual; they must be carried out with the belief that they are obligatory.<sup>16</sup>

It is important to emphasize that these practices must be both widespread and recognized as legally binding a nation. Nonetheless, the validity of a practice can be questioned if it is inconsistent or contradictory.<sup>17</sup> And, in the absence of a prohibition, states generally retain the freedom to exercise jurisdiction within their territories. This concept, known as the Lotus Principle<sup>18</sup>, has faced criticism for allowing too much leeway, essentially permitting any action not expressly forbidden.<sup>19</sup> That said, the ICJ has reaffirmed since that a state is only bound by the

---

14. Vienna Convention on the Law of Treaties art. 11 to 17, May 23, 1969, 1155 U.N.T.S. 331, where formation of multilateral treaties involve: (1) negotiation, (2) consensus, (3) translation, (4) signing, (5) completion of national processes, and (6) deposit of instrument of ratification.

15. *The Paquete Habana*, 175 U.S. 677 (1900) where customary international law is accepted part of American law and can be applied by federal courts.

16. See, Marc Villiger, *Customary International Law and Treaties: A Manual on the Theory and Practice of the Interrelation of Sources* 15 (2d ed. 1997).

17. See, *Asylum*, Judgement, I.C.J. Reports 1950 at 277 (Nov 26, 1950).

18. *The Case of the S.S. “Lotus” (France v. Turkey)*, Permanent Court of International Justice, 1927, P.C.I.J. (Ser. A) No. 10. (Sept. 7, 1927).

19. See, *id.*, six dissenting judges in the case itself disagreed with the proposition.

rules it explicitly agrees to, seen usually through treaties.<sup>20</sup> Given the fast-paced and ever-changing international order, creating law through customs is increasingly uncertain.<sup>21</sup>

### Widely Adopted Treaties as Customary Law

Establishing customary law today is more challenging than in the past, yet its integration with treaty law offers distinct advantages. A widely adopted treaty can evolve into customary law, especially if it codifies existing customs.<sup>22</sup> For instance, the universal adherence to the UN Charter and the 1949 Geneva Conventions<sup>23</sup> exemplifies this phenomenon. Benefits include the inability of states to unilaterally withdraw from their obligations, the incorporation of customary law into domestic legal systems, and its greater societal weight compared to contractual obligations. This creates an *erga omnes* effect, where all states become legally interested in the actions of their international neighbors.<sup>24</sup>

However, a treaty does not automatically become customary law for non-signatory states; this occurs only when a treaty consolidates and defines an emerging rule, ultimately “reflecting it”.<sup>25</sup> This process highlights the nuances of treaties and customs. While there is no definitive rule, the more states adhere to a treaty, the greater the chance the ICJ will view such adherence as shaping and contributing to customary international law.<sup>26</sup>

---

20. See also, *Military and Paramilitary Activities in and against Nicaragua (Nicaragua v. United States)*, 1986 I.C.J. 14 (June 27).

21. Hans Helsen, *Principles of International Law* 450-52 (2d rev. Ed. Tucker ed. 1966).

22. Consider Article 1 of the Convention on the Prevention and Punishment of the Crime of genocide, Dec. 9, 1948, 78 U.N.T.S. 277, in which the parties “confirm that genocide, whether committed in time of peace or in time of war, is a crime under international law”.

23. Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces, Aug. 12, 1949, 6 U.S.T. 3114, 75 U.N.T.S. 31.

24. Theodor Meron, *Human Rights and Humanitarian Norms and Customary Law* 3-10, 114-35, 192-95 (Oxford Univ. Press 1989); See also Theodor Meron, *Revival of Customary Humanitarian Law*, 99 A.J.I.L. 817, 821 (2005).

25. *North Sea Continental Shelf (Federal Republic of Germany/Denmark)*, I.C.J. Reports 1969, 3. where the Court did not view the process of negotiating and adopting the 1958 Geneva Convention as “crystalizing” a new rule of customary international law.

26. International Law Commission, *Report of the Seventy-Third Session: Draft Conclusions on Identification of Customary International Law*, with commentaries (2018), U.N. Doc. A/73/10, ch. V, Commentary to Conclusion 11, para. (6).

## II. The United Nations and International Nuclear Law

International organizations, though not typically legislative bodies<sup>27</sup>, play a crucial role in shaping international law. United Nations General Assembly resolutions, while not legally binding to nations, can reflect customary rules<sup>28</sup> and influence treaty negotiations.<sup>29</sup> However, assuming that customary law can be based solely on these resolutions is misleading, as they might not represent states' actual practices.<sup>30</sup> Despite this, resolutions have historically initiated significant treaty negotiations, such as the Cybercrime Treaty<sup>31</sup> and the Treaty on the Prohibition of Nuclear Weapons (TPNW)<sup>32</sup>.

### International Court of Justice, Advisory Opinion 1996

In 1996, the UN General Assembly sought<sup>33</sup> an advisory opinion from the ICJ on the legality of nuclear weapons.<sup>34</sup> The Court first examined existing treaties but found none. The debate centered around whether the non-use<sup>35</sup> of nuclear weapons since 1945 constituted *opinio juris*, reflecting a legal obligation rather than mere practice. The Court concluded that the

---

27. Recall Case Concerning Military and Paramilitary Activities in and against Nicaragua (Nicaragua v. United States), 1986 I.C.J. 14, 100, para. 188 where the Court relied upon the “the attitude of the Parties and the attitude of States towards certain general Assembly resolutions, and particularly resolution 2625 (XXV) entitled ‘Declaration on Principles of International Law concerning Friendly Relations and Co-operation among States in accordance with the Charter of the United Nations.

28. See, e.g., U.N. Gen. Res. 3452 (XXX), Annex, art. 2 adopted Dec. 9, 1975, reprinted in U.N. Doc. A/10034 at 91-92 (1976). Where the U.N. General Assembly unanimously adopted a resolution in which it proclaimed that: “Any act of torture or other cruel, inhuman or degrading treatment or punishment is an offense to human dignity and shall be condemned as a denial of the purposes of the Charter of the United Nations and as a violation of the human rights and fundamental freedoms proclaimed in the Universal Declaration of Human Rights.”

29. Int’l Law Comm. Conclusions on Identification of Customary International Law, with commentaries (2018), U.N. Doc. A/73/10, at 147, 148 (conclusions 12(1) and 12(3)).

30. See Roberts, Traditional and Modern Approaches to Customary International Law: A Reconciliation, 95 A.J.I.L. 757, 758-59 (2001). See also, C. Wilfred Jenks, From Apology to Utopia: The Structure of International Legal Argument (2d ed. 2005).

31. U.N. Gen. Res. 74/247, U.N. Doc. A/RES/74/247 where a resolution calling for an ad hoc intergovernmental committee to create an international convention on countering the use of cybercrime was adopted 79-60 with 33 abstentions and 21 no votes.

32. U.N. Gen. Res. 71/258, U.N. Doc. A/RES/71/258 (Dec. 23, 2016) where resolution on establishing a working group to pursue a nuclear weapons ban treaty was adopted 113-35 votes against with 13 abstentions.

33. Pursuant to U.N. Charter, Article 96, paragraph 1.

34. Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, I.C.J. Reports 1996, p. 226, International Court of Justice (ICJ), 8 July 1996.

35. Nuclear weapons have been used twice in warfare – in the bombings of Hiroshima (August 6, 1945) and Nagasaki (August 9, 1945). According to the Arms Control Association, at least eight countries have carried out a total of 2,056 nuclear tests since. Most recently on September 3, 2017 in North Korea.

international community was “profoundly divided”. The Court then turned to UN General Assembly resolutions, particularly GA Resolution 1653, which condemned the use of nuclear weapons. General Assembly Resolution 1653 declared in paragraph 1:

*“the use of nuclear and thermo-nuclear weapons is contrary to the spirit, letter and aims of the United Nations and, as such, a direct violation of the Charter of the United Nations”*<sup>36</sup>

States argued that such resolutions, when affirmed strongly with consistent regularity, signify the existence of customary law.<sup>37</sup> The ICJ did not see the issue the same way. Instead, the ICJ held that such non-binding resolutions can go as far as having normative value and possibly contribute to the formation of *opinio juris*, but cannot on their own be used as conclusive evidence of customary law.<sup>38</sup>

#### Overturning Custom by Treaty: TPNW

Dissatisfied with the ICJ’s verdict, states initiated a treaty-based strategy to ban nuclear weapons, leading in 2017 to the creation of the Treaty on the Prohibition of Nuclear Weapons (TPNW). Mandated by a UN General Assembly resolution<sup>39</sup>, the TPNW comprehensively prohibits developing, testing, producing, acquiring, possessing, using or threatening to use nuclear weapons indefinitely.<sup>40</sup> Despite the absence of major nuclear powers in adopting and ratifying the treaty, the TPNW, with 93 signatories and 63 ratifying parties including South Africa and Kazakhstan, showcases alternative methods for establishing new international legal norms through treaties and UN resolutions, even amidst unfavorable ICJ opinions or challenging global circumstances.

---

36. Gen. Res. 1653 (XVI), paragraph 1-2 (Nov. 24, 1961), Declaration on the Prohibition of the Use of Nuclear and Thermo-nuclear Weapons adopted by a vote of 55-20, with 26 abstentions. Australia, Canada, China, France, Italy, and the United Kingdom were among states that voted no.

37. Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226 at 68.

38. Id. at 70-73.

39. Gen. Res. Res. 71/258 (U.N. Dec. 23 2016) where a resolution calling for the negotiations of a TPNW was adopted 113-35 with 13 abstentions.

40. Treaty on the Prohibition of Nuclear Weapons, July 7, 2017, 729 U.N.T.S. 161, U.N. Doc. A/CONF.229/2017/8

### III. Implications of a Nuclear Fuel Cycle

Understanding the full nuclear fuel cycle is essential to grasp the broader implications of a nation achieving complete nuclear autonomy, a feat few countries have mastered. This cycle encompasses several stages, from mining to fuel fabrication, and potentially, reprocessing.

#### Mining & Milling

The cycle begins with uranium extraction using conventional mining or in-situ leach mining. The uranium ore is processed into “yellowcake” ( $U_3O_8$ ), a controllable export<sup>41</sup>, and then converted into a gaseous uranium hexafluoride ( $UF_6$ ) for enrichment.<sup>42</sup>

#### Enrichment

The most critical phase of the nuclear fuel cycle is enrichment.<sup>43</sup> This stage involves using enrichment and reprocessing (ENR) technologies to increase the proportion of U-235 isotopes in the gaseous  $UF_6$ . Natural uranium contains 0.7% of the U-235 and the remaining 99.3% is mostly U-238 which does not contribute directly to the fission process. Gas centrifuges and laser enrichment techniques are able to separate the heavier U-238 from the lighter U-235 and create fissile material enriched to varying levels depending on the application:

- Civilian reactors (low-enriched uranium, LEU):<sup>44</sup> 3 - 5 %
- Medical Isotopes (medium-enriched uranium):<sup>45</sup> < 20 %
- Naval Propulsion (highly-enriched uranium, HEU):<sup>46</sup> 25 - 93 %
- Explosive Weapons (weapons-grade uranium):<sup>47</sup> > 90 %

---

41. Assistance to Foreign Atomic Energy Activities, 10 C.F.R. § 810.2(c) (Department of Energy 2023).

42. See J.R. Lamarsh & A.J. Baratta, Introduction to Nuclear Engineering, 3rd. Ed., Prentice Hall (2011).

43. See Alexander Glaser, “On the Proliferation Potential of Uranium Fuel for Research Reactors at Various Enrichment Levels,” Science and Global Security, Vol. 14, 2006, pp. 1-24. Article reviews rationale of selecting an enrichment of less than 20% as the preferred enrichment level for research reactor fuels.

44. “Uranium Enrichment,” World Nuclear Association, October 2022. [world-nuclear.org/information-library/nuclear-fuel-cycle](http://world-nuclear.org/information-library/nuclear-fuel-cycle).

45. See generally, The American Medical Isotopes Production Act (AMIPA) Pub. L. No. 112-354, 126 Stat. 4053 (Jan. 4, 2013).

46. See Philippe, Sebastian, and Frank von Hippel. “The Feasibility of Ending HEU Fuel Use in the US Navy.” Arms Control Today Vol. 46, no. 9 (2016). Russia relies on fuel enriched to 25-55%. The United States and the United Kingdom are known to use a type of HEU fuel enriched to 93%.

47. Krass, Allan S., et al. Uranium enrichment and nuclear weapon proliferation. Routledge, Nov 20 2020.



## Fuel Assembly

After enrichment, the new fissile material is converted into uranium dioxide (UO<sub>2</sub>), a kind of black powder, and pressed into pellets before being sintered in a furnace. The pellets are loaded into zirconium alloy tubes to form fuel rods, are then assembled into bundles known as fuel assemblies for use in nuclear reactors.<sup>48</sup> These reactors place the fuel assemblies into a core where controlled fission reactions in the U-235 generate heat. Cooling towers convert this heat into steam that drive generators and produce electricity.

Nuclear fuel is considered spent when it can no longer sustain the fission reaction necessary to generate sufficient heat. In a pressurized water reactor, this takes about three to seven years.<sup>49</sup> Spent fuel is highly radioactive however and needs to be stored in steel-lined concrete cooling pools before being placed in concrete storage casks and then often buried.<sup>50</sup>

## Reprocessing

Reprocessing is a chemical process that separates plutonium and uranium from the spent nuclear fuel. In a heavy-water nuclear reactor, spent fuel is bombarded with neutrons to have the remaining U-238 converted into plutonium-239. It is possible for this plutonium to then be recycled into mixed-oxide (MOX) fuel.<sup>51</sup> The concern with heavy-water reactors is that they can be similarly used for weapons.<sup>52</sup> The same plutonium produced from the reprocessing of spent reactor fuel is able to be used in an explosive device.<sup>53</sup>

---

48. C.V. Sundaram & S.L. Mannan, Nuclear fuels and development of nuclear fuel elements, *Sadhana* 14(1), 21-57 (1989).

49. Management of Spent Fuel from Nuclear Power Reactors, *Lifecycle of Nuclear Fuel*, IAEA Bulletin, June 2019

50. "Department of Energy. '5 Fast Facts about Spent Nuclear Fuel.' *Energy.gov*, last accessed December 10, 2023, <https://www.energy.gov/ne/articles/infographic-5-fast-facts-about-spent-nuclear-fuel>."

51. Kuperman, Alan J. "Challenges of plutonium fuel fabrication: explaining the decline of spent fuel recycling." *International Journal of Nuclear Governance, Economy and Ecology* 4.4 at 302-316 (2019).

52. See Afroozi, Mohsen Alizadeh. "Investigating the increase of plutonium extraction from heavy water reactors". 2023 8th International Conference on Technology and Energy Management (ICTEM). Mazandaran, Babol, Iran, 2023, at 1-4 "heavy water is relevant...on preventing development of nuclear weapons"

53. The nuclear weapon that was dropped on Nagasaki on August 9, 1945 was an imposition-type device with a plutonium core. See, Von Hippel, Frank, Masafumi Takubo, and Jingmin Kang. *Plutonium: How Nuclear Power's Dream Fuel Became a Nightmare*. Springer Nature, 2019.

## Dual-Use ENR Technologies in the Nuclear Fuel Cycle

The nuclear fuel cycle as described is a sophisticated process, involving several dual-use ENR technologies. These technologies have applications in both peaceful energy generation and potential military uses:

1. *Gas centrifuges and Components*: Primarily used for uranium enrichment in nuclear fuel production, these can also be repurposed to produce HEU, suitable for weapons.<sup>54</sup>
2. *Laser Enrichment Technology*: An advanced technique for uranium enrichment, this technology has similar dual applications, including weaponization.<sup>55</sup>
3. *Heavy Water and Heavy Water Production Technologies*: Heavy water reactors play a key role in reprocessing spent fuel and in producing weapons-grade plutonium.<sup>56</sup>
4. *Nuclear Grade Graphite*: Used in some reactor designs, but can also be used in reactors that produce plutonium. Graphite has many non-nuclear-related purposes as well.<sup>57</sup>
5. *Maraging Steel and High-Strength Aluminum Alloys*: These materials are needed in the construction of centrifuges for uranium enrichment. These materials also have many non-nuclear applications as well.<sup>58</sup>
6. *Nuclear-Grade Ceramics and Composites*: Employed in different stages of the nuclear fuel cycle, these materials are also applicable in industrial design and production.<sup>59</sup>

The progression of states in mastering these technologies increasingly blurs the line between civilian energy development and the potential for weaponization.

### Example: Iran

Iran's nuclear program has been a focal point of this debate. Between 1992 and 2002, Iran made progress towards industrializing its nuclear fuel cycle and secretly carried out

---

54. See Olander, Donald R. "The gas centrifuge." *Scientific American* 239.2 (1978): 37-43.

55. See Casper, Barry M. "Laser enrichment: a new path to proliferation?" *Bulletin of the Atomic Scientists* 33.1 (1977): 28-41.

56. See Milhollin, Gary. "Heavy water cheaters." *Foreign Policy* 69 (1987): 100-119.

57. See Zhou, Xiang-wen, et. al. "Nuclear graphite for high temperature gas-cooled reactors." *New Carbon Materials* 32.3 (2017): 193-204. See also, Nightingale, R. "Graphite in the nuclear industry." New York and London Academic Press (1962).

58. See Grant Christopher, "3D Printing: A Challenge to Nuclear Export Controls," *Strategic Trade Review* 1 (Autumn 2015), at 18-25.

59. See Bonal, Jean-Pierre, et al. "Graphite, ceramics, and ceramic composites for high-temperature nuclear power systems." *MRS bulletin* 34.1 (2009)

enrichment experiments on centrifuges.<sup>60</sup> In 2002, Iran admitted to the existence of its Natanz enrichment facility and its Arak heavy water reactor, prompting several IAEA resolutions calling for full transparency.<sup>61</sup> After three years of little progress, the IAEA found Iran non-compliant<sup>62</sup> with its international obligations and referred the matter to the UN Security Council.<sup>63</sup>

Indeed, on July 31, 2006 the UN Security Council became seized of the Iranian nuclear issue for the first time, passing UN Security Council Resolution 1696, demanding that Iran halt its uranium enrichment activities.<sup>64</sup> On the day the resolution passed, the President of Iran, Mahmoud Ahmadinejad gave a speech to a crowd in the town of Bojnurd where he told them “the Iranian people see taking advantage of technology to produce nuclear fuel for peaceful purposes as their right”.<sup>65</sup>

A series of UN Security Council resolutions were passed that brought comprehensive international sanctions on Iran for its failure to halt its enrichment activities.<sup>66</sup> In 2010 the United Nations Security Council, as part of its fourth round of sanctions against Iran, established a UN “panel of experts” to monitor states’ implementation of sanctions against Iran, report on violation of sanctions, and recommend ways to continually improve enforcement of previous resolutions.<sup>67</sup> The mandate for this panel of experts was renewed four times, each time for an additional year.<sup>68</sup>

---

60. See al-Harby, Sami. “Iran’s Insistence on Uranium Enrichment: Motives and Repercussions.” *Journal for Iranian Studies* Year 6.15 (2022).

61. See International Atomic Energy Agency, Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran, GOV/2003/69, adopted September 12, 2003; GOV/2003/81 adopted on 26 November 2003; GOV/2004/21 adopted on 13 March 2004; GOV/2004/49 adopted on 18 June 2004; and GOV/2004/79 adopted on 18 September 2004.

62. IAEA, GOV/2005/77 adopted on 24 September 2005.

63. IAEA, GOV/2006/14 adopted on 4 February 2006.

64. United Nations Security Council, Resolution 1696, S/RES/1696 (2006), adopted July 31, 2006, 14-1 (Qatar), 0 abstentions

65. Michele Gaietta, *The Trajectory of Iran's Nuclear Program* (Palgrave Macmillan, 2015).

66. United Nations Security Council, Resolution 1737, S/RES/1737 (2006), adopted December 23, 2006, 15-0; United Nations Security Council, Resolution 1747, S/RES/1747 (2007), adopted March 24, 2007, 15-0; United Nations Security Council, Resolution 1803, S/RES/1803 (2008), adopted March 3, 2008, 14-0-1 (Indonesia); United Nations Security Council, Resolution 1835, S/RES/1835 (2008), adopted September 27, 2008, 15-0, 0 abstentions

67. United Nations Security Council, Resolution 1929, S/RES/1929 (2010), adopted June 9, 2010, 12-2 (Brazil, Turkey), 1 abstention (Indonesia)

68. United Nations Security Council, Resolution 1984, S/RES/1984 (2011), adopted May 11, 2011, 14-0 (Lebanon), 1 abstention; United Nations Security Council, Resolution 2049, S/RES/2049 (2012), adopted October 15, 2012, 15-0; United Nations Security Council, Resolution 2105, S/RES/2105 (2013), adopted June 14, 2013, 15-0; United Nations Security Council, Resolution 2159, S/RES/2159 (2014), adopted April 17, 2014, 15-0

In 2015, a political agreement was reached between Iran, the P5+1<sup>69</sup>, and the European Union (EU) known as the Joint Comprehensive Plan of Action (JCPOA) or the Iran nuclear deal.<sup>70</sup> While the Iran nuclear deal was not a formal treaty, its endorsement is detailed in UN Security Council Resolution 2231.<sup>71</sup> In exchange for the removal of international sanctions, Iran agreed to eliminate its stockpile of medium-enriched uranium, reduce its stockpile of LEU by 98%, and reduce the number of gas centrifuges it operates by two-thirds for 13 years. Iran also agreed to enrich uranium only up to 3.67% for a duration of 15 years.<sup>72</sup> The Iran nuclear deal is a rare example of successful diplomacy in nuclear non-proliferation and signaled the end to Iran's international isolation as a real possibility.<sup>73</sup>

On May 8th, 2018, the United States announced its withdrawal from the JCPOA, expressing concerns about the effectiveness of the verification mechanisms stipulated by the deal and arguing that they didn't provide enough assurances about Iran's compliance<sup>74</sup>, unilaterally reimposing sanctions on Iran. One year later, President Rouhani of Iran announced that Iran would stop complying with parts of the JCPOA as part of the country's retaliation and protest against the United State's withdrawal. And more recently, the Director General of the IAEA has said that the Iran nuclear deal "entered a sort of limbo when the United States withdrew from it in 2018 and Iran started...retaliating by ceasing to abide by this agreement, thereby reopening the possibility they would do a number of things which could be of concern".<sup>75</sup>

---

69. The five permanent members of the United Nations Security Council (China, France, Russia, United Kingdom, United States) and Germany.

70. Fitzpatrick, Mark. "Assessing the JCPOA." *Adelphi Series* 57.466-467 (2017): 19-60.

71. United Nations Security Council, Resolution 2231, S/RES/2231 (2015), adopted July 14, 2015, 15-0

72. *Id.* at 11/104 Paragraph A. Enrichment, Enrichment R&D, Stockpiles.

73. Serim, A. Esra. "A Rare Successful Nonproliferation Policy: The JCPOA." *Middle East Policy* 29.4 (2022): 45-59.

74. President Donald J. Trump is Ending United States Participation in an Unacceptable Iran Deal – The White House, [trumpwhitehouse.archives.gov/briefings-statements/president-donald-j-trump-ending-united-states-participation-unacceptable-iran-deal](https://trumpwhitehouse.archives.gov/briefings-statements/president-donald-j-trump-ending-united-states-participation-unacceptable-iran-deal).

75. "US withdrawal put JCPOA in limbo: IAEA chief," Mehr News Agency, December 12, 2023.

As of November 2023, the IAEA is investigating the presence of man-made particles enriched to 83.7%, alarmingly close to weapons-grade material and far beyond the 3.67% limit set by the JCPOA.<sup>76</sup> Iran also continues to build up stockpiles of both low-enriched uranium (LEU) and medium-enriched uranium, theoretically having enough to produce three nuclear weapons.<sup>77</sup> In January 2026, Resolution 2231 is set to expire, and the Security Council at that time will no longer be seized of the Iran nuclear issue.<sup>78</sup> The international legal regime guiding Iran will resort to the international law guiding the country before the JCPOA, namely the Treaty on the Nonproliferation of Nuclear Weapons.

#### **IV. The Treaty on the Nonproliferation of Nuclear Weapons (NPT)**

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) represents a cornerstone in the international effort to prevent the spread of nuclear weapons.<sup>79</sup> Established on three foundational pillars, the NPT aims to balance nuclear disarmament, non-proliferation, and the peaceful use of nuclear energy.

1. *Non-Proliferation (Articles I and II)*: Nuclear-weapon States<sup>80</sup> agree not to transfer nuclear weapons or assist non-nuclear weapon states in their development or acquisition of nuclear weapons. In return, non-nuclear weapon States would commit to forgoing the acquisition or control of nuclear weapons.
2. *Disarmament (Article VI)*: All parties are obliged to engage in good-faith negotiations toward nuclear disarmament. While the language of Article VI is indeterminate, many non-nuclear weapon states interpret it as a binding

---

76. International Atomic Energy Agency, Board of Governors, Report by the Director General, GOV/2023/23, paragraph 36.

77. Norman, "Iran Maintains Steady Expansion of Nuclear Program," Wall Street Journal, November 15, 2023.

78. United Nations Security Council, Resolution 2231, S/RES/2231 (2015) at paragraph E.24, at 97/104, adopted July 14, 2015.

79. Treaty on the Non-Proliferation of Nuclear Weapons (NPT), July 1, 1968, 729 U.N.T.S. 161, 21 U.S.T. 483.

80. *Id.* at Article IX, paragraph 3 where states having detonated a nuclear device before 1 January 1967 include the United States, the Soviet Union, the United Kingdom, France, and China.

commitment for nuclear-weapon states to pursue negotiations and bring about their conclusions, a stance later upheld by the ICJ.<sup>81</sup>

3. *Peaceful Use of Nuclear Energy (Article VI)*: The third pillar recognizes the “inalienable right” of all parties to develop and use nuclear energy for peaceful purposes. This has been interpreted by some to include the right to manufacture and use ENR technologies, technologies that are crucial for the development of a full fuel cycle but come with proliferation concerns.<sup>82</sup> For this reason a safeguards system was established under the auspices of the International Atomic Energy Agency (IAEA) to verify that fissionable material is not diverted from peaceful uses to nuclear weapons or explosive devices.<sup>83</sup>

### The First Pillar: Non-Proliferation (Article I and II)

The first two articles of the NPT explicitly forbid NPT member states from aiding non-nuclear weapon states in acquiring nuclear weapon technology.<sup>84</sup> Additionally, these articles require non-nuclear weapon states to permanently forgo the development or acquisition of nuclear weapons.<sup>85</sup> Although this aspect of the treaty has been largely successful, several notable countries remain outside its legal framework as non-signatories, including Israel, India, Pakistan, and North Korea. North Korea presents a unique case; originally a signatory, it withdrew from the NPT in 2003, citing national security reasons for developing nuclear weapons, and conducted its first nuclear test in 2006. This makes North Korea the sole nation to have exited the NPT.<sup>86</sup>

### Disparate Treatment and Export Control Regimes

The NPT is often viewed as a discriminatory legal framework because it categorizes member states into two groups: nuclear weapon states and non-nuclear weapon states. As per the

---

81. Legality of the Threat or Use of Nuclear Weapons ICJ 3, ICJ Reports 1996 p. 226 where the ICJ states that Article VI requires states to pursue negotiations in good faith and bring them to a conclusion.

82. "Q&A: Is there a 'right' to enrich uranium? Iran says yes, U.S. says not necessarily," Reuters, November 23, 2013.

83. Treaty on the Non-Proliferation of Nuclear Weapons at Article III, paragraph 1.

84. Id at Article 1.

85. Id. at Article 2.

86. See Abe, Nobuyasu. "The NPT at fifty: Successes and failures." *Journal for Peace and Nuclear Disarmament* 3.2 (2020): 224-233.

NPT, nuclear-weapon states are obliged not to transfer nuclear weapons or nuclear explosive devices to any country, nor to assist non-nuclear-weapon states in their acquisition.<sup>87</sup> Additionally, it's important to note, the context surrounding the NPT is architected by four informal, non-legally binding export control regimes (ECRs): the Nuclear Suppliers Group (NSG)<sup>88</sup>, the Missile Technology Control Regime (MTCR)<sup>89</sup>, the Australia Group (AG)<sup>90</sup>, and the Wassenaar Arrangement (WA)<sup>91</sup>. These ECRs, sometimes referred to by scholars as “nuclear cartels” present challenges to the non-proliferation and disarmament agendas. They are essentially consortia of aligned countries that, while operating outside the NPT’s formal framework, possess widely recognized authority among its members.<sup>92</sup>

#### Example: Nuclear Suppliers Group Violating NPT

Export control regimes have historically played a controversial role in the proliferation of nuclear weapons. A notable instance is the introduction of nuclear weapons into South Asia, which is closely tied to the nuclear programs of India and Pakistan. India’s first nuclear device, detonated in 1974, was developed using plutonium diverted from the Canadian-Indian, US

---

87. Id. at Article II.

88. For the control of nuclear and nuclear-related technology. See generally Antstey, Isabelle. “Negotiating Nuclear Control: The Zangger Committee and the Nuclear Suppliers’ Group in the 1970s.” *The Making of the Global Nuclear Order in the 1970s*. Routledge, 2020. 13-33.

89. For the control of rockets and other aerial vehicles capable of delivering weapons of mass destruction. See generally Brockmann, Kolja, Mark Bromley, and Lauriane Heau. “Adapting the Missile Technology Control Regime for Current and Future Challenges” (2023).

90. For the control of chemical and biological technology that could be weaponized. See also, Prakash, Nilima, P. Sharada, and G.L. Pradeep. “Bioterrorism: Challenges and Considerations.” *Journal of forensic dental sciences* 2.2 (2010): 59.

91. For the export control for conventional arms and dual-use goods and technology. See Ruohonen, Jukka, and Kai kK. Kimppa. “Updating the Wassenaar debate once again: Surveillance, intrusion, software, and ambiguity” *Journal of Information Technology & Politics* 16.2 (2019): 169-186.

92. See also, Davis, Zachary S. “The realist nuclear regime.” *The Proliferation Puzzle*. Routledge, 2020. 79-99.

(CIRUS) reactor.<sup>93</sup> Following India's nuclear test<sup>94</sup>Canada ceased all cooperation with India but did not demand account of the fissile material used in CIRUS nor compliance with the IAEA.<sup>95</sup>

This incident prompted international concern over the dual-use nature of enrichment and reprocessing technologies. Seven countries – Canada, West Germany, France, Japan, the Soviet Union, the United Kingdom, and the United States – established the Nuclear Suppliers Group (NSG), aiming to fill the gaps in the NPT and regulate the transfer of sensitive technologies to non-members of the NPT.<sup>96</sup>

However, Canada, despite having ratified the NPT in 1970, violated Articles I and II of the treaty, as did the United States. To this day, India remains outside the NPT framework as a non-signatory, leaving a significant portion of its nuclear program beyond IAEA oversight. Despite these challenges, the NSG continues its efforts to monitor countries not party to the NPT. This concern has only lingered following India's nuclear test in 1998, and Pakistan's subsequent test of five nuclear devices, with both having entered the club of de-facto nuclear states but remain outside the obligations of the NPT.<sup>97</sup>

### The Second Pillar (Article VI): Disarmament

Prior to the establishment of the Prohibition of Nuclear Weapons (TPNW), there was no international legal framework for nuclear disarmament as encompassing and robust as the provisions set forth in Article VI of the NPT. The NPT remains the only nuclear disarmament treaty adhered to by all five nuclear-weapon states.

---

93. Lee, Lavina. "The Indian Nuclear Energy Programme: the Quest for Independence." *Nuclear Energy Development in Asia: Problems and Prospects*. London: Palgrave Macmillan UK, 2011. 68-97.

94. O'Mahoney, Joseph. "The Smiling Buddha effect: Canadian and US policy after India's 1974 nuclear test." *The Nonproliferation Review* 27.1-3 (2020): 161-179.

95. Akbar, Muqarrab, and Anum Riaz. "Indian Nuclear Development, NSG and Nuclear Non-Proliferation Regime: An Analysis." *American Journal of Humanities and Social Sciences Research (AJHSSR)* 4.5 (2020).

96. Strulak, Tadeusz. "The nuclear suppliers group." *The Nonproliferation Review* 1.1 (1993): 2-10.

97. Rizvi, Hasan-Askari "Pakistan's nuclear testing." *South Asia's Nuclear Security Dilemma* (2015): 97-109.



Article VI, commonly known as the NPT's second pillar, requires each state party to engage in good faith negotiations towards effective measures for the cessation of the nuclear arms race and the achievement of nuclear disarmament. In its 1996 advisory opinion, the ICJ clarified that this is an obligation to not only initiate negotiations, but also conclude them, aiming for complete nuclear disarmament.<sup>98</sup> This focus on complete disarmament, as stipulated under Article VI, paves the way for a discussion on the balance between the endorsement of peaceful nuclear technology, and the rigorous safeguards designed to prevent nuclear proliferation.<sup>99</sup> It is important to remember that the NPT is not just for non-proliferation or for the advancement of peaceful uses of nuclear technology, but also there exists an obligation to bring about the complete eradication of nuclear weapons. Since the NPT went into force in 1970, no nuclear-weapon state has voluntarily disarmed under the treaty.<sup>100</sup>

## **V. Balancing Article IV and Article III of the NPT**

For non-nuclear states, Article IV of the NPT, which concerns the right to peaceful uses of nuclear energy, is the most important aspect of the treaty. It is worthwhile to consider the full text of Article IV paragraph 1:

1. *Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty.*<sup>101</sup> (emphasis added)

### Article IV of the NPT: Inalienable Right Without Discrimination

Article IV of the NPT contains the treaty's third pillar, the right for nations to pursue peaceful uses of nuclear energy. This article is a reminder that the NPT not only promotes

---

98. Nuclear Weapons Advisory Opinion, paragraph 99, at 263-264, I.L.M. at 830 (citing NPT, Art. VI, July 1968, 179 U.N.T.S. 10485).

99. Id. at paragraph 105F, at 267, I.L.M. at 831.

100. South Africa ended its nuclear weapons program; however it was not a signatory of the NPT at the time

101. Treaty on the Non-Proliferation of Nuclear Weapons, at Article IV, paragraph 1.

non-proliferation of nuclear weapons, but also the international cooperation of peaceful uses of nuclear technology. The NPT establishes a bargain in this regard: in exchange for renouncing the pursuit of nuclear weapons, states are assured comprehensive access to nuclear technology. This access is provided only with the expressed stipulation of “conformity with Articles I and II”, representing the NPT’s non-proliferation pillar.

Paragraph 1 of Article IV asserts an “inalienable right” for states to utilize nuclear energy for peaceful purposes, underscored by the principle of “non-discrimination”. This principle has been interpreted as endorsing technological neutrality within the NPT’s framework, allowing states the wide discretion to select their nuclear fuel cycle approaches.<sup>102</sup> For example, this may include the decision regarding the level of uranium enrichment and the reprocessing of spent fuel using heavy water reactors. Central to the legal interpretation of the NPT is whether Article IV implicitly includes the right to develop and utilize ENR technologies for a complete nuclear fuel cycle, particularly as it involves enrichment of HEU or the production of weapons-grade plutonium. In fact, Article IV does not define specific ENR technologies, a deliberate omission, it seems, to allow for the “fullest possible exchange of nuclear-related equipment”.<sup>103</sup>

#### Example: Japan’s Plutonium

Japan presents a notable example, possessing the world’s largest stockpile of weapons-usable civilian plutonium<sup>104</sup>, second only to that of the United States, a nuclear-weapon state. As a signatory to the NPT, Japan commits a significant portion of the IAEA’s annual budget to the monitoring and safeguarding of its plutonium stockpiles.<sup>105</sup> Despite these efforts, China has expressed deep concerns about Japan’s expansive reprocessing activities. The presence

---

102. See, Lettow, Paul Vorbeck. *Strengthening the nuclear nonproliferation regime*. No. 54. Council on Foreign Relations, 2010.

103. Treaty on the Non-Proliferation of Nuclear Weapons, at Article IV, paragraph 2.

104. McCormack, Gavan. "Japan is a plutonium superpower." *Japan Focus* 9 (2007).

105. See Katsuta, Tadahiro, and Tatsujiro Suzuki. "Japan's spent fuel and plutonium management challenge." *Energy Policy* 39.11 (2011): 6827-6841.

of 11 metric tons of plutonium on Japanese soil, in addition to another 37 tons stored overseas, equates to a potential capacity to manufacture 2,000 nuclear weapons, posing a significant proliferation risk.<sup>106</sup> As a signatory of the NPT, Japan is subject to transparency requirements in line with the Statute of the IAEA, particularly under Article III of the NPT, which addresses the safeguarding and non-proliferation aspects of nuclear materials.

#### Article III of the NPT: IAEA Safeguards

Article III of the NPT obligates each party to the treaty to adhere to safeguards established by the IAEA. This alignment of the NPT with the IAEA's Statute establishes a mechanism for addressing non-compliance, potentially escalating to involvement by the United Nations Security Council.<sup>107</sup> The safeguards stipulated are to be "applied on all source or special fissionable material in all peaceful nuclear activities". Notably, the language of Paragraph 1 in Article III pertains specifically to the elemental materials, excluding any mention of specific ENR technologies or equipment associated with these materials.

To address the potential inclusion of dual-use ENR technologies, one must turn to the broader workings of Paragraph 2(b) of Article III:

*"Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article."*<sup>108</sup>

---

106. Mian, Zia, et al. "Fissile materials in South Asia and implications of the US-India nuclear deal." *Science and Global Security* 14.2-3 (2006): 117-143.

107. IAEA Statute, Article XII "Agency Safeguards" at paragraph C where the IAEA Board of Governors "shall report the non-compliance to all members and to the Security Council and General Assembly of the United Nations.

108. Treaty on the Non-Proliferation of Nuclear Weapons, at Article III, paragraph 2(b).

Article III does not define “equipment or material especially designed or prepared for the processing, use, or production of special fissionable material” as explicitly as the “source material” is defined in the IAEA Statute. The reference to equipment is broad, characterized only by its specific design or preparation for use with uranium or plutonium.<sup>109</sup> That said, this Article addresses only the exchange of such equipment to non-nuclear weapon states and it does not directly or indirectly restrict the research and development of such technologies indigenously designed and manufactured, a potential gap.

#### Balancing Article IV with Article III Under the NPT

The NPT orchestrates a delicate balance between Article III(2)(b) and Article IV(1). Article IV acknowledges the right to peaceful nuclear technology, while Article III establishes responsibilities to prevent the misuse of these technologies. Consequently, the entitlement to nuclear technology access under Article IV is thereby judiciously counterbalanced with the obligation to comply with IAEA safeguards and inspections stipulated in Article III, aligning with the non-proliferation goals of Articles I and II. In areas where the NPT’s text remains silent, Article IV distinctly affirms an “inalienable right”. This raises a critical question: to what extent does this right extend, especially when it potentially conflicts with Article III?

A close examination of Article IV reveals explicit references only to Articles I and II. It is logical to infer, therefore, that this inalienable right should not be overridden unless directly conflicting with only Articles I and II. This suggests that Article III, while important, does not constitute a “pillar” of the NPT, in the way Articles I, II, IV, and VI do. This interpretation is grounded in the treaty’s plain language and the significant emphasis on the term “inalienable”.

---

109. See IAEA Statute at Article XX; Thorium is also a special fissionable material included as part of the definition of “special fissionable materials”.

Proponents of the IAEA's role should then consider its implicit role under Article IV, in addition to Article III. Article IV(2) enables countries to collaborate independently, with others, or with "international organizations to further develop nuclear energy applications for peaceful purposes".<sup>110</sup> The IAEA, as a leading international authority in nuclear energy, fits this description aptly and has been instrumental in guiding the international nuclear regime. Furthermore, the NPT's preamble supports a safeguard system overseeing the "flow of source and special fissionable materials".<sup>111</sup> Even more, Article III requires the establishment of a safeguard through negotiations between the IAEA and individual states, tailored to their specific nuclear industries.<sup>112</sup> Thus, the IAEA's involvement is not confined to Article III but can be said to extend to Article IV, indicating its role also in the peaceful uses of nuclear energy. Together, Articles III and IV forge a robust mechanism, upholding the NPT's foundational bargain.

#### 2000 NPT Review Conference on Article IV v. Article III

The 2000 NPT Review Conference focused on strengthening the NPT, particularly by emphasizing the importance of Article III. Many nations advocated for bolstering the IAEA Board of Governors to better identify non-compliant states. Regarding the peaceful use of nuclear energy, the conference's Final Document affirmed:

*"nothing in the Treaty shall be interpreted as affecting the inalienable right of all the parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I, II, and III of the Treaty"*<sup>113</sup> (emphasis added)

---

110. Treaty on the Non-Proliferation on Nuclear Weapons, at Article IV, paragraph 2.

111. Id. at Preamble.

112. Id. at Article III.

113. United Nations Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Final Document, NPT/CONF.2000/28 (Parts I and II), paragraph 8 (2000).

This language mirrors that of Article IV but notably includes Article III. By doing so, the Final Document of the 2000 NPT Review Conference gave legal basis for the IAEA to find states non-compliant with the NPT should a state fail to implement safeguard agreements.<sup>114</sup> Remember, the original text of the NPT only mentions Article I and II concerning Article IV's "inalienable right" to nuclear energy. The explicit inclusion of Article III during the Review Conference was a clear elevation in the authority of the IAEA, perhaps necessary to continue the non-proliferation regime enjoyed by the international community.

### Zangger Committee

The 2000 Review Conference's Final Document, while addressing the balance between the rights granted in Article IV and the obligations under Article III, did not resolve the ambiguity about the lack of definitions for ENR technologies. Since the NPT's drafting, the Zangger Committee, an informal group, has played a "faithful interpreter" role in such non-proliferation issues, especially in the case where it has been difficult to resolve within the Nuclear Suppliers Group or other ECRs.<sup>115</sup> Published and updated regularly to clarify the ambiguities of Article III(2)(b), the Committee is responsible for its "Trigger List" in 1974, which includes dual-use technologies subject to export control policies of its members. Although not legally binding, this list significantly influences the export control policies of states.<sup>116</sup>

### Example: India

Again, India's situation is unique as a non-NPT nuclear-weapon state. The 2008 India-Civil Nuclear Cooperation Agreement marked a shift in Indo-US relations, with the US

---

114. See generally United Nations Conference on the Non-Proliferation of Nuclear Weapons. Final Document of the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (1st : 1975 : Geneva), NPT/CONF.35/1, May 30, 1975,

115. Schmidt, Fritz. "NPT export controls and the Zangger committee." *The Nonproliferation Review* 7.3 (2000): 136-145; See also, Schmidt, Fritz W. "The Zangger Committee: its history and future role." *The Nonproliferation Review* 2.1 (1994): 38-44.

116. See IAEA Information Circular, INFCIRC/539/Rev. 1, April 2000.

advocating for NSG amendments to facilitate nuclear trade with India, despite India's non-participation in the NPT. This agreement challenged the NPT's credibility.<sup>117</sup> Suddenly India was no longer isolated from the Nuclear Supplier Group but it still remained outside the NPT.<sup>118</sup> In exchange for international engagement from the NSG, India agreed to IAEA safeguards on several of its civilian reactors, with an agreement to report exports of nuclear materials.<sup>119</sup> India retained the right to withdraw facilities from inspection<sup>120</sup>, noting this right in the preamble of their agreement with the IAEA.<sup>121</sup>

## **VI. Non-Peaceful, Non-Explosive Use of Fissile Material**

As part of their obligation to the NPT, parties to the treaty are required to negotiate with the IAEA safeguard agreements. These agreements are designed to detect the diversion of fissile material that may "further any military purpose".<sup>122</sup> A standard safeguard agreement was negotiated by the IAEA Board of Governors to be used as a reference document for non-nuclear states.<sup>123</sup> This document is known as INFCIRC/153 and paragraph 14 has been identified as a loophole in the nuclear non-proliferation regime and warrants examination.<sup>124</sup>

---

117. Akbar, Muqarrab, and Anum Riaz. "Indian Nuclear Development, NSG and Nuclear Non-Proliferation Regime: An Analysis." *American Journal of Humanities and Social Sciences Research (AJHSSR)* 4.5 (2020).

118. Id., See also Kapur, S. Paul, and Sumit Ganguly. "The transformation of US-India relations: An explanation for the rapprochement and prospects for the future." *Asian Survey* 47.4 (2007): 642-656.

119. Id., See also Jaspal, Zafar Nawaz. "Indo-US Nuclear Deal: Altering Global Nuclear Order." *Strategic Studies* 28.2/3 (2008): 18-38.

120. Id., See also Sundaram, Kumar, and M. V. Ramana. "India and the policy of no first use of nuclear weapons." *Journal for Peace and Nuclear Disarmament* 1.1 (2018): 152-168.

121. Vienna Convention on the Law of Treaties, art. 31 para. 2, 1155 U.N.T.S. 331 (May 23, 1969) where "context for the purpose of the interpretation of a treaty shall comprise, in addition to the text, including its preamble and annexes".

122. Statute of the International Atomic Energy Agency, Article III, paragraph A at 5.

123. The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons, INFCIRC/153, June 1972.

124. Id. at Paragraph 14 titled "non-application of safeguards to nuclear material to be used in non-peaceful activities".

### Non-Peaceful, Non-Explosive Use: The NPT

The NPT prohibits non-nuclear weapon states from acquiring nuclear weapons or other nuclear explosive devices<sup>125</sup> and mandates IAEA safeguards on all nuclear material for peaceful activities.<sup>126</sup> This reference to peaceful purposes implies the possibility of non-nuclear weapon states having nuclear material for non-peaceful purposes, i.e., military use, provided that it is not used for an explosive device.<sup>127</sup> With the benefit of hindsight, it is now known that this language was included in the NPT to leave open the possibility of having nuclear-powered submarines.<sup>128</sup>

On a literal interpretation, the NPT could be read as allowing the supply of nuclear material to non-nuclear weapon states for non-peaceful, non-explosive purposes outside safeguards. Clearly this would defeat the “object and purpose” of the treaty, so we must assume this was not intended by the parties.<sup>129</sup> It is therefore more likely that because these issues weren’t considered at the time, this part of the NPT was written in general terms, and it is really only now, more than fifty years later, that the issue requires more thought.

### Non-Peaceful, Non-Explosive Use: The IAEA

In 1983, Argentina requested an IAEA study on the legality of non-explosive military applications on safeguarded nuclear material, arguing that Paragraph 14 of INFCIRC/153 allowed for the removal of nuclear material from safeguards for military purposes. The text of Paragraph 14(b) is helpful context:

---

125. Treaty on the Non-Proliferation of Nuclear Weapons, Article 1 and II.

126. *Id.* at Article III paragraph 1.

127. *Id.* at paragraph 2.

128. Carlson, John. "IAEA Safeguards, the Naval ‘Loophole’ and the AUKUS Proposal." Vienna Center for Disarmament and Non-Proliferation, October 8, 2021

129. Vienna Convention on the Law of Treaties, art. 31 provides “A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in light of its object and purpose”. See also, Curtis A. Bradley, *Unratified Treaties, Domestic Politics, and the U.S. Constitution*, 48 HARV. INTL’L L.J. 307, 314-15 (2007).



*“The Agency and the State shall make an arrangement so that, only while the nuclear material is in such [military] activity, the safeguards provided for in the Agreement will not be applied. The arrangement shall identify, to the extent possible, the period or circumstances during which safeguards will not be applied. In any event, the safeguards provided for in the Agreement shall again apply as soon as the nuclear material is reintroduced into a peaceful nuclear activity. The Agency shall be kept informed of the total quantity and composition of such safeguarded nuclear material in the State and of any exports of such material”*<sup>130</sup> (emphasis added)

The IAEA Secretariat’s study concluded that military use of nuclear material under an INFCIRC/153-type agreement would “not align”. For a nation to take advantage of Paragraph 14, it must invoke its use and make an “arrangement” identifying the total quantity of material outside of safeguards.<sup>131</sup> In answering Argentina’s request, the Secretariat saw non-explosive military use of material outside safeguards as potentially lawful, but prior to any action, “paragraph 14 would have to be invoked”.<sup>132</sup> To date no country has invoked Paragraph 14.

Paragraph 14 should not be interpreted where it can become a loophole for evading safeguards. In keeping with the object and purpose of the NPT and the IAEA, Paragraph 14 must be read in a way that allows states to protect sensitive information while applying verification measures. There is reason to believe this to be the guiding aim, because any arrangement made between the IAEA and a state invoking Paragraph 14 only needs to include the length of time the fissile material will be outside safeguards<sup>133</sup>, and does not need to include military details.<sup>134</sup> In any case, this should not take away from the need to cooperate with the IAEA as an essential demonstration of compliance with the NPT’s fundamental obligations.

---

130. IAEA, INFCIRC/153 at Paragraph 14(b).

131. Id. at Paragraph 14(a).

132. International Atomic Energy Agency, Board of Governors, Information Circular, GOV/INF/433, paragraph 21 (2023).

133. Id. at paragraph 14(c).

134. See T. Shea, *The Nonproliferation and Disarmament Challenges of Naval Nuclear Propulsion*, Federation of American Scientists (FAS), 2017, and L. Rockwood, *Naval Propulsion and IAEA Safeguards*, FAS, 2017.

## Example: AUKUS

The 2021 AUKUS “enhanced trilateral security partnership”, involving Australia, the United Kingdom, and the United States, includes the sale of nuclear-powered submarines requiring approximately four tons of HEU as fuel. This HEU is identical to that of weapons-grade uranium and presents an enormous safeguards challenge. The importing of HEU fuel to Australia, a non-nuclear state under the NPT, by two nuclear-states under the NPT, is a transfer of fissile material enough for 160 nuclear warheads<sup>135</sup>, effectively granting Australia near-nuclear status with the terms of the deal. Australia will have to acquire expertise of course, in how it handles spent fuel and the disposal of nuclear waste within its own territory.<sup>136</sup>

To provide assurances to the international community regarding the proliferation risks, the HEU fuel is expected to be inaccessible to Australia for the lifespan of the submarines sold. Australia has also announced funding for a naval nuclear power safety regulator as part of the AUKUS program to make the case that this unprecedented transfer is a positive one, setting a high bar in nuclear safety and non-proliferation.<sup>137</sup> Though, it also be reasonably said that AUKUS appears to go against the obligation to disarm under Article VI of the NPT and may influence other states to develop related technologies.

## **VII. Insights from the 2023 NPT Preparatory Committee for the 2026 Review Conference**

The first session of the Preparatory Committee for the 2026 NPT Review Conference recently concluded<sup>138</sup>, shedding light on the issues that parties to the NPT see as important

---

135. Chew, Alvin. "AUKUS - Understanding the Uranium Connection." Lowy Institute, June 5, 2023

136. Dalton, Toby, and Ariel Levite. "AUKUS as a Nonproliferation Standard?" *Arms Control Today* 53.6 (2023): 6-11.

137. "Australia to create navy nuclear safety watchdog for AUKUS," Reuters, December 13, 2023, <https://www.reuters.com/world/aukus-submarine-deal-very-tricky-nuclear-inspectors-iaea-chief-2021-09-28/>.

138. Report of the Preparatory Committee on its first session, NPT/CONF.2026/PC.1/6, Vienna, 31 July - 11 August 2023

through submitted working papers. The reflections from the Chair of the 2023 Preparatory Committee are also considered. These discussions provide context for the future review cycles.<sup>139</sup>

#### Working Paper 1: Zangger Committee’s Role

The Zangger Committee presented a working paper aiming to refine the definition of ENR technologies, thereby bolstering the ECR regime where the NPT might have gaps.<sup>140</sup> The paper reiterated the Zangger Committee’s interpretation of Article III(2), focusing on “source material” and “special fissionable material”. It proposed a comprehensive list of items that should be included as part of export controls including reactors and various, centrifuges, laser systems, and other nuclear-related technologies that should trigger IAEA safeguard. This Trigger List, reviewed periodically by the Zangger Committee for technological relevance, is authored by all de-jure nuclear weapon states.

#### Working Paper 22: Iran’s Emphasis on Article IV

In contrast, Iran submitted its own paper, advocating for the “inalienable right” to nuclear technology for peaceful purposes, as enshrined in Article IV. Iran’s submission highlighted the need for “unimpeded access” to nuclear technology<sup>141</sup>, particularly for developing countries, and called for reinforced language to ensure non-discriminatory implementation of the NPT.<sup>142</sup>

#### Working Paper 31: China’s Concerns About AUKUS

Addressing the potential diversion of naval fuel for HEU extraction, China’s paper underscored the importance of safeguards and credible assurances against such diversion.<sup>143</sup>

---

139. The Second Session of the Preparatory Committee for the 2026 NPT Review Conference will take place in Geneva from July 22 to August 2, 2024.

140. NPT/CONF.2026/PC.I/WP.1, Procedures in relation to exports of nuclear materials and certain categories of equipment and material under article III (2) of the Treaty on the Nonproliferation of Nuclear Weapons.

141. NPT/CONF.2026/PC.I/WP.22, The inalienable right to develop research, production and use of nuclear energy for peaceful purposes, working paper submitted by Iran.

142. Id. at paragraph 15(b).

143. Carlson, John, Verification of Nuclear Material in Non-Prescribed Military Use by a State with a Comprehensive Safeguards Agreement: Legal and related aspects, 15 February 2022, VCDNP.

While no state has yet invoked INFCIRC/153 for non-application of safeguards, China requested as part of its working paper for IAEA negotiations to begin with Australia as required under Paragraph 14 of its safeguard agreement. China made clear that it saw a “huge international divergence” on the issue.<sup>144</sup>

### Working Paper 38: Reflections by the Chair

The chair’s reflections highlighted two areas: safeguards and export controls. Reaffirming the IAEA’s verification role under Article III(1), the chair proposed assessing how new technologies like small modular reactors will impact safeguards in the future. In discussing export control, the chair recommended the 2026 NPT Review Conference:<sup>145</sup>

- (a) propose specific measures states can take to fulfill obligations under Article III;
- (b) find ways to ensure that the measures referenced in (a) “do not unjustly hinder the rights acknowledged in Article IV”; and
- (c) encourage robust national laws that regulate “transfer of nuclear and dual-use items”.

One way of reading the chair’s working paper here is that both the Zangger Committee’s position (a) and (c) and Iran’s position (b) are reflected in the chair’s working paper. Neither position however is expressly favored over the other.

### **VIII. Toward a Fissile Material Cut Off Treaty (FMCT)**

Fissile materials, mainly highly enriched uranium and plutonium, are critical for nuclear weapons, and their global stockpiles have remained a security concern. In 1993, the United Nations General Assembly unanimously adopted Resolution 48/75L which called for a “non-discriminatory, multilateral and internationally effectively verifiable treaty banning the

---

144. NPT/CONF.2026/PC.I/WP.31, Nuclear Submarine Cooperation among the United Kingdom of Great Britain and Northern Ireland and the United States of America and Australia, working paper submitted by China, 2 August 2023.

145. NPT/CONF.2026/PC.I/WP.38, Reflections by the Chair, 11 August 2023.

production of fissile material for nuclear weapons or other nuclear explosive devices”, also known as a Fissile Material Cut Off Treaty (FMCT)<sup>146</sup>. In 1995, the United Nations Conference on Disarmament (CD) established a committee to discuss the proposed FMCT. Any CD discussion since the late 1990s has been blocked by Pakistan, with backing from China. The need for addressing the global stockpile of these fissile materials remains. For example, between 1993 and 2019, the IAEA reported 3,686 incidents related to nuclear material security.<sup>147</sup>

As part of the 2000 NPT Review Conference, thirteen “practical steps” were unanimously agreed to support the “full implementation of Article VI of the NPT” (second pillar of disarmament). First among these was the call for states to join the Comprehensive Nuclear Test Ban Treaty<sup>148</sup> (CTBT). The next practical step<sup>149</sup> was to launch negotiations for a FMCT. The same document called for FMCT negotiations to begin and conclude within five years. This was not achieved. In 2010, the NPT Review Conference’s Final Document reaffirmed the “urgent necessity of negotiating and bringing to a conclusion a non-discriminatory” without specifying a timeline.<sup>150</sup> This was the second time that the NPT called on the Conference of Disarmament to begin negotiations on a FMCT , and again without any success.

#### Working Paper 4: FMCT Proposed by the European Union

The European Union, notably the sole author of Working Paper 4 submitted to the 2023 Preparatory Committee for the 2026 NPT review cycle, envisioned a “world without nuclear

---

146. U.N. Gen. Res. 48/75L 16 Dec. 1993 “Prohibition of the production of fissile material for nuclear weapons or other nuclear explosive devices”; See also, Official Records of the General Assembly, Forty-eighth Session, Supplement No. 27 (A/48/27), paragraph 2.

147. IAEA Incident and Trafficking Database. These incidents break down into three categories: 290 instances likely involving trafficking or malevolent use, 1,023 cases with unclear motives, and 2,373 occurrences unrelated to nefarious activities.

148. 2000 NPT Review Conference, Final Document, Section 15 at para. 1. The CTBT is a multilateral treaty to ban all nuclear weapon tests, for both civilian and military purposes in all environments. It was adopted by the United Nations General Assembly on 10 September 1996 but has not neuted into force, pending further action from China, Egypt, India, Iran, Israel, North Korea, Pakistan, Russia, and the United States.

149. Action 3 of the 2000 Action Plan, Final Document of the 2000 NPT Review Conference

150. NPT/CONF.2010/50 (Vol. I), actions 15 to 18, especially section E i.

weapons”.<sup>151</sup> In the first paragraph of its working paper, the European Union recalls the adoption of UN General Assembly 48/75L as “providing the framework for the commencement” of negotiations on a Fissile Material Cut Off Treaty. The European Union calls for the 2026 NPT Review Conference to urge the Conference on Disarmament (CD) to launch negotiations before the NPT’s subsequent review conference, presumably set to take place in 2031. The working paper calls the CD’s inability to start negotiations after over thirty years “very concerning”. Although this would be the third time the NPT Review Conference called upon the CD to act towards a FMCT, the working paper submitted by the European Union is a different posture than that of the 2000 and 2010 Review Conference. Where the 2000 NPT Review Conference ambitiously asked the CD to begin and conclude negotiations within five years, the European Union’s working paper merely asks for the commencement of negotiations and is silent on whether conclusion of negotiations is also expected. In contrast, the 2010 Review Conference called upon the CD to begin negotiations without specifying a timeline.

### The Verification Challenge of a FMCT

The verification of a FMCT has historically been a contentious issue, but it no longer needs to be.<sup>152</sup> When the FMCT was first proposed by the United Nations General Assembly in 1993, the technology for real-time monitoring of enrichment, as now used by the IAEA, was not available. One such advancement is the Online Enrichment Monitor (OLEM) device, deployed at

---

151. NPT/CONF.2026/PC.I/WP.4 “Towards a fissile material cut-off treaty: advancing the objective of stopping fissile material production for nuclear weapons or other nuclear explosive devices in the next Non-Proliferation review cycle”, 6 June 2023.

152. Shannon N. Kile and Robert E. Kelley, Verifying a Fissile Material Cut-Off Treaty, Technical and Organizational Consideration, SIPRI Policy Paper 33, August 2012.

Iran's Natanz Enrichment Plant under the JCPOA.<sup>153</sup> These devices can continuously measure U-235 levels, allowing for continual monitoring and is less intrusive than on-site methods.<sup>154</sup>

### The Scope Challenge of a FMCT

Defining the scope of a FMCT is likely to be more challenging. Initially, the “Shannon Mandate” aimed to establish an ad hoc committee with the CD on whether a FMCT would include existing stockpiles of fissile materials.<sup>155</sup> This issue has led to a deadlock at the Conference on Disarmament, with countries like the United States and Russia favoring a treaty that addresses only the future production of weapons-grade fissile materials, without considering existing stockpiles.<sup>156</sup> Pakistan, however, advocates for a broader treaty that includes all materials.<sup>157</sup> As of the beginning of 2021, global stockpiles were estimated at approximately 1,255 tons of enriched uranium and 545 tons of separated plutonium. The decision whether or not to include these stockpiles remains an open question.<sup>158</sup>

### Comparing State Positions to Facilitate FMCT Negotiations

The successful negotiations of the Treaty on the Prohibition of Nuclear Weapons (TPNW) outside the Conference on Disarmament (CD) provide a valuable lesson. This demonstrates that negotiations outside the CD framework, where unanimous consensus is not

---

153. A. Glaser, FMCT Verification, Geneva Centre for Security Policy, Maison de la Paix, March 5, 2018

154. See Jawerth, Nicole. "Revealing facts through science for nuclear verification." *IAEA Bulletin* (2016): 21. See also, Dixit, Aabha. "Swipe check: collecting and analyzing environmental samples." *IAEA Bulletin (Online)* 57.2 (2016): 22-23.

155. See, "Report of Ambassador Gerald E. Shannon of Canada on Consultations on the Most Appropriate Arrangement to Negotiate a Treaty Banning The Production of Fissile Material For Nuclear WEapons or Ohter Nuclear Explosive Devices" Conference on Disarmament, CD/1299, 23 March 1995; See also, Rauf, Tariq, and Usman Iqbal Jadoon. "Perspectives on a Treaty Prohibiting the Production and Stockpiling of Weapons-Usable Nuclear Material." *Nuclear Non-Proliferation in International Law-Volume III: Legal Aspects of the Use of Nuclear Energy for Peaceful Purposes* (2016): 113-145.

156. Rauf, Tariq, and Usman Iqbal Jadoon. "Perspectives on a Treaty Prohibiting the Production and Stockpiling of Weapon-Usable Nuclear Material." *Nuclear Non-Proliferation in International Law-Volume III: Legal Aspects of the Use of Nuclear Energy for Peaceful Purposes* (2016): 113-145.

157. Hashmi, Muhammad Jawad, and Muhammad Mushtaq. "Non-Proliferation Regime: A Pakistani Perspective on Fissile Material Cut-Off Treaty (FMCT)." *Pakistan Journal of Social Sciences* 35.2 (2015): 543-555.

158. See International Panel on Fissile Materials, Fissile Material Stocks (May 2, 2022).

required, may offer a path of less resistance. Countries with political will can thus work towards disarmament unimpeded by less cooperative states.

If the 2026 NPT Review Conference fails to prompt the CD to initiate FMCT negotiations for the third time, or if the resolution proposed by the European Union to begin negotiations within five years is ignored, exploring alternatives outside the CD might be prudent. By 2033, forty years after the United Nations General Assembly's mandate to negotiate a FMCT, the international community must not allow this mandate to weaken. Seizing political will for an additional UN General Assembly resolution is needed. This resolution should call for negotiations to commence and conclude within a maximum of five years.<sup>159</sup> A successful FMCT will strive towards a non-discriminatory nuclear regime, applicable to all parties equally. Similar to the TPNW, such an FMCT could be activated upon ratification by the fiftieth state.<sup>160</sup>

The first FMCT draft, submitted by the Bush administration in 2006 to the CD, lacked provisions for verification and diverged from the 1993 UN Resolution for a non-discriminatory treaty.<sup>161</sup> It proposed a fifteen-year ban on the future production of fissile material for weapons, excluding current stockpiles and HEU fuel for nuclear-powered submarines. The draft was discriminatory in that it would have only applied to the five-nuclear states recognized by the NPT, again leaving out India, Pakistan, and North Korea from the global nuclear regime.

The second draft, submitted in 2009 by Japan, Canada, and the Netherlands, was broader in scope, including current stockpiles and having an unlimited duration. Drafted<sup>162</sup> by the

---

159. Adhering to the timeline set by the 2000 NPT Review Conference's Final Document.

160. Treaty on the Prohibition of Nuclear Weapons (TPNW), entering into force on 22 January 2021 after the fiftieth ratifying party.

161. See Squassoni, Sharon A., Andrew Demkee, and Jill Marie Parillo. "Banning Fissile Material Production for Nuclear Weapons: Prospects for a Treaty (FMCT)." Congressional Research Service, the Library of Congress, 2006; See also, Burgess, Marion. *The proposed Fissile Material Cutoff Treaty (FMCT) and its potential impact on US Navy nuclear propulsion programs*. Diss. Monterey, California. Naval Postgraduate School, 2010.

162. Draft for Discussion Prepared by The International Panel on Fissile Materials, A Fissile Material (Cut Off) Treaty with article-by-article explanation, 16 March 2009. The Panel has members from sixteen countries: Brazil, China, France, Germany, India, Japan, Mexico, the Netherlands, Norway, Pakistan, South Korea, Russia, South Africa, Sweden, the United Kingdom, and the United States.



International Panel on Fissile Materials (IPFM), this proposal sought a non-discriminatory application to all states while allowing exceptions for non-peaceful, non-explosive uses, such as naval propulsion, similar to the NPT's approach. Should the CD fail to initiate FMCT negotiations, and the UN General Assembly offers a renewed mandate for negotiations outside the CD, a proposal amalgamating the 2006 Bush draft, the 2009 IPFM draft, and the 2023 European Union working paper, might garner the greatest international support.

Areas of agreement include the treatment of future stockpiles, where its existence seems contradictory to Article VI of the NPT. However, the United States' 2006 proposal for unequal treatment presents a challenge. A non-discriminatory FMCT, potentially excluding current stockpiles and allowing exceptions for naval propulsion, is likely to receive support from countries like Australia, Brazil, Canada, the European Union, France, Germany, and Japan. However, it might lose support from China, Pakistan, and Iran. This situation is an example where crafting an FMCT that appeals to major powers like Russia and the United States comes at the cost of alienating other important states.<sup>163</sup> While there will be a time for each nation to find it opportune to join a FMCT, defining the scope of such a treaty remains the responsibility of legal scholars today to ensure a stronger nuclear regime for tomorrow.

## **IX. Conclusion: A Future with the Fissile Material Cut Off Treaty**

As the 2026 NPT Review Conference nears, the international nuclear regime faces a number of challenges. Notable, the discord between the NPT's Article IV, which grants the right to peaceful use of nuclear technology, and Article III, which mandates safeguards to prevent nuclear proliferation, remains largely unresolved. Additionally, the regulation of ENR

---

163. See Appendix for Table comparing position of states on a FMCT.

technologies and naval nuclear propulsion continues to pose complex challenges. This paper has argued for refocusing on the Fissile Material Cut Off Treaty (FMCT) as a solution.

First, a FMCT can address Iran's HEU stockpile without addressing issues of equipment or technology. Verification devices are already used by Iran as an example of how modern techniques can provide for an efficient verification regime. The expiration of UN Resolution 2231 (2015) in early 2026 further adds to the 2026 NPT Review Conference's importance. Opportunities for diplomacy should be nurtured when possible.

Also, every effort should be made to bring about a non-discriminatory FMCT. Doing so will offer a means of engaging productively with states that do not possess nuclear weapons but manage sophisticated fuel cycles, like Japan or Iran. In areas where a FMCT may not prevail, such as in the case with naval propulsion, it can still assuage concerns surrounding programs like AUKUS. Negotiators can call for articulated provisions surrounding the non-explosive military use of fissile materials, providing greater thought to an area left untouched when first considered over fifty years ago. The FMCT could be an opportunity to establish legal precedents for future cases of misuse, serving as a proactive, instead of as a reactionary instrument of law.

Alternative strategies akin to those employed for the Treaty on the Prohibition of Nuclear Weapons (TPNW) should be considered. Expediting a nuclear-weapon-free world hinges on the political will and the legal expertise of the international community. The path to the FMCT demands persistence and optimism. It is an opportunity that must be seized with determination and foresight, guided by a commitment to a safer, more secure world.

## X. Appendix: Comparing Position of States on a FMCT

Should a FMCT...	Include current stockpiles?	Include future production?	be negotiated outside the Conference of Disarmament?	Include non-peaceful, explosive use?	Include non-peaceful, non-explosive use? (Naval)	Comments
United States	NO	YES	Possibly	YES	NO	See AUKUS; See 2006 Bush Draft of FMCT
Russia	NO	YES	NO	YES	Possibly	Requires FMCT be non-discriminatory.
China	NO	YES	NO	YES	Possibly	Strongly against any disarmament agreement outside the Conference of Disarmament.
France	NO	YES	Possibly	YES	NO	Reflecting European Union Working Paper 4
United Kingdom	NO	YES	Possibly	YES	NO	See AUKUS
India	NO	YES	NO	YES	NO	Requires FMCT be non-discriminatory.
Pakistan	YES	YES	NO	YES	YES	
North Korea	YES	YES	NO	YES	YES	
Israel	N/A	N/A	N/A	N/A	N/A	Sought not to be seen as a “spoiler” but would “never sign”.
Iran	YES	YES	NO	YES	YES	Requires FMCT be non-discriminatory
Japan	NO	YES	Possibly	YES	Possibly	
Australia	NO	YES	Possibly	YES	NO	See AUKUS
Brazil	YES	YES	NO	YES	NO	

Canada	NO	YES	NO	YES	YES	Duration should be indefinite and scope non-discriminatory.
Germany	NO	YES	Possibly	YES	NO	Position of the European Union as stated in Working Paper 4.
Should a FMCT...	Include current stockpiles?	Include future production?	be negotiated outside the Conference of Disarmament?	Include non-peaceful, explosive use?	Include non-peaceful, non-explosive use? (Naval)	Comments
2006 Bush Draft of FMCT	NO	YES	NO	YES	NO	Only applied to the five NWS as outlined in the NPT for a period of 15 years.
2009 IPFM Draft	YES	YES	NO	YES	NO	Recognizing NPT's exception for naval propulsion, it seeks non-discriminatory treaty on existing and future stockpiles. Submitted to CD by Japan, Canada and the Netherlands in September 2009. Unlimited duration.
2023 NPT Preparatory Working Paper from European Union	NO	YES	NO	YES	NO	Urging CD to begin negotiations for non-discriminatory FMCT by 2031.

## **XI. References and Bibliography (Alphabetical)**

- Abe, Nobuyasu. "The NPT at fifty: Successes and failures." *Journal for Peace and Nuclear Disarmament* 3.2 (2020): 224-233.
- Akbar, Muqarrab, and Anum Riaz. "Indian Nuclear Development, NSG and Nuclear Non-Proliferation Regime: An Analysis." *American Journal of Humanities and Social Sciences Research (AJHSSR)* 4.5 (2020).
- al-Harby, Sami. "Iran's Insistence of Uranium Enrichment: Motives and Repercussions." *Journal for Iranian Studies Year* 6.15 (2022).
- Antstey, Isabelle. "Negotiating Nuclear Control: The Zangger Committee and the Nuclear Suppliers' Group in the 1970s." *The Making of the Global Nuclear Order in the 1970s*. Routledge, 2020. 13-3
- Assistance to Foreign Atomic Energy Activities, 10 C.F.R. § 810.2(c) (Department of Energy 2023).
- Asylum, Judgement, I.C.J. Reports 1950 at 277 (Nov 26, 1950).
- Bonal, Jean-Pierre, et al. "Graphite, ceramics, and ceramic composites for high-temperature nuclear power systems." *MRS bulletin* 34.1 (2009): 28-34.
- Brockmann, Kolja, Mark Bromley, and Lauriane Heau. "Adapting the Missile Technology Control Regime for Current and Future Challenges" (2023).
- Burgess, Marion. *The proposed Fissile Material Cutoff Treaty (FMCT) and its potential impact on US Navy nuclear propulsion programs*. Diss. Monterey, California. Naval Postgraduate School, 2010.
- Carlson, John. "IAEA Safeguards, the Naval 'Loophole' and the AUKUS Proposal." *Vienna Center for Disarmament and Non-Proliferation*, October 8, 2021
- Carlson, John, *Verification of Nuclear Material in Non-Prescribed Military Use by a State with a Comprehensive Safeguards Agreement: Legal and related aspects*, 15 February 2022, VCDNP.
- Casper, Barry M. "Laser enrichment: a new path to proliferation?" *Bulletin of the Atomic Scientists* 33.1 (1977): 28-41.
- Chew, Alvin. "AUKUS - Understanding the Uranium Connection." *Lowy Institute*, June 5, 2023
- Convention on the Prevention and Punishment of the Crime of genocide, Dec. 9, 1948, 78 U.N.T.S. 277
- Corfu Channel (United Kingdom v. Albania), Judgment of 9 April 1949, ICJ Reports 1949, p.4
- Davis, Zachary S. "The realist nuclear regime." *The Proliferation Puzzle*. Routledge, 2020. 79-99.
- Declaration on Principles of International Law Concerning Friendly Relations and Cooperation Among States in Accordance with the Charter of the United Nations, G.A. Res. 2625 (XXV), Oct. 24, 1970
- Department of Energy. '5 Fast Facts about Spent Nuclear Fuel.' *Energy.gov*, last accessed December 10, 2023, <https://www.energy.gov/ne/articles/infographic-5-fast-facts-about-spent-nuclear-fuel>.
- Fitzpatrick, Mark. "Assessing the JCPOA." *Adelphi Series* 57.466-467 (2017): 19-60.

Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces, Aug. 12, 1949, 6 U.S.T. 3114, 75 U.N.T.S. 31.

Glaser, A. FMCT Verification, Geneva Centre for Security Policy, Maison de la Paix, March 5, 2018.

Grant Christopher, "3D Printing: A Challenge to Nuclear Export Controls," *Strategic Trade Review* 1 (Autumn 2015), at 18-25.

Hashmi, Muhammad Jawad, and Muhammad Mushtaq. "Non-Proliferation Regime: A Pakistani Perspective on Fissile Material Cut-Off Treaty (FMCT)." *Pakistan Journal of Social Sciences* 35.2 (2015): 543-555.

Helsen, Hans. *Principles of International Law* 450-52 (2d rev. Ed. Tucker ed. 1966).

Hersch Lauterpacht, *International Law: Collected Papers* 86-87 (Cambridge Univ. Press 1970)

International Atomic Energy Agency, Board of Governors, Information Circular, GOV/INF/433, paragraph 21 (2023).

International Atomic Energy Agency, Board of Governors, Report by the Director General, GOV/2023/23, paragraph 36.

International Atomic Energy Agency, Implementation of the NPT Safeguards Agreement and the Additional Protocol in the Islamic Republic of Iran, GOV/2004/21, adopted March 13, 2004

International Atomic Energy Agency, Implementation of the NPT Safeguards Agreement and the Additional Protocol in the Islamic Republic of Iran, GOV/2004/49, adopted June 18, 2004

International Atomic Energy Agency, Implementation of the NPT Safeguards Agreement and the Additional Protocol in the Islamic Republic of Iran, GOV/2004/79, adopted September 18, 2004

International Atomic Energy Agency, Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran, GOV/2003/69, adopted September 12, 2003

International Atomic Energy Agency, Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran, GOV/2005/77, adopted September 24, 2005

International Atomic Energy Agency, Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran, GOV/2006/14, adopted February 4, 2006

International Atomic Energy Agency, Request for Advisory Opinion on the Right to Strike under ILO Convention No. 87, Judgment of 27 November 2023, ICJ Reports 2023, p. 71

International Labour Organization, Request for Advisory Opinion on the Right to Strike under ILO Convention No. 87, Judgment of 27 November 2023, ICJ Reports 2023, p. 71

International Law Commission, Report of the Seventy-Third Session: Draft Conclusions on Identification of Customary International Law, with commentaries (2018), U.N. Doc. A/73/10, ch. V, Commentary to Conclusion 11, para. (6).

Int'l Law Comm Conclusions on Identification of Customary International Law, with commentaries (2018), U.N. Doc. A/73/10

Jaspal, Zafar Nawaz. "Indo-US Nuclear Deal: Altering Global Nuclear Order." *Strategic Studies* 28.2/3 (2008): 18-38.

Jenks, C. Wilfred. *From Apology to Utopia: The Structure of International Legal Argument* (2d ed. 2005).

Kile, Shannon N. and Robert E. Kelley, *Verifying a Fissile Material Cut-Off Treaty, Technical and Organizational Consideration*, SIPRI Policy Paper 33, August 2012.

Krass, Allan S., et al. *Uranium enrichment and nuclear weapon proliferation*. Routledge, Nov 20 2020.

Kuperman, Alan J. "Challenges of plutonium fuel fabrication: explaining the decline of spent fuel recycling." *International Journal of Nuclear Governance, Economy and Ecology* 4.4 at 302-316 (2019).

Lamarsh, J.R. & Baratta, A.J., *Introduction to Nuclear Engineering*, 3rd. Ed., Prentice Hall (2011).

Lee, Lavina. "The Indian Nuclear Energy Programme: the Quest for Independence." *Nuclear Energy Development in Asia: Problems and Prospects*. London: Palgrave Macmillan UK, 2011. 68-97.

Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, I.C.J. Reports 1996, p. 226, International Court of Justice (ICJ), 8 July 1996.

Legality of the Threat or Use of Nuclear Weapons ICJ 3, ICJ Reports 1996 p. 226

Lettow, Paul Vorbeck. *Strengthening the nuclear nonproliferation regime*. No. 54. Council on Foreign Relations, 2010.

Management of Spent Fuel from Nuclear Power Reactors, Lifecycle of Nuclear Fuel, IAEA Bulletin, June 2019

McCormack, Gavan. "Japan as a plutonium superpower." *Japan Focus* 9 (2007).

Meron, Theodor. *Human Rights and Humanitarian Norms and Customary Law* 3-10, 114-35, 192-95 (Oxford Univ. Press 1989)

Meron, Theodor. *Revival of Customary Humanitarian Law*, 99 A.J.I.L. 817, 821 (2005).

Mian, Zia, et al. "Fissile materials in South Asia and the implications of the US-India nuclear deal." *Science and Global Security* 14.2-3 (2006): 117-143.

Military and Paramilitary Activities in and against Nicaragua (Nicaragua v. United States), 1986 I.C.J. 14 (June 27).

Milhollin, Gary. "Heavy water cheaters." *Foreign Policy* 69 (1987): 100-119.

Norman, "Iran Maintains Steady Expansion of Nuclear Program," *Wall Street Journal*, November 15, 2023.

North Sea Continental Shelf (Federal Republic of Germany/Denmark), I.C.J. Reports 1969, 3.

NPT/CONF.2026/PC.1/WP.1, Procedures in relation to exports of nuclear materials and certain categories of equipment and material under article III (2) of the Treaty on the Nonproliferation of Nuclear Weapons.

NPT/CONF.2026/PC.I/WP.22, The inalienable right to develop research, production and use of nuclear energy for peaceful purposes, working paper submitted by the Islamic Republic of Iran.

NPT/CONF.2026/PC.I/WP.31, Nuclear Submarine Cooperation among the United Kingdom of Great Britain and Northern Ireland and the United States of America and Australia, working paper submitted by China, 2 August 2023.

NPT/CONF.2026/PC.I/WP.38, Reflections by the Chair, 11 August 2023.

NPT/CONF.2026/PC.I/WP.4 “Towards a fissile material cut-off treaty: advancing the objective of stopping fissile material production for nuclear weapons or other nuclear explosive devices in the next Non-Proliferation review cycle”, 6 June 2023.

O’Mahoney, Joseph. "The Smiling Buddha effect: Canadian and US policy after India's 1974 nuclear test." *The Nonproliferation Review* 27.1-3 (2020): 161-179.

Official Records of the General Assembly, Forty-eighth Session, Supplement No. 27 (A/48/27), paragraph 2.

Olander, Donald R. “The gas centrifuge.” *Scientific American* 239.2 (1978): 37-43.

Oscar Schachter, *International Law in Theory and Practice* (Martinus Nijhoff Publishers 1991).

Philippe, Sebastian, and Frank von Hippel. “The Feasibility of Ending HEU Fuel Use in the US Navy.” *Arms Control Today* Vol. 46, no. 9 (2016).

President Donald J. Trump is Ending United States Participation in an Unacceptable Iran Deal – The White House, [trumpwhitehouse.archives.gov/briefings-statements/president-donald-j-trump-ending-united-states-participation-unacceptable-iran-deal](https://trumpwhitehouse.archives.gov/briefings-statements/president-donald-j-trump-ending-united-states-participation-unacceptable-iran-deal) (last visited Dec. 10, 2023).

Q&A: Is there a ‘right’ to enrich uranium? Iran says yes, U.S. says not necessarily," Reuters, November 23, 2013.

Rauf, Tariq, and Usman Iqbal Jadoon. "Perspectives on a Treaty Prohibiting the Production and Stockpiling of Weapon-Usable Nuclear Material." *Nuclear Non-Proliferation in International Law-Volume III: Legal Aspects of the Use of Nuclear Energy for Peaceful Purposes* (2016): 113-145.

Report of the Preparatory Committee on its first session, NPT/CONF.2026/PC.I/6, Vienna, 31 July - 11 August 2023.

Roberts, *Traditional and Modern Approaches to Customary International Law: A Reconciliation*, 95 *A.J.I.L.* 757, 758-59 (2001).

Rizvi, Hasan-Askari “Pakistan’s nuclear testing.” *South Asia’s Nuclear Security Dilemma* (2015): 97-109.

Ruohonen, Jukka, and Kai K. Kimppa. “Updating the Wassenaar debate once again: Surveillance, intrusion, software, and ambiguity” *Journal of Information Technology & Politics* 16.2 (2019): 169-186.

Schmidt, Fritz W. "The Zangger Committee: its history and future role." *The Nonproliferation Review* 2.1 (1994): 38-44.

Schmidt, Fritz. "NPT export controls and the Zangger committee." *The Nonproliferation Review* 7.3 (2000).

Serim, A. Esra. “A Rare Successful Nonproliferation Policy: The JCPOA.” *Middle East Policy* 29.4 (2022)



Shannon N. Kile and Robert E. Kelley, *Verifying a Fissile Material Cut-Off Treaty*, Technical and Organizational Consideration, SIPRI Policy Paper 33, August 2012.

Squassoni, Sharon A., Andrew Demkee, and Jill Marie Parillo. "Banning Fissile Material Production for Nuclear Weapons: Prospects for a Treaty (FMCT)." Congressional Research Service, the Library of Congress, 2006.

Statute of the International Court of Justice, June 26, 1945, 59 Stat. 1055, 33 U.N.T.S. 933.

Strulak, Tadeusz. "The nuclear suppliers group." *The Nonproliferation Review* 1.1 (1993): 2-10.

Sundaram, Kumar, and M. V. Ramana. "India and the policy of no first use of nuclear weapons." *Journal for Peace and Nuclear Disarmament* 1.1 (2018): 152-168.

Sundhya Pahuja, *Decolonising International Law: Development, Economic Growth and the Politics of Universality* (Cambridge Univ. Press 2011).

T. Shea, *The Nonproliferation and Disarmament Challenges of Naval Nuclear Propulsion*, Federation of American Scientists (FAS), 2017, and L. Rockwood, *Naval Propulsion and IAEA Safeguards*, FAS, 2017.

American Medical Isotopes Production Act (AMIPA) Pub. L. No. 112-354, 126 Stat. 4053 (Jan. 4, 2013)

The Case of the S.S. "Lotus" (France v. Turkey), Permanent Court of International Justice, 1927, P.C.I.J. (Ser. A) No. 10. (Sept. 7, 1927).

The Paquete Habana, 175 U.S. 677 (1900)

The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons, INFCIRC/153, June 1972.

Theodor Meron, *Human Rights and Humanitarian Norms as Customary Law* 3-10 (Oxford Press 1989)

Theodor Meron, *Revival of Customary Humanitarian Law*, 99 A.J.I.L. 817, 821 (2005).

Treaty on the Non-Proliferation of Nuclear Weapons (NPT), July 1, 1968, 729 U.N.T.S. 161, 21 U.S.T. 483.

Treaty on the Prohibition of Nuclear Weapons, July 7, 2017, 729 U.N.T.S. 161, U.N. Doc. A/CONF.229/2017/8.

U.N. Gen. Res. 48/75L 16 Dec. 1993 "Prohibition of the production of fissile material for nuclear weapons or other nuclear explosive devices.

United Nations Conference on the Non-Proliferation of Nuclear Weapons. Final Document of the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (1st : 1975 : Geneva), NPT/CONF.35/I, May 30, 1975.

United Nations General Assembly, Declaration on the Prohibition of the Use of Nuclear and Thermo-nuclear Weapons, G.A. Res. 1653 (XVI), paragraph 1-2, adopted November 24, 1961.

United Nations, Charter of the United Nations, 24 October 1945, 1 UNTS XVI.

United Nations, General Assembly Resolution 3452 (XXX), Annex, art. 2, adopted December 9, 1975, reprinted in United Nations Document A/10034, at 91-92 (1976).

United Nations, General Assembly Resolution 71/258, A/RES/71/258, adopted December 23, 2016.

United Nations, General Assembly Resolution 74/247, A/RES/74/247, adopted December 22, 2019.

United Nations, General Assembly Resolution A/RES/71/258, adopted December 23, 2016.

United Nations General Assembly, Declaration on the Prohibition of the Use of Nuclear and Thermo-nuclear Weapons, G.A. Res. 1653 (XVI), paragraph 1-2, adopted November 24, 1961.

United Nations Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Final Document, NPT/CONF.2000/28.

United Nations Security Council, Resolution 1696, S/RES/1696 (2006), adopted July 31, 2006.

United Nations Security Council, Resolution 1737, S/RES/1737 (2006), adopted December 23, 2006, 15-0.

United Nations Security Council, Resolution 1747, S/RES/1747 (2007), adopted March 24, 2007, 15-0.

United Nations Security Council, Resolution 1803, S/RES/1803 (2008), adopted March 3, 2008, 14-0-1 (Indonesia).

United Nations Security Council, Resolution 1835, S/RES/1835 (2008), adopted September 27, 2008, 15-0, 0 abstentions.

United Nations Security Council, Resolution 1929, S/RES/1929 (2010), adopted June 9, 2010, 12-2 (Brazil, Turkey), 1 abstention (Indonesia).

United Nations Security Council, Resolution 1984, S/RES/1984 (2011), adopted May 11, 2011, 14-0 (Lebanon), 1 abstention.

United Nations Security Council, Resolution 2049, S/RES/2049 (2012), adopted October 15, 2012, 15-0.

United Nations Security Council, Resolution 2105, S/RES/2105 (2013), adopted June 14, 2013, 15-0.

United Nations Security Council, Resolution 2159, S/RES/2159 (2014), adopted April 17, 2014, 15-0.

United Nations Security Council, Resolution 2231, S/RES/2231 (2015), adopted July 14, 2015, 15-0

U.N. Gen. Res. 48/75L, 16 Dec. 1993 'Prohibition of the production of fissile material for nuclear weapons or other nuclear explosive devices', Official Records of the General Assembly, Forty-eighth Session, Supplement No. 27 (A/48/27), paragraph 2.

The United States also maintains that 'stockpiles for non-explosive military purposes, such as fuel for naval propulsion, would not be covered.' See Rose Goettmoller, Assistant Secretary, Bureau of Arms Control, Verification and Compliance, Remarks at Wilson Park Conference: Challenges of the Nuclear Non-Proliferation Regime (Dec 13, 2011).

Vienna Convention on the Law of Treaties, May 23, 1969, 1155 U.N.T.S. 331.

World Nuclear Association, 'Uranium Enrichment,' October 2022, [Online]. Available: <https://world-nuclear.org/information-library/nuclear-fuel-cycle/uranium-resources.aspx>.