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Atoms for Peace in a time of international conflict: Assessing the legal situation of nuclear power plants under belligerent occupation

*by Emiliano Buis**

I. Introduction

This article discusses the current legal aspects related to the protection of nuclear facilities under international law, especially regarding belligerent occupation.[1] A comprehensive analysis of all relevant international instruments allows us to overcome the *de facto / de jure* dichotomy regarding state responsibility for nuclear safety and nuclear security in cases of foreign interim control of nuclear facilities.

Section II addresses the international nuclear legal framework related to safety and security in order to examine the main provisions (both in hard law and soft law instruments) dealing with the application of legally binding and non-binding principles in times of armed conflict. Special attention is paid here to the seven pillars proposed by the Director-General of the International Atomic Energy Agency (IAEA), Rafael Mariano Grossi, to deal with the protection of nuclear facilities in cases of war.

Section III looks at the application of international humanitarian law (IHL) to nuclear facilities. By making a distinction between the regimes applicable in international and non-international armed conflicts, the goal is to describe the conventional and customary rules regarding the protection of nuclear power plants as installations containing dangerous forces.

Section IV focuses on the regulation of occupation under IHL, in particular the legal regime establishing obligations upon the occupying party. Some specific decisions and advisory opinions of the International Court of Justice (ICJ) are of special interest here, as they provide conceptual tools to understand the scope of obligations arising from international law when a state occupies foreign territory and establishes provisional control over it.

Finally, to better deal with the difficulties and grey areas caused by the seizure of nuclear power plants in times of war, this article suggests supplementing the seven pillars elaborated by the Director-General of the IAEA with an additional consideration that, in cases of military occupation, ultimate international responsibility for the observation of relevant nuclear law instruments relies on the occupying power if it exerts "authority" over the nuclear installation and/or material. This suggested norm – strictly based on well-known *jus in bello* principles – should be understood as not compromising the status of the warring parties in any way. In that sense, from a legal perspective, attributing responsibility to the Russian Federation (Russia) for the safety and security of nuclear power plants under its control does not imply any formal or informal recognition of the legality of the annexation of the foreign territory in which the nuclear facility is placed.

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1. The control of radiation sources in times of armed conflict is also a topic for concern, as indicated by González, A. (2023), *Health Risks of Ionising Radiation and International Radiation Protection Institutions*, slideshow presented at the ISNL, NEA and University of Montpellier, Montpellier, France, 22 Aug. 2023. However, although some of the conclusions could be expanded to cover several aspects of nuclear safety and nuclear security related to radioactive sources or materials, this article focuses solely on nuclear facilities.

1. *The point of departure: Facts and problems*

The Zaporizhzhia Nuclear Power Plant (ZNPP), the largest in Europe, houses six pressurised water reactors of the Russian VVER type, collectively boasting a capacity of 5 700 megawatts electrical (MWe).[2] Prior to the onset of the conflict, Zaporizhzhia played a crucial role, supplying almost one-quarter of Ukraine's electricity.[3] The operator of the plant is the State Enterprise National Nuclear Energy Generating Company "Energoatom" (SE NNEGC "Energoatom"), which also operates the other three operational nuclear power plants in the country (Rivne, South Ukraine and Khmelnytskyi).[4]

On 4 March 2022, Ukraine announced that Russian forces had gained control of the ZNPP site during the night, resulting in some structural damage from shelling: a projectile hit the plant's onsite training facility and provoked a local fire not far away from the reactor units.[5] However, the reactors' physical integrity, along with their safety and security systems, remained unaffected after the incursion.[6] Despite the challenging circumstances posed by the presence of occupying forces and ongoing military actions, Ukrainian staff continued to operate the site.[7] Notably, Russian forces introduced military equipment onto the premises, and shelling continued in the surrounding areas. From 24 February to 31 March 2022, the Chernobyl Nuclear Power Plant (Chernobyl Plant) – which is currently in a permanent shutdown state and undergoing decommissioning – was also occupied by Russian forces who had entered the country from Belarus and took over the compound within a few hours.[8] News reports stated that the plant was seized from the Ukrainian army.[9]

The Director-General of the IAEA expressed his concerns over the situation regarding the Ukrainian nuclear industry during the hostilities.[10] After visiting the facilities, he released a first report with preliminary considerations in which he summarised his observations and suggested specific actions regarding nuclear safety, security and safeguards in the country.[11]

Nevertheless, the situation at the ZNPP escalated in August 2022 and fighting continued into September 2022, with increased shelling causing damage to critical areas such as the spent fuel storage and the plant's external power supply system.[12] These

2. See World Nuclear Association (n.d.), "Reactor Database", https://world-nuclear.org/nuclear-reactor-database (accessed 20 Sept. 2024).
3. Energoatom (n.d.), "JSC NNEGG Energoatom", https://energoatom.com.ua/en (accessed 20 Sept. 2024).
4. *Ibid*. The fifth nuclear power plant is Chernobyl, which was shut down in December 2000. In total, in February 2022 15 reactors were operational in the country. See Duliba, Y. (2022) "Nuclear safety: A global challenge in the context of the war in Ukraine", *Journal of Energy & Natural Resources Law*, Vol. 43, No. 3, International Bar Association, London pp. 321-333. See also Przybylak, J. (2023), "Nuclear power plants in war zones: Lessons learned from the war in Ukraine", *Security and Defence Quarterly*, Vol. 46, No. 2, War Studies University, Warsaw, p. 3.
5. Dolzikova, D. and J. Watling (2023), *Dangerous Targets: Civilian Nuclear Infrastructure and the War in Ukraine. Preliminary Lessons for Safety and Security in War Zones*, Special Report, Royal United Services Institute for Defence and Security Studies (RUSI), London, p. 7.
6. *Ibid*.
7. *Ibid*.
8. Przybylak, J. (2023), *supra* note 4, p. 4.
9. A radiation spike (i.e. levels increased about 20-fold) was monitored near the Chernobyl Plant the day after it was occupied, probably caused by heavy military vehicles stirring contaminated soil in the exclusion zone surrounding the abandoned plant. See Gill, V., "Chernobyl: Radiation spike at nuclear plant seized by Russian forces", *BBC News* (25 Feb. 2022).
10. IAEA (2022), *Nuclear Safety, Security and Safeguards in Ukraine – Summary Report by the Director-General, 24 February – 28 April 2022*, IAEA, Vienna.
11. *Ibid*.
12. Carlson, J. (2022), *Prohibition of military attacks on nuclear facilities*, Vienna Center for Disarmament and Non-Proliferation (VCDNP), Vienna, p. 5. For more detailed description of damage resulting from the shelling see IAEA, Press Release *Update 89 – IAEA Director General Statement on Situation in Ukraine*, IAEA Press Release 126/2022 (9 Aug. 2022).

developments raised substantial safety concerns among experts, particularly concerning the integrity of the external power supply.[13] The IAEA secured access to the ZNPP site on 1 September 2022.[14] The presence of international inspectors did not alter the strong military deployment at the ZNPP and inspectors had no authority to act on the situation.[15] Nevertheless, under the leadership of the Director-General of the IAEA, an IAEA assessment team visited the site and issued a second, more detailed report on 6 September 2022.[16] The Director-General of the IAEA subsequently briefed the UN Security Council (UNSC) on their findings. According to this second report:

> The situation in Ukraine is unprecedented. It is the first time a military conflict has occurred amid the facilities of a large, established nuclear power programme. A nuclear accident can have serious impacts within the country and beyond its borders, and the international community is relying on the IAEA to perform a rigorous assessment of the situation and to keep it informed with accurate and timely information….[17]

The risk involved here is not related to a direct strike, but rather to human error or to a failure of functioning systems, like water or the energy supply.[18] Even though the last operating reactor in the ZNPP was put into a cold shutdown state in September 2022,[19] a constant supply of coolant is required, and this access to water could be compromised as a result of the deployment of military actions in the area surrounding the site.[20] Reliance on emergency diesel generators to maintain power supply to ZNPP can serve to deal with unexpected energy cuts but cannot provide for a sustainable plan in case of extended power outage as a result of war-related actions.[21] Under these circumstances, it seems clear that maintaining the security conditions of the six reactors in ZNPP has been a challenge[22] and still poses challenges every day, requiring careful attention.[23]

Bearing in mind the consequences of the 1986 Chernobyl Plant accident, a possible accident at the ZNPP could result in large economic loss and may have a serious humanitarian impact that deserves special attention among stakeholders.[24] So, the question that must be posed is: How should this dangerous situation be dealt with from a legal point of view to ensure an adequate normative framework for these abnormal circumstances?

The current situation regarding nuclear power plants in Ukraine, which is being closely monitored by international organisations and agencies,[25] has created a debate between those who believe that a new legal framework to deal with the protection of nuclear

13. *Ibid*.
14. Przybylak, J. (2023), *supra* note 4, pp. 5-6.
15. *Ibid*.
16. IAEA (2022), *Nuclear Safety, Security and Safeguards in Ukraine – 2nd Summary Report by the Director-General, 28 April – 5 September 2022*, IAEA, Vienna.
17. *Ibid*., p. 44.
18. Dolzikova, D. and J. Watling (2023), *supra* note 5, pp. 8-10.
19. Przybylak, J. (2023), *supra* note 4, p. 5.
20. *Ibid*.
21. Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 13.
22. Przybylak, J. (2023), *supra* note 4, p. 5.
23. While no events significantly affecting the physical integrity of the facilities have occurred to date, some minor damage to areas important for nuclear safety and security at the ZNPP have been reported. This damage demonstrates that "the facilities at the ZNPP remain at risk as the armed conflict continues", as recently explained by the Board of Directors of the IAEA. See IAEA (2024), *Nuclear Safety, Security and Safeguards in Ukraine, Report by the Director General*, GOV/2024/30, IAEA, Vienna, paras. 34-38.
24. Moore, G.M. (2022), "How international law applies to attacks on nuclear and associated facilities in Ukraine", *Bulletin of the Atomic Scientists*, https://thebulletin.org/2022/03/how-international-law-applies-to-attacks-on-nuclear-and-associated-facilities-in-ukraine.
25. On the most recent developments, see Nuclear Energy Agency (NEA) (2025), "Ukraine: Current status of nuclear power installations", NEA, www.oecd-nea.org/ukraine.

installations in times of war should be developed[26] and those who reject such proposals, arguing it is unnecessary, as existing norms and principles could be applied even in these extreme circumstances.[27]

This article considers the existing global legal framework and its limits, taking into account the unique aspects of the events occurring at the ZNPP. The article then explores the applicable legal provisions, both in international nuclear law (INL) and in IHL, to examine how they deal with the seizure of a nuclear power plant during open hostilities. Although there is not currently the threat of a direct attack against nuclear facilities, the belligerent occupation of a territory and the establishment of external authorities in a facility are unprecedented occurrences requiring a reassessment of relevant juridical frameworks.

2. Beyond the past: The "new" challenge of occupation

Prior to Zaporizhzhia there had been several attacks on nuclear facilities, though in most cases before the facilities concerned had commenced operation. Fortunately, none of these attacks resulted in significant releases of radiation.[28] During the Second World War, for example, the Allies attempted to destroy the Norsk Hydro heavy water-production facility in Norway.[29] On 30 September 1980, Iranian aircraft bombed Iraq's French-made Osirak research reactor, then under construction at the Tuwaitha research centre near Baghdad.[30] The attack damaged ancillary buildings but did not damage the reactor itself.[31] The following year, Israeli aircraft destroyed the reactor.[32] Between 1984 and 1987, during the Iran-Iraq war, Iraq struck two Iranian power reactors at the Bushehr Nuclear Power Plant, then in the last stages of construction, resulting in great damage to the facility.[33] In 1991 and 1993, during the First Gulf War and on the basis of United Nations Security Council (UNSC) Resolution 678, the United States attacked several nuclear targets in Iraq, including the Tuwaitha Nuclear Research Centre, the Tarmiya Uranium Enrichment Facility, the Al Qaim Superphosphate Fertilizer Plant and the Mosul Feed Materials Production Facility.[34]

26. See e.g. Rodríguez, L. and L. Sukin (2022), "Russian actions at Zaporizhzhia show need for better legal protections of nuclear installations", Bulletin of the Atomic Scientists, https://thebulletin.org/2022/10/russian-actions-at-zaporizhzhia-show-need-for-better-legal-protections-of-nuclear-installations/. See also Burke, A. (2022), "Attacks on Ukrainian nuclear-power plants challenge treaties", *Nature*, Vol. 611 (7935), Springer Nature, London, pp. 232-235.
27. See e.g. Onderco, M. and C. Egger (2022), "Why a new convention to protect nuclear installations in war is a bad idea", *Bulletin of the Atomic Scientists,* https://thebulletin.org/2022/12/why-a-new-convention-to-protect-nuclear-installations-in-war-is-a-bad-idea.
28. Carlson, J. (2022), *supra* note 12, p. 1; Fedchenko, V. (2023), *Nuclear Security During Armed Conflict: Lessons from Ukraine*, Stockholm International Peace Research Institute (SIPRI) Research Policy Paper, SIPRI, Stockholm, p. 3.
29. *Ibid.*, p. 3.
30. Although not yet in operation, the Osirak research reactor had enriched uranium under IAEA safeguards; Lamm, V. (2003), "Protection of civilian nuclear installations in time of armed conflict", *Nuclear Law Bulletin,* No. 72, OECD Publishing, Paris, pp. 29-38. See also Reiter, D. (2005), "Preventive Attacks against Nuclear Programs and the 'Success' at Osiraq", *The Nonproliferation Review*, Vol. 12, No. 2, pp. 355-371. On the different positions regarding the targeting of Osirak in terms of nonproliferation, see Sadot, U. (2016), "Osirak and the Counter-Proliferation Puzzle", *Security Studies*, Vol. 25, No. 4, University of California, Berkley, pp. 646-676.
31. *Ibid*.
32. Carlson, J. (2022), *supra* note 12, p. 1; Fedchenko, V. (2023), *supra* note 28, p. 4. Regarding the legal intricacies of this attack, see Mallison, W.T. and S.V. Mallison (1982). "The Israeli Aerial Attack of June 7, 1981 upon the Iraqi Nuclear Reactor: Aggression or Self-Defense?", *Vanderbilt Law Review*, Vol. 15, No. 3, Vanderbilt Law School, Nashville, Tennessee, pp. 417-488.
33. Carlson, J. (2022), *supra* note 12, p. 1.
34. On the legality of these actions (both in times of war and peace), see Kreps, S.E. and M. Fuhrmann (2011), "Attacking the Atom: Does Bombing Nuclear Facilities Affect Proliferation?", *Journal of Strategic Studies*, Vol. 34, No. 2, Routledge, Milton Park, United Kingdom, pp. 161-187.

In 2007, Israel destroyed Syria's al-Kibar reactor.[35] Hamas, a non-state actor, unsuccessfully launched rocket attacks against Israel's Dimona reactor in July 2014.[36] Nuclear facilities have also been affected by cyberattacks launched against them, such as the assault in 2010 against the Natanz Pilot Fuel Enrichment Plant (PFEP) in Iran in 2010.[37]

The current situation in Ukraine is nevertheless unique among attacks on nuclear facilities,[38] not only because previous attacks were never directed against operating power reactors,[39] but also because this was the first time in which an operational plant under IAEA safeguards was included within a broad range of facilities targeted in a full military assault, rather than an isolated target.[40] Also for the first time, a large nuclear facility, possessing large volumes of irradiated nuclear fuel both in reactor cores and in onsite storage, was placed under belligerent occupation. The uniqueness of the situation begs for an examination of the legal aspects involved.

Unlike the situation with the Chernobyl Plant, which was formally returned to the control of the Ukrainian operator after some months, the ZNPP is the first example in history in which, after seizure, a nuclear plant remained in operation while in the control of the attacking party.[41] The speculated reasons behind Russia's decision to take control of the installation are numerous. Some authors have argued that the decision to operate the plant could be explained through the military advantages provided by the physical control over the facility, since the site could be used as a missile and artillery launch site.[42] At the same time, the appropriation of the ZNPP could also serve to manipulate the amount of energy available to Ukraine, threating to cut off one of the most important sources of electricity in the country.[43]

The current international nuclear legal regime, as explained in this article, has not addressed an intentional use of a nuclear installation for war-related purposes in its current institutional framework.[44] Some have suggested that the strategic occupation of nuclear facilities is equivalent to the use of human shields, in which civilians are used in order to manipulate the actions of an enemy who would not dare to attack non-military

35. Garwood-Gowers, A. (2011), "Israel's Airstrike on Syria's Al-Kibar Facility: A Test Case for the Doctrine of Pre-emptive Self-Defence?", *Journal of Conflict & Security Law*, Vol. 16, No. 2, Oxford University Press, Oxford, pp. 263-291.
36. Carlson, J. (2022), *supra* note 12, p. 1.
37. Fedchenko, V. (2023), *supra* note 28, p. 4. Regarding cyberattacks against nuclear installations, see Meyer, T. (2023), "*Les sites nucléaires en temps de conflit*", in *Géopolitique du nucléaire. Pouvoir et puissance d'une industrie duale,* Éditions du Cavalier Bleu, Paris, pp. 125-133.
38. The most similar case is probably the situation of the Krško Nuclear Power Plant during the conflict in the former Yugoslavia in 1991. Due to fear that the plant could be the object of an air strike after Slovenia declared its independence, it was brought to a cold shutdown. The nuclear power plant was never targeted, seized or occupied, but this created serious concern regarding nuclear security and safety. See Stritar, A. et al. (1993), "Some aspects of nuclear power plant safety under war conditions", *Nuclear Technology,* Vol. 101, No. 2, American Nuclear Society, Westmont, Illinois, pp. 193-201.
39. Sokolski, H.D. (2022), "Present Danger: Nuclear Plants in War", *The US Army War College Quarterly: Parameters*, Vol. 52, No. 4, US Army War College (USAWC), Carlisle, Pennsylvania, p. 8. See also Przybylak, J. (2023), *supra* note 4, p. 12.
40. Fedchenko, V. (2023), *supra* note 28, p. 4.
41. While all reactors at the plant are currently in cold shutdown, the plant was in operation when Russia first occupied the plant and continued to operate in some capacity for several months while under occupation. IAEA, Press Release *Update 223 – IAEA Director General Statement on Situation in Ukraine*, IAEA Press Release 36/2024 (13 Apr. 2024).
42. Bachega, H., "Russia using Zaporizhzhia nuclear power plant as army base", *BBC News*, Kyiv (8 Aug. 2022). See also Alberque, W. (2023), "The wartime weaponisation of nuclear power stations", *IISS Online Analysis,* available at: https://iiss.org/online-analysis/online-analysis/2023/06/the-wartime-weaponisation-of-nuclear-power-stations/.
43. Sokolski, H.D. (2022), *supra* note 39, p. 8.
44. Budjeryn, M. (2022), "Distressing a System in Distress: Global Nuclear Order and Russia's War against Ukraine", *Bulletin of the Atomic Scientists,* Vol. 78, No. 6, pp. 339-346.

targets.[45] Furthermore, the control-by-force of nuclear facilities is complemented by an ideological use of language. Russia accompanied its appropriation of strategic installations, such as the Chernobyl Plant and the ZNPP, with unsubstantiated claims regarding Ukraine's nuclear capabilities.[46] The whole international nuclear order could be thus undermined by clear political intentions, in which strict legality would play a minor role.[47]

But how has this occupation been handled on the ground? As of this writing, the ZNPP is under the management of the Russian state-owned enterprise Rosatom.[48] According to several witnesses, since the invasion, the movement of local staff around the facility has been heavily restricted and is constantly monitored by different units of the Russian National Guard that are currently stationed at the site.[49] In practical terms, the military control of the ZNPP by Russian authorities – which has included the provisional detention of the former Ukrainian head of the power plant and allegations of physical mistreatment of some local technical personnel – has created a high-pressure work environment for the permanent staff at the facility.[50] Additionally, the tension increased when some employees of the ZNPP were accused of treason by the Ukrainian government: as an example, the mayor of the nearby town of Enerhodar, Dmytro Orlov, called ZNPP workers "collaborators" when talking to the media on 2 July 2023.[51]

In such a chaotic situation, there is arguably no clear decision-related hierarchy within the ZNPP, and the number of employment contracts has been significantly reduced under the management of Rosatom's representatives.[52] From a legal point of view, these shortcomings and vulnerabilities generate several questions regarding the lack of efficient control and the uncertain distribution of responsibilities related to the operation of the facility.[53] To complicate the picture, there is evidence that Rosatom has brought additional operators from Russian nuclear power plants to oversee or assist the operation of the plant.[54] Furthermore, since they are not licensed by Ukrainian authorities to operate these facilities, they are acting against Ukrainian law.[55]

In this imprecise landscape, the legal responsibility related to the respect of nuclear safety and nuclear security standards in the power plant seems to have been blurred. The Director-General of the IAEA's second report on the situation of the plant described the situation in the following terms:

45. Przybylak, J. (2023), *supra* note 4, p. 11.
46. Yaroshchuk, O. (2023), "Russian Disinformation Strategy in the Field of Nuclear Security. Examining Key Narratives", *Ukraine Analytica*, Vol. 1, No. 30, pp. 27-36. On the manipulation of nuclear-related information as a war strategy, see also Solovian, V. (2023), "Ukrainian Nuclear Plants in the Focus of Russian Information Warfare", *Ukraine Analytica*, Vol. 1, No. 30, pp. 37-45.
47. Bollfrass, A.K. and S. Herzog (2022), "The War in Ukraine and Global Nuclear Order". *Survival*, Vol. 64, No. 4, International Institute for Survival Studies, London, United Kingdom, pp. 7-32.
48. Established in 2007 with headquarters in Moscow, this non-profit organisation is the largest electricity generating company in Russia, producing more that 20% of the country's total electricity. In charge of 76% of global nuclear technology exports, Rosatom is responsible for many nuclear power plant units in Russia and overseas, comprising as an organisation more than 350 enterprises, including scientific research organisations, a nuclear weapons complex, and the world's only nuclear icebreaker fleet. See Rosatom (n.d.), "Rosatom State Atomic Energy Corporation ROSATOM", https://rosatom.ru/en/index.html (accessed 20 Sept. 2024).
49. Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 16.
50. *Ibid*., p. 15.
51. Przybylak, J. (2023), *supra* note 4, p. 4. The working situation in the nuclear power plant is described by Datskevych, B. "Mayor: Part of Rosatom employees leave Russian occupied nuclear plant", *Kyiv Independent* (2 July 2023).
52. *Ibid*.
53. The different types of legal, institutional and operational shortcomings related to nuclear facilities in times of warfare are identified in: Alkış, M.A. (2023), "Armed Conflict and Nuclear Security: Implications for Europe", *Non-proliferation and Disarmament Papers*, No. 82, April 2023, EU Non-Proliferation and Disarmament Consortium, SIPRI, Stockholm, pp. 8-9.
54. Przybylak, J. (2023), *supra* note 4, p. 4.
55. Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 33.

> During the [IAEA Support and Assistance Mission to Zaporizhzhia], the Ukrainian plant staff and managers informed the team that all safety systems for the ZNPP were in normal operation and that the physical protection system was operational. However, the team was also informed by the Ukrainian plant staff and managers that after the occupation of the ZNPP by military forces, some important functions of physical protection such as guarding and access control to the site (protected area) were taken over by Russian military command despite the fact that the responsibility for physical protection still rested with the management of the ZNPP under existing Ukrainian legislation.[56]

According to the conclusions, despite the presence of Russian armed forces in the ZNPP, physical protection remains the responsibility of the facility's Ukrainian management team.[57] The daily reality of the plant, however, is more complicated. The first report prepared by the Director-General of the IAEA acknowledged the difficulties of assessing the situation: even if no event having an impact on nuclear and/or radiation safety and nuclear security was noted, the report made it clear that "… it is not possible to assess the situation of a number of facilities and activities using radioactive sources in Ukraine, as they are located in areas under Russian occupation or active battle".[58]

Across several submissions, Ukraine informed the IAEA that, as a result of the temporarily occupied territory, it had lost control over nuclear material at the Chernobyl site (special report dated on 25 February 2022), and then, in two similar reports (in March 2022 and July 2022), that the country was unable to control all facilities on the Zaporizhzhia site and at three locations outside facilities (LOFs) in south-eastern parts of the country.[59]

On 3 March 2022, the IAEA Board of Governors expressed "further grave concern that the Russian Federation's aggression is impeding the Agency from fully and safely conducting safeguards verification activities at Ukrainian nuclear facilities within its internationally recognised borders" and called upon Russia "to immediately cease all actions against, and at, the Chornobyl Nuclear Power Plant and any other nuclear facility in Ukraine, in order for the competent Ukrainian authorities to preserve or promptly regain full control over all nuclear facilities…".[60] In other later resolutions condemning these Russian activities at Ukrainian nuclear power plants,[61] the Board of Governors insisted on the need to ensure a prompt return of the facilities to the control of the Ukrainian government.[62]

II. The regulation of war under international nuclear law

"Nuclear security" concerns "the prevention of, detection of, and response to, criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities, or associated activities".[63] "Nuclear safety", as a different concept, refers to the "achievement of proper operating conditions, prevention of accidents

56. IAEA (2022), *supra* note 16, p. 13.
57. *Ibid*.
58. IAEA (2022), *supra* note 10, p. 22.
59. *Ibid.*, p. 43.
60. IAEA Board of Governors Resolution, "The safety security and safeguards implications of the situation in Ukraine", IAEA Doc. No. GOV/2022/17, adopted on 3 Mar. 2022.
61. Other IAEA Board of Governors resolutions adopted during the first year of occupation include GOV/2022/58, adopted on 15 Sept. 2022, and GOV/2022/71, adopted on 17 Nov. 2022.
62. Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 18.
63. Basic Safety Standards Secretariat (BSS Secretariat) (2014), *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards*, General Safety Requirements Part 3, IAEA Doc. No. GSR Part 3, IAEA, Vienna (approved by the NEA Steering Committee for Nuclear Energy, 28 Oct. 2011, as presented in "NEA Co-sponsorship of 'Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards'", NEA Doc. NEA/NE(2011)12, "Summary Record of the 123rd Session of the Steering Committee for Nuclear Energy", NEA Doc. NEA/SUM(2011)2, pp 7-8).

and mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation hazards".[64] The distinction between nuclear safety and nuclear security, which is one of the particular features of INL, can be summarised by saying that "safety involves keeping sources of radiation away from people, while security involves keeping people away from sources of radiation".[65]

1. *War in nuclear security instruments*

There is no single instrument addressing international nuclear security as a whole.[66] However, a key treaty on the subject is the Convention on the Physical Protection of Nuclear Material (CPPNM).[67] The 2005 amendment to the CPPNM (A/CPPNM),[68] adopted under IAEA auspices, strengthened the previous unamended version of the treaty, which had only focused on nuclear material used for peaceful purposes in international transport.[69] The amendment expanded the scope of the CPPNM by including the physical protection of nuclear facilities, in addition to material, both in international transport and in domestic activities.[70] It also expanded on member states' related criminal law commitments in order to identify punishable conduct and ancillary offences.[71] Twelve fundamental principles on nuclear physical protection are listed in the A/CPPNM, giving a full-scope account of the framework that state parties should implement.[72]

While it provides a general set of rules to deal with the protection of nuclear installations and materials from illicit actions or unauthorised acts, the A/CPPNM specifically excludes applications of the convention to acts of war:

> The activities of armed forces during an armed conflict, as those terms are understood under international humanitarian law, which are governed by that law are not governed by this Convention, and the activities undertaken by military forces of a State in the exercise of their official duties, inasmuch as they are governed by other rules of international law, are not governed by this Convention.[73]

The explicit exclusion of armed conflicts is justified by the fact that these situations are governed by a specific set of rules – international humanitarian law. The principles dealing with the physical protection of installations and materials in the nuclear field, as foreseen in the treaty, are only binding in times of peace and as long as they are under

64. BSS Secretariat (2014), *supra* note 63.
65. Anthony, I. (2013), "The role of the European Union in strengthening nuclear security", *EU Nonproliferation Papers,* No. 32, EU Non-Proliferation Consortium, p. 2.
66. Stoiber, C. (2010), "Nuclear Security: Legal Aspects of Physical Protection, Combating Illicit Trafficking and Nuclear Terrorism", *International Nuclear Law: History, Evolution and Outlook,* OECD Publishing, Paris, p. 220.
67. Convention on the Physical Protection of Nuclear Material (1980), IAEA Doc. INFCIRC/274 Rev. 1, 1456 UNTS 125, entered into force 8 Feb. 1987 (CPPNM).
68. Amendment to the Convention on the Physical Protection of Nuclear Material (2005), IAEA Doc. INFCIRC/274/Rev.1/Mod.1, entered into force 8 May 2016 (A/CPPNM).
69. See CPPNM, *supra* note 67.
70. According to the amended Article 2 of the A/CPPNM,
    > [t]his Convention shall apply to nuclear material used for peaceful purposes in use, storage and transport and to nuclear facilities used for peaceful purposes, provided, however, that articles 3 and 4 and paragraph 4 of article 5 of this Convention shall only apply to such nuclear material while in international nuclear transport…

    See Vez Carmona, L. (2005) "The International Regime on the Physical Protection of Nuclear Material and the Amendment to the Convention on the Physical Protection of Nuclear Material", *Nuclear Law Bulletin,* Vol. 76, OECD Publishing, Paris, p. 40.
71. See A/CPPNM, *supra* note 68, Article. 7.
72. Drobysz, S. (2022), "Nuclear security: Physical protection, illicit trafficking and nuclear terrorism", in Nick, K.S. and S.G. Burns (eds.), *Principles and Practice of International Nuclear Law*, OECD Publishing, Paris, pp. 343-344.
73. CPPNM, *supra* note 67, Article. 2(4)(b).

civilian control (nuclear material and facilities retained for military purposes are explicitly excluded from control).[74]

Another relevant hard law instrument here is the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), signed in 2005 and in force since 2007.[75] The main objective of this treaty – which is one of the many universal anti-terrorism legal instruments – is to require state parties to criminalise not only the purposeful and unlawful possession of radioactive material with the intent to cause death or serious bodily injury, or substantial damage to property or the environment, but also the use, or threat of use of radioactive material or devices, or damage to nuclear facilities, with the same intent or to compel a natural or legal person, an international organisation or a state to do or refrain from doing such act.[76] State parties are also bound to include in their national criminal legislation threats to commit any of those offences, as well as unlawful demands of radioactive material, devices or nuclear facilities by threat or use of force.[77]

In comparison to the A/CPPNNM, ICSANT is broader, covering acts involving both nuclear and other radioactive material, including in military uses, as well as nuclear facilities used for both peaceful and military purposes.[78] In spite of its broad content, here again the treaty excludes situations of armed conflicts, with text providing exactly the same content as in the A/CPPNM. Thus, Article 4(2) of ICSANT reproduces the same language of Article 2(4)(b) of the A/CPPNM. Nevertheless, in the case of the instrument dealing with nuclear terrorism a definition of "military forces of a State" is provided in the following terms:

> "Military forces of a State" means the armed forces of a State which are organized, trained and equipped under its internal law for the primary purpose of national defence or security and persons acting in support of those armed forces who are under their formal command, control and responsibility.[79]

What is interesting in ICSANT is that, although it covers facilities and materials under military control, the scope of the convention makes it impossible to evaluate the actions of armed forces, which are attributed to the state. So even if an obligation against attack

74. *Ibid*., Article 2(5). This point is further exemplified by the US interpretive declaration to the A/CPPNM:

> (1) The United States of America understands that the term "armed conflict" in Paragraph 5 of the Amendment (Article 2 of the Convention on the Physical Protection of Nuclear Material, as amended) does not include internal disturbances and tensions, such as riots, isolated and sporadic acts of violence, and other acts of a similar nature. (2) The United States of America understands that the term "international humanitarian law" in Paragraph 5 of the Amendment (Article 2 of the Convention on the Physical Protection of Nuclear Material, as amended) has the same substantive meaning as the law of war. (3) The United States of America understands that, pursuant to Paragraph 5 of the Amendment (Article 2 of the Convention on the Physical Protection of Nuclear Material, as amended), the Convention on the Physical Protection of Nuclear Material, as amended, will not apply to: a) the military forces of a State, which are the armed forces of a State organized, trained, and equipped under its internal law for the primary purpose of national defense or security, in the exercise of their official duties; b) civilians who direct or organize the official activities of military forces of a State; or c) civilians acting in support of the official activities of the military forces of a State, if the civilians are under the formal command, control, and responsibility of those forces…

Available at: https://iaea.org/sites/default/files/22/06/cppnm_amend_reserv.pdf.

75. International Convention for the Suppression of Acts of Nuclear Terrorism (2005), 2445 UNTS 137, entered into force 7 July 2007 (Nuclear Terrorism Convention or ICSANT).
76. *Ibid*., Article 2(1).
77. *Ibid*., Article 2(2). ICSANT also includes obligations related to the establishment of jurisdiction, extradition and international co-operation in the domain of nuclear terrorism.
78. Drobysz, S. (2022), *supra* note 72, p. 348.
79. ICSANT, *supra* note 75, Article 1(6).

on nuclear facilities is established in Article 2(1)(b)(ii),[80] in terms of the convention offences, it could only be committed by individuals, therefore excluding the possibility of attributing responsibility to states for acts related to terrorist actions against nuclear targets.

While it is true that extraordinary events are indirectly considered in the paradigm offered by these hard law instruments, the nuclear security stakeholders who designed these instruments specifically excluded their applicability to armed conflicts, although reality shows that both war and large-scale civil unrest could eventually involve serious threats that could put the security of a nuclear facility at stake.[81] The different circumstances that could arise in times of war should require concrete planning to distribute responsibilities and foresee adequate levels of response, an aspect on which both the A/CPPNM and ICSANT remain silent.

As supplements to existing hard law, soft law instruments provide interesting inputs regarding standards for nuclear security at an international level. For instance, the 2011 IAEA *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities* (INFCIRC/225/Revision 5) refer to the need to implement measures in order to assess potential threats through a design basis threat (DBT),[82] with the aim of examining "normal" circumstances, and thus avoiding possible scenarios in which nuclear or other radioactive material is removed without authorisation or there is sabotage by external or internal actors.[83] There are some relevant explicit references to armed attacks in the recommendations as a situation that could endanger the security of nuclear facilities and materials. The recommendations provide that: "The State should give attention to providing protection measures against any airborne threat and against possible stand-off attacks specified in the State's threat assessment or design basis threat."[84] When discussing the nature of sabotage and its effects, the recommendations similarly mention:

> Sabotage scenarios should consider external and/or insider adversaries who attempt to disperse nuclear material or other radioactive material or to damage or interfere with equipment, systems, structures, components or devices, including possible stand-off attack, consistent with the State's threat assessment or design basis threat.[85]

It could arguably be concluded that, unlike hard law instruments that tend to exclude military activities from the scope of their articles, the IAEA document explicitly addresses actions related to attacks by an enemy. In fact, a "stand-off attack", as mentioned in these provisions, is defined in the same instrument as "[a]n attack, executed at a distance from the target nuclear facility or transport, which does not require adversary hands-on access to the target, or require the adversary to overcome the physical protection system".[86] However, despite the inclusion of an armed attack as an event that should be considered when analysing security risks in nuclear-related facilities, the nature of the non-binding document makes it difficult to interpret the reference to an intentional will, on behalf of the international community, to expand the scope of applicability of nuclear security rules to embrace situations of warfare. In any case, the IAEA recommendations only point to isolated attacks; this does not seem to be enough to deal with open hostilities, since – as it has been argued – specific acts of armed violence cannot cover sustained military activity or belligerent occupation.[87]

80. Mapako, K., "The Nexus of Nuclear Security and Pertinent Armed Conflicts: A Reflection of International Law Applicability in the Ukraine-Russia Conflict", *Opinio Juris* (1 Dec. 2022).
81. Fedchenko, V. (2023), *supra* note 28, p. 17.
82. IAEA (2011), "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities", IAEA Nuclear Security Series No. 13, INFCIRC/225/Revision 5, IAEA, Vienna.
83. Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 23.
84. IAEA (2011) *supra* note 82, p. 13.
85. *Ibid.*, p. 31.
86. *Ibid.*, p. 54.
87. Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 24.

2. War in nuclear safety instruments

Although there are several hard law norms concerning nuclear safety, these instruments also remain mute on the technical protection of nuclear installations or material in the extraordinary case of the outbreak of an armed conflict. It is notable that the 1986 Convention on Early Notification of a Nuclear Accident[88] and the 1986 Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency,[89] adopted in the aftermath of the Chernobyl accident,[90] only deal with obligations which originate in the case of the event of a nuclear accident or radiological emergency. Their scope of application does not address the circumstances motivating the accident. As a consequence, there is no mention of the existence of threats or risks that could be responsible for the emergency, insofar as there is no intention of consolidating preventive measures.[91] Warfare or internal conflicts are thus, understandably, not mentioned in any of the provisions included in either treaty.

In the same vein, neither the 1994 Convention on Nuclear Safety (CNS)[92] nor the 1997 Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention)[93] include specific references to the activities of armed forces in the context of an armed conflict.[94] The CNS, being the "first and foremost international legal instrument addressing the safety of nuclear power plants", was drafted to ensure, by means of fundamental principles, that state parties operating land-based civil nuclear power plants maintain a high level of safety.[95] It is an incentive convention, in the sense that its goals are achieved through the establishment of an innovative mechanism to exchange information (a "peer review" system). It should be noted that the CNS applies to the safety of "nuclear installations", which are defined as "land-based civil" nuclear power plants.[96] This excessive limitation in its material scope has been criticised; India, for example, made a declaration when ratifying the treaty in which it expressed the need to also include military facilities in order to fully promote global safety.[97] It is surprising that, considering the importance given to the identification of risks posed in ensuring safety, the text contains no explicit allusion to the challenges that could arise from operating nuclear power installations during war.

88. Convention on Early Notification of a Nuclear Accident (1986), IAEA Doc. INFCIRC/335, 1439 UNTS 276, entered into force 27 Oct. 1986 (Early Notification Convention).
89. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986), IAEA Doc. INFCIRC/336, 1457 UNTS 134, entered into force 26 Feb. 1987 (Assistance Convention).
90. Burns, S.G. (2022), "The impact of the major nuclear power plants accidents on the international legal framework for nuclear power", in Nick, K.S. and S.G. Burns (eds.), *Principles and Practice of International Nuclear Law,* OECD Publishing, Paris, pp. 87-91.
91. See Léger, M. (2023), "*Le nucléaire, la guerre et le droit de la guerre*", *Revue générale nucléaire,* Vol. Summer 2023, No. 2, French Nuclear Energy Society (SFEN), Paris.
92. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293, entered into force 24 Oct. 1996 (CNS).
93. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997), IAEA Doc. INFCIRC/546, 2153 UNTS 357, entered into force 18 June 2001 (Joint Convention).
94. Léger, M. (2023), *supra* note 91. On these conventions, he mentions that "*elles n'évoquent pas les situations de guerre ou de conflict armé*" [they do not refer to situations of war or armed conflict], although he acknowledges that the preamble of the CNS states that a safety culture should be always promoted.
95. Tonhauser, W., A. Wetherall and L. Thiele (2022), "International legal framework on nuclear safety: Development, challenges and opportunities", in Nick, K.S. and S.G. Burns (eds.), *Principles and Practice of International Nuclear Law,* OECD Publishing, Paris, p. 123.
96. CNS, *supra* note 92, Articles 2(1) and 3.
97. The unilateral declaration upon signature was made in the following terms:
    > India continues to believe that a Convention on Nuclear Safety should cover all nuclear power plants, civil and military. We note, however, that the present convention covers only civilian nuclear power plants. We hope that the safety aspects of nuclear power plants in the military domain would also be given attention, to achieve comprehensive nuclear safety worldwide.

    Available at: https://iaea.org/sites/default/files/22/06/nuclearsafety_reserv.pdf.

The Joint Convention is the first and only legally binding instrument focused on spent fuel and radioactive waste management safety and, contrary to the provisions contained in the CNS, the Joint Convention is not limited to civilian installations. Apart from dealing with spent fuel resulting from the operation of civilian nuclear reactors and with radioactive waste resulting from civilian applications, it also applies to spent fuel and radioactive waste from military and defence programmes, provided such materials are transferred permanently to and managed within exclusively civilian programmes, or where declared as spent fuel or radioactive waste for the purpose of the Convention by the state party concerned.[98]

The absence of references to war, armed conflict or belligerent occupation is also noticeable in nuclear-safety-related soft law instruments. At the crossroads between nuclear safety and nuclear security, the Code of Conduct on the Safety and Security of Radioactive Sources, approved by the IAEA Board of Governors on 8 September 2003, does not mention situations of war or armed conflict, and the Code "does not apply to radioactive sources within military or defence programmes".[99] In particular, the situation of radiological sources in countries that are facing international or internal armed conflicts has been the object of recent discussion.[100]

To summarise, the legally binding instruments (hard law) and the IAEA recommendations and guidelines (soft law), both on nuclear security and safety, do not apply to situations resulting from armed conflicts. As persuasively postulated by researchers Darya Dolzikova and Dr Jack Watling, none of these legal texts "have been designed for express application in a military conflict scenario or to respond to the full range of threats and challenges that emerge in such a scenario".[101]

In practical terms these sets of exclusions are problematic. Despite facing a full-fledged war on its soil, it cannot be contested that Ukraine is still bound by the fundamental principles of nuclear safety regarding its nuclear power plants, as established in the treaties previously discussed.[102] However, an unmitigated application of safety instruments to a case of military occupation, essentially ignoring the reality of the circumstances, generates impractical obligations. In the latest review meeting of the state parties to the CNS, it was particularly worrisome to notice that Ukraine expressed its inability to fully comply with relevant obligations, as explained in the Summary Report elaborated by the President of the meeting:

> One Contracting Party informed that it could only partially fulfil its commitments and responsibilities under the Convention with respect to ensuring nuclear safety in its installations due to the ongoing armed conflict in the country.[103]

98. Joint Convention, *supra* note 93, Article 3(3).
99. IAEA (2004), *Code of Conduct on the Safety and Security of Radioactive Sources*, IAEA Doc. IAEA/CODEOC/2004, IAEA, Vienna, p. 4.
100. This concern for the protection of radiological sources in times of war was the object of a recent workshop organised by NEA and the Norwegian Radiation and Nuclear Safety Authority, "Radiological Protection during Armed Conflict: Improving Regulatory and Operational Resilience", that took place in Oslo on 22-24 November 2023. The full programme of the event can be found here: www.oecd-nea.org/rp-armed-conflict-conference.
101. Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 24.
102. The language used by the IAEA is related to the need to recover in practice the normal situation of these facilities. The reports insist in the responses given to Ukraine's requests to provide technical support and assistance "in re-establishing, *as appropriate*, a sound nuclear safety and security regime at its nuclear facilities and in activities involving radioactive sources" (italics added). See Board of Directors of the IAEA (2024), "Nuclear Safety, Security and Safeguards in Ukraine", Report by the Director General, GOV/2024/30, summary, available at: https://iaea.org/sites/default/files/documents/gov2024-30.pdf.
103. Contracting Parties to the Convention on Nuclear Safety (2023), "Summary Report of the Joint 8th and 9th Review Meeting of the Contracting Parties to The Convention on Nuclear Safety", CNS/8&9RM/2023/08, para. 30, IAEA, Vienna. Country Group discussions during the Review Meeting explicitly addressed the Ukrainian situation and the need to share experiences regarding the management of extraordinary circumstances such as armed conflict. See also Thiele, L. (2023), "The Convention on Nuclear Safety", slideshow presented at the ISNL, NEA and University of Montpellier, Montpellier, France, 22 Aug. 2023.

The same report identifies the reasons behind this difficulty in compliance: the staffing situation at the ZNPP is "complex and challenging", with Rosatom contracts under approval and a decreasing number of local employees who are working under the direction of plant management appointed by Russia.[104]

The current scope of nuclear safety instruments cannot cover the particular challenges generated by the occupation of the ZNPP. It should then be asked whether the existing protection systems and regulatory frameworks that the international communities designed to ensure nuclear safety are able to cope with the phenomenon of war. Can the applicable instruments adequately maintain an efficient capacity to monitor and manage nuclear and radiological protection? How is the implementation of hard law and soft law instruments in this field weakened as a result of the outbreak of an armed conflict, and how do they apply in cases in which nuclear facilities or radioactive materials are under the provisional control of an occupying state not bound, in normal circumstances, to exercise vigilant control over these activities?

3. War in nuclear liability instruments

It is a well-known principle in nuclear law that, due to the unusual risks associated with the activity, the operator of a nuclear installation[105] is strictly liable for damage to third parties resulting from a nuclear incident occurring either at that installation or during the course of transport of nuclear substances to or from that installation.[106] It should be also mentioned that operators will be held liable even if the incident is caused by force majeure, and only under certain very exceptional circumstances can they be exempted from liability.[107] An armed conflict is one such circumstance.[108]

The original Paris Convention sought to establish a legal regime to ensure adequate compensation to the public for damage resulting from a nuclear accident, without encumbering the nuclear industry with insurmountable financial burdens.[109] It exonerates the operator in cases of armed conflict in the following terms: "The operator shall not be liable for damage caused by a nuclear incident directly due to an act of armed conflict, hostilities, civil war, insurrection …".[110] While preserving the overall principle, the 2004 Protocol to Amend the Paris Convention made a slight change in this text, stating: "The operator shall not be liable for nuclear damage caused by a nuclear incident directly due to an act of armed conflict, hostilities, civil war, or insurrection".[111] In turn, the Brussels

104. Contracting Parties to the Convention on Nuclear Safety (2023), *supra* note 103, para. 40.
105. An "operator" can be defined as "any person, organization, or government entity licensed or authorised to undertake the operation of a nuclear facility". IAEA (2011), *supra* note 82; see also NEA (2023), *Glossary of Nuclear Legal Terms, Acronyms and Terminology,* 14th edition, OECD Publishing, Paris, p. 99.
106. Schwartz, J.A. (2022), "Liability and compensation for third party damage resulting from a nuclear incident", in Nick, K.S. and S.G. Burns (eds.), *Principles and Practice of International Nuclear Law,* OECD Publishing, Paris, p. 411.
107. NEA (1994), *Liability and Compensation for Nuclear Damage: An International Overview*, OECD Publishing, Paris, p. 130.
108. Stoiber, C., et al. (2003), *Handbook on Nuclear Law*, IAEA, Vienna, p. 113.
109. *Ibid.*, p. 420
110. Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1960), 1519 UNTS 329 (Paris Convention or PC), Article 9.
111. Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (2004), entered into force 1 Jan. 2022 (2004 Paris Protocol). It should be added that both Germany and Switzerland made reservations to Article 9. Germany stated that "in respect of nuclear incidents occurring in the Federal Republic of Germany, (…) the operator shall be liable for damage caused by a nuclear incident directly due to an act of armed conflict, hostilities, civil war, insurrection or a grave natural disaster of an exceptional character". NEA (2024), *Paris Convention: Status of Reservations, Declarations and Notifications*, OECD Publishing, Paris, p. 3. Quite similarly, in its reservation on Article 9, the Swiss

Supplementary Convention, which provides for additional compensation for damage (on the basis of state funds from the installation state and other contracting parties) in situations where the liability coverage of the operator under the Paris Convention is inadequate or insufficient, does not reference any exoneration provisions.[112]

Quite expectedly, the 1963 Vienna Convention on Civil Liability for Nuclear Damage (Vienna Convention), which is part of the IAEA regime, included an identical provision to the one included in the Paris Convention, excluding liability in the case of "armed conflict, hostilities, civil war or insurrection".[113] The 1997 Convention on Supplementary Compensation for Nuclear Damage (CSC), likewise, provides exoneration in the case of a direct link between the incident in question and "an act of armed conflict hostilities, civil war or insurrection.[114]

As explained in the Revised *Exposé des Motifs* of the Revised Paris Convention, the idea behind such an exoneration is to avoid generating responsibility on the operator for activities that are the result of state decisions:

> First, an operator will be exonerated from liability for damage caused by a nuclear incident directly due to certain disturbances of an international character, namely acts of armed conflict and hostilities, or of a political nature, namely civil war and insurrection, on the grounds that all such matters are the responsibility of the State as a whole. An operator is not, however, exonerated from nuclear damage caused by a nuclear incident directly due to an act of terrorism, whatever its scale, since terrorist acts are not covered by the events enumerated in Article 9.[115]

Terrorism, as stated in the different conventions, does not fall within the scope of the exoneration. In this sense, since terrorism is conceived as an act committed outside a situation of military hostilities or situations of war, it cannot be assimilated to a war-like event.[116] From a textual interpretation, only exonerations on the grounds of an interstate armed conflict or an internal politically motivated uprising (as well as a major catastrophe originating in nature itself) are accepted, and only provided that the nuclear damage in question is a direct consequence of those incidents.[117]

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reservation makes it clear that "in respect of nuclear incidents occurring in its territory and involving the liability of a Swiss operator of a nuclear installation, (…) such operator is liable for damage caused by a nuclear incident if that incident is directly due to an act of armed conflict, hostilities, civil war or insurrection". *Ibid*, p. 5 (unofficial translation).

112. Convention of 31st January 1963 Supplementary to the Paris Convention of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1963), 1041 UNTS 358 (Brussels Supplementary Convention or BSC).
113. Vienna Convention on Civil Liability for Nuclear Damage (1963), IAEA Doc. INFCIRC/500, 1063 UNTS 266, entered into force 12 Nov. 1977 (Vienna Convention), Article IV(3)(a).
114. Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 ILM 1473, entered into force 15 April 2015 (CSC), Article 3(5)(a).
115. NEA (2024), "Revised Exposé des Motifs of the Paris Convention as Amended by the Protocols of 1964, 1982 and 2004", 7 June 2024, NEA/NLC/DOC(2020)1/REV1/FINAL, p. 39, para. 80(a).
116. Horbach, N.L.J.T., O.F. Brown and T.V. Borre (2002), "Terrorism and Nuclear Damage Coverage", *Journal of Energy & Natural Resources Law*, Vol. 20, No. 3, Taylor & Francis, London, pp. 231-269. The text provides a thorough study of the history of these provisions. Of course, the commissioning of "acts of terror" by military forces or armed groups as a method of combat within an armed conflict are excluded because such does not fall within this reference to "terrorism".
117. *Ibid*., p. 242. It is interesting to note that the term "hostilities", which is found in the treaties, replaced the original word "invasion" in the Paris Protocol of 1964, so as to harmonise the language with the Vienna Convention; even though the drafters of the text did not distinguish between "invasion" and "hostilities", they consider this last noun "to be wider in the sense that 'invasion' suggests military troops/ships or aircraft on a foreign territory, whereas 'hostilities' could take place with no actual physical presence in the foreign country". *Ibid*. p. 244.

So how do these provisions apply in the case of the Russian-Ukrainian war? The applicable law for addressing questions related to liability for the consequences of nuclear incidents is the Vienna Convention, which was accessed by Ukraine in 1996 and ratified by Russia in 2005.[118] As previously explained, the Ukrainian government appointed Energoatom as the operator of its plants. Thus, taking into account the provisions of the treaty regarding legal channelling, in principle Energoatom should be considered absolutely and solely liable for any damage "caused by a nuclear incident" in its installation (Article IV(1)), but the operator would be exonerated if that damage is "directly due" to an act of armed conflict or hostility, as explicitly specified in Article IV(3)(a)).[119]

It seems clear that in cases where the operator is exonerated from liability, it is expected that the state itself will assume responsibility for compensating any nuclear damage incurred. However, as addressed later in the article, the legal discussion on state responsibility becomes complicated when taking into account that Russian forces are now controlling the ZNPP, since – according to the Vienna Convention – the provisions included in the treaty "shall not be construed as affecting the rights, if any, of a Contracting Party under the general rules of public international law in respect of nuclear damage".[120] The next Section intends to show that these "general rules" should be understood as including the relevant provisions of international humanitarian law, including in particular the legal regime applicable to belligerent occupation.[121]

4. A new framework: The IAEA seven pillars and five principles

The importance of addressing the problem motivated, many years ago, several interesting IAEA General Conference resolutions.[122] Already in 1990, the General Conference became "aware of the fact that an armed attack on a nuclear installation could result in radioactive releases with grave consequences within and beyond the boundaries of the state which has been attacked" and was "convinced of the need to prohibit armed attacks on nuclear installations from which such releases could occur and of the urgency of concluding an international agreement in this regard", so it recognised that "attacks or threats of attack on nuclear facilities devoted to peaceful purposes could jeopardize the development of nuclear energy".[123]

Even before that, in 1985, in a resolution dealing with the "protection of nuclear installations devoted to peaceful purposes against armed attacks", it had been noted that "any armed attack on and threat against nuclear facilities devoted to peaceful purposes constitutes a violation of the principles of the United Nations Charter, international law and the Statute of the Agency".[124] More recently, the same language was used in 2009 in an IAEA resolution on the "[p]rohibition of armed attack or threat of attack against nuclear installations, during operation or under construction".[125] Similarly, Action 64 of the Action Plan adopted at the aftermath of the 2010 Review Conference of the Parties to the Treaty

118. Vienna Convention, *supra* note 113.
119. Morgandi, T. and B. Betin (2022), "Legal Implications of the Military Operations at the Chernobyl and Zaporizhzhya Nuclear Power Plants", EJIL:Talk!, https://ejiltalk.org/legal-implications-of-the-military-operations-at-the-chernobyl-and-zaporizhzhya-nuclear-power-plants/.
120. Vienna Convention, *supra* note 113, Article XVIII.
121. *Ibid.*
122. Carlson, J. (2022), *supra* note 12, p. 4. These "texts directly focus on the protection of nuclear installations devoted to peaceful purposes against armed attacks and the prohibition of armed attack or threat of attack against nuclear installations during operation or under construction". Alkış, A. (2022), "Nuclear Security during Armed Conflict. A contribution to the Nuclear Security Policy Menu series", *Stimson Policy Memo*, available at: https://stimson.org/2022/nuclear-security-during-armed-conflict. See also Alkış, M.A. (2023), *supra* note 53, pp. 8-9.
123. IAEA, General Conference (1990), GC(XXXIV)/RES/533, Oct. 1990, para. 1.
124. IAEA, General Conference (1985), GC(XXIX)/RES/444, Sept. 1985, para. 2.
125. IAEA, General Conference (2009), GC(53)/DEC/13, Sept. 2009.

on the Non-Proliferation of Nuclear Weapons (NPT)[126] called on states to abide by that decision related to the prohibition of armed attacks against civilian nuclear facilities.[127]

During the introductory statement of a meeting of the IAEA Board of Governors on 2 March 2022, the Director-General of the IAEA announced "seven indispensable pillars of nuclear safety and security" during armed conflicts, outlined to address the exceptional implications of the situation in Ukraine.[128] These "common-sense" pillars have been drafted to cover potential flaws in the application of existing hard law and soft law during extreme moments of violence. They are:

1. The physical integrity of the facilities – whether it is the reactors, fuel ponds or radioactive waste stores – must be maintained.
2. All safety and security systems and equipment must be fully functional at all times.
3. The operating staff must be able to fulfil their safety and security duties and have the capacity to make decisions free of undue pressure.
4. There must be secure off-site power supply from the grid for all nuclear sites.
5. There must be uninterrupted logistical supply chains and transportation to and from the sites.
6. There must be effective onsite and offsite radiation monitoring systems and emergency preparedness and response measures.
7. There must be reliable communications with the regulator and others.[129]

These seven pillars, derived from IAEA safety standards and nuclear security guidance, are aimed at ensuring three main safety functions widely endorsed by the international community: containment, control and cooling.[130] The importance of these principles can be explained by the fact that nuclear installations are not designed for a warfare scenario, although its defence strategy is much more robust than the one used in other civilian structures. Whereas threats posed by terrorist groups are addressed in the current safety and security standards, it should be noticed that nuclear power plants are not prepared to withstand intense and continuous military bombardment.

Concerning security, these pillars have gone beyond the traditional non-state-actor approach, since they are intended to deal with the disruption of the normal operation of nuclear facilities produced by military action and hostilities conducted by states.[131] Nevertheless, in spite of the widespread support for these pillars,[132] it should be noted that

126. Treaty on the Non-Proliferation of Nuclear Weapons (1968), IAEA Doc. INFCIRC/140, 729 UNTS 169, entered into force 5 Mar. 1970 (NPT).
127. According to its text, "[t]he Conference calls upon all States to abide by the decision adopted by consensus at the IAEA General Conference on 18 September 2009 on prohibition of armed attack or threat of attack against nuclear installations, during operation or under construction." See 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Final Document, Vol. I, New York, NPT/CONF.2010/50 (Vol. I), p. 29.
128. IAEA, Press Release, "IAEA Director General Grossi's Initiative to Travel to Ukraine IAEA", Press Release 21/2022 (4 Mar. 2022).
129. IAEA (2023), "Nuclear Safety, Security and Safeguards in Ukraine. February 2022-February 2023)", IAEA, Vienna, Feb. 2023, pp. 5-8.
130. Fedchenko, V. (2023), *supra* note 28, p. 9.
131. *Ibid*.
132. For instance, the NEA fully supported the pillars. Director-General William D. Magwood, IV considered that "[i]t is essential that nuclear facilities be operated and managed safely and securely under all conditions". NEA (2022) "NEA supports the IAEA 7 pillars of nuclear security and safety", NEA News Brief, https://oecd-nea.org/jcms/pl_66360/nea-supports-the-iaea-7-pillars-of-nuclear-security-and-safety.

the seven pillars are a novel framework that creates no legally binding responsibilities upon IAEA member states.[133]

Along with the seven pillars, the Director-General of the IAEA also elaborated five concrete principles to prevent a nuclear accident and ensure the integrity of the ZNPP:

1. no attack of any kind from or against the plant, targeting in particular the reactors, spent fuel storage, other critical infrastructure or personnel;
2. no use of the plant as storage nor as a base for heavy weapons or military personnel that could be used for an attack;
3. no placement of off-site power – which must be available and secure at all times – at risk;
4. the protection of all structures, systems and components essential to the plant's safe and secure operation from attacks or acts of sabotage; and
5. no action which undermines these principles.[134]

Concerning these pillars and principles, even in the absence of disagreement with the recommendations, the question remains unanswered: Who should be considered responsible for their implementation in cases where *de jure* and *de facto* control do not lie within the same authority? In particular, and bearing in mind the reality of the ZNPP with Russian managers and Ukrainian employees, how shall the relevant standards regarding nuclear security and nuclear safety be applied in the case of the occupation or annexation of a nuclear facility?[135]

In a resolution adopted on 17 November 2022, the IAEA Board of Governors explicitly affirmed that the Russian occupation of Ukraine shall not be legally recognised, stating that the Board:

> [d]eplores and does not recognize, consistent with resolution A/RES/ES-11/4 adopted by the UN General Assembly on 12 October, the Russian Federation's attempts to take ownership of Ukraine's Zaporizhzhya Nuclear Power Plant and its attempted illegal annexation of the Ukrainian territory on which the plant is located and calls upon the Russian Federation to immediately abandon its baseless claims of ownership of the plant.[136]

In a practical sense, the IAEA's resolution does not attribute responsibility to Russia in relation to the safety and the security of the occupied nuclear power plant. On the contrary, the only obligation created for Russia is to put an end to the occupation, so as to allow Ukraine to be able to comply with its obligations as the installation state. Further the Board called upon Russia to:

> immediately withdraw its military and other personnel from the Zaporizhzhya Nuclear Power Plant, in order for the competent Ukrainian authorities to regain full control of the plant to ensure its safe and secure operation, and in order for the Agency to fully and safely conduct its safeguards verification activities, in accordance with Ukraine's Comprehensive Safeguards Agreement, entered into pursuant to the Treaty on the Non-Proliferation of Nuclear Weapons and the Statute, and the Additional Protocol thereto.[137]

133. Alkış, A. (2022), *supra* note 122.
134. IAEA Director General Statement to the United Nations Security Council (30 May 2022), available at https://iaea.org/newscenter/statements/iaea-director-general-statement-to-united-nations-security-council (accessed 25 Sept. 2024).
135. Fedchenko, V. (2023), *supra* note 28, p. 11.
136. IAEA Board of Governors Resolution, "The safety security and safeguards implications of the situation in Ukraine", IAEA Doc. No. GOV/2022/71, adopted on 17 Nov. 2022, para. 2.
137. *Ibid.*, para. 4.

To sum up, the existing normative order in the field of INL, in spite of the growing number of instruments in the last decade, does not appear to adequately address the exceptional risks to nuclear installations and materials in times of war, hostilities or internal unrest. In the case of belligerent occupation, there is no legal architecture in place that holds an occupying state responsible for damage caused by nuclear power plants, even where the damage is directly attributable to that state's actions.[138] The insufficiency of the legal framework produced the need for the IAEA to conceive basic rules – such as the seven pillars and the five principles – that ought to be taken into account by the parties of an armed conflict where there are nuclear facilities that could be under threat or danger.

III. The regulation of nuclear facilities under international humanitarian law

Also known as the law of armed conflict, IHL is a self-contained normative regime of public international law encompassing a set of rules (considered as minimum standards of humanity) to limit the negative consequences of armed conflicts.[139] Its main purpose is to ensure the protection of those persons who do not (or no longer) take direct part in hostilities, as well as to restrict the available means and methods of warfare that parties to a conflict may employ.[140] Based on a plurality of formal hard law sources (including treaties and customs) and soft law instruments, IHL is intertwined with defence policy and military operational considerations.[141] In general terms, IHL provisions offer "a few layers of legal protection" in cases of armed conflict, sparing victims and protecting civilian objects and facilities that are not legitimate targets of attack.[142]

Regarding nuclear activities, in times of armed conflict IHL moves beyond the scope of the traditional nuclear security framework because rules regarding terrorism or the commission of illegal criminal offences by individuals differ from a legal *corpus* such as IHL that regulates, in general, the conduct of hostilities and their consequences.[143] Taking into account the situation of the ZNPP, this section examines the relevant IHL instruments that contain explicit references to nuclear facilities, in order to rethink the respective rights and obligations of the parties to the conflict. In this sense, this article argues that to understand the complexities of those exceptional scenarios in which nuclear facilities are situated in a context where there is military confrontation, the nuclear law regime (focused on security, safety and liability for damages) should be complemented by IHL rules, principles and criteria.[144]

One of the main principles of IHL is "distinction". It refers to the ability to identify and differentiate between the multiple actors involved in a battlefield.[145] Individuals not participating in the conduct of hostilities should be spared and protected, since they are

138. It is significant that the Conference of the Parties to the A/CPPNM, reiterated that:
> … the responsibility for nuclear security within a State *rests entirely with that State*, and noted the responsibility of each State, in accordance with its respective national and international obligations, to maintain at all times effective and comprehensive nuclear security of nuclear material and facilities used for peaceful purposes…

Conference of the Parties to the A/CPPNM (2022), "2022 Conference of the Parties to the Amendment to the Convention on the Physical Protection of Nuclear Material: Outcome Document", ACPPNM/RC/2022/4, para. 20 (emphasis added).

139. Solis, G.D. (2010), *The Law of Armed Conflict. International Humanitarian Law in War,* Cambridge University Press, Cambridge, pp. 20-22.
140. Melzer, N. (2016), *International Humanitarian Law: A Comprehensive Introduction,* International Committee of the Red Cross (ICRC), Geneva, p. 17.
141. Blank, L. and G.P. Noone (2019), *International Law and Armed Conflict. Fundamental Principles and Contemporary Challenges in the Law of War,* 2nd ed., Wolters Kluwer, New York, p. xxiii.
142. Fedchenko, V. (2023), *supra* note 28, p. 5.
143. *Ibid.* p. 19.
144. Mapako, K. (2022), *supra* note 80, p. 3, has provided useful arguments to justify the need for a closer relationship between nuclear security law and IHL.
145. Blank, L. and G.P. Noone (2019), *supra* note 141, p. 400.

considered unlawful targets.[146] This, of course, includes civilians, but it also encompasses combatants who are no longer fighting. A similar distinction should be implemented regarding facilities or objects: it is only possible to capture or destroy "military objectives", meaning those objects which, by their nature, location, purpose or use, make an effective contribution to military action, and whose partial or total destruction, capture or neutralisation, in the circumstances ruling at the time, offers a definite military advantage.[147] In an opposite sense, all other objects are considered to be "civilian" and, therefore, shall not be the object of attack or of reprisals.[148] In case of doubt on the military or civilian status of an object, IHL clearly considers that the object shall be presumed not to be used to make an effective contribution to military action.[149] This means that, when doubt exists about the potentially civilian nature of the presumed target, no attack against that object should be launched.

These principles are enshrined in customary international law and are applicable, as such, to all forms of armed conflict. Under IHL instruments, two types of armed conflict can be traditionally identified:[150] (1) armed conflicts of an international character (IAC), where two or more high contracting parties (i.e. states) fight against each other through their regular armed forces,[151] and (2) armed conflicts not of an international character (NIAC), that take place in the territory of one state and in which at least one of the parties involved is non-governmental.[152] Since the specific binding conventional rules for both types of conflict differ, it is necessary to discuss these situations separately.

1. Nuclear facilities in times of international armed conflict

IACs are regulated under the four 1949 Geneva Conventions (GC), as well as the 1977 Additional Protocol I (AP-I).[153] Regarding nuclear installations that are used for civilian purposes, it seems clear that their protection is justified under the general framework that prohibits any attack against those objects that are not military objectives. But in the specific case of nuclear power plants, Article 56 of AP-I explicitly asserts in the relevant passages that:

> 1. Works or installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, shall not be made the object of attack, even

146. Melzer, N. (2016), *supra* note 140, p. 85.
147. Additional Protocol I to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (1977), entered into force 7 Dec. 1978, 1125 UNTS 3 (AP-I), Article 52(2) (AP-I).
148. *Ibid.*, Article 52(1).
149. *Ibid.*, Article 52(3).
150. For the classical view on classification, see for example Green, L.C. (1993), *The contemporary law of armed conflicts,* Manchester University Press, Manchester, pp. 52-66.
151. According to Common Article 2(1) of the four 1949 Geneva Conventions (CG), adopted 12 Aug. 1949, IACs involve "all cases of declared war or of any other armed conflict which may arise between two or more of the High Contracting Parties, even if the state of war is not recognized by one of them". On the practical complexities of grey areas in the legal classification of armed conflicts, see Vité, S. (2009), "Typology of armed conflicts in international humanitarian law: legal concepts and actual situations", *International Review of the Red Cross*, Vol. 91, No. 873, Cambridge University Press, Cambridge, pp. 69-94.
152. Common Article 3 of the four 1949 Geneva Conventions (CG) is the only provision in those treaties dealing specifically with the rights and obligations of the parties to a NIAC. In 1977, a supplementary instrument was adopted to also deal with NIAC, although the broad notion of a NIAC has been restricted for this later treaty to apply. Protocol Additional to the Geneva Conventions of 12 August 1949 and Relating to the Protection of Victims of Non-International Armed Conflicts, entered into force 7 Dec. 1978, 1125 UNTS 609 (AP-II). According to Article 1 of, it only covers those NIACs in which the armed forces of a state fight against "dissident armed forces or other organized armed groups which, under responsible command, exercise such control over a part of its territory as to enable them to carry out sustained and concerted military operations and to implement this Protocol".
153. Melzer, N. (2016), *supra* note 140, pp. 54-55.

where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population. Other military objectives located at or in the vicinity of these works or installations shall not be made the object of attack if such attack may cause the release of dangerous forces from the works or installations and consequent severe losses among the civilian population.

2. The special protection against attack provided by paragraph 1 shall cease: (…)

(b) for a nuclear electrical generating station only if it provides electric power in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support; (…).[154]

Adopted by consensus after a long discussion within the Working Group over a draft originally elaborated by the ICRC,[155] the text of Article 56 has been criticised for being confusing[156] or potentially troublesome.[157] This is due to the fact that, according to the provision, a nuclear power plant could be considered a legitimate target, and therefore an attack not necessarily in violation of AP-I, provided certain criteria are met. Per the article, protection of a nuclear power plant ceases if the attack is the only feasible way to terminate significant and direct support of military operations.[158] However, the plant can still be deemed an illegitimate target if the foreseen attack "may cause the release of dangerous forces and consequent severe losses among the civilian population", in which case it should be aborted. According to the 1987 ICRC Commentary to AP-I, the adjective "severe" here is equivalent to "important" or "heavy" and should be assessed on the basis of common sense and in good faith.[159]

Although some experts argue it would have been better to provide absolute protection for nuclear power plants, the text was negotiated to address the concerns of the contracting states and the result is that attacks on nuclear power plants are not *per se* violations. Rather the AP-I obliges state parties involved in IAC to conduct a risk assessment that considers the possible release of dangerous forces and subsequent severe civilian losses, prior to launching a direct attack on a nuclear power plant[160] or taking offensive or defensive military action in the vicinity of a nuclear power plant.[161]

154. AP-I, *supra* note 147, Article 56. The following sections of the article include references to the protection of the civilian population (3), the prohibition of reprisals against these installations (4), the prohibition of locating military objectives in the vicinity of those facilities, unless they have the sole purpose of defending them (5), the importance of concluding further agreements for additional protection (6) and the identification of the objects with a special sign (7).
155. Lamm, V. (2003), *supra* note 30, pp. 29-30.
156. On the United States' position against the text, see Carnahan, B.M. (1992), "Protecting Nuclear Facilities from Military Attack: Prospects after the Gulf War", *American Journal of International Law,* Vol. 86, No. 3, Cambridge University Press, Cambridge, pp. 524-541.
157. Carlson, J. (2022), *supra* note 12, p. 2.
158. *Ibid*.
159. Sandoz, Y., C. Swinarski and B. Zimmerman (1987) (eds.), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949*, ICRC, Geneva, p. 669, para. 2154.
160. Morgandi, T. and B. Betin (2022), *supra* note 119. See also Lamm, V. (2003), *supra* note 30, which explains the reasons why research reactors should be included within the installations containing dangerous forces.
161. See Bettati, M. (2016), *Le Droit de la guerre,* Odile Jacob, Paris, p. 92; Przybylak, J. (2023), *supra* note 4, p. 6. See Dienelt, A. (2022), "How Are Nuclear Power Plants Protected by Law During War?", Völkerrechtsblog, https://voelkerrechtsblog.org/how-are-nuclear-power-plants-protected-by-law-during-war/. See also ICRC (2022), "How humanitarian law applies to armed conflict and nuclear power plants", ICRC, https://icrc.org/en/document/how-ihl-applies-to-conflict-nuclear-power-plants.

In the specific case of the Russian-Ukrainian war, this article is key to understanding the legal obligations related to the ZNPP. Since both states are party to AP-I,[162] to examine the legality of Russia's military action against the nuclear power plant, it should be asked whether the ZNPP provided electric power in "regular, significant and direct support" of Ukraine's military operations. In this sense, it is not sufficient to consider that a plant provides electricity both to civilians and to military forces to justify the attack.[163] According to most scholars, the Russian assault on the ZNPP was a violation of the AP-I[164] because, even if there are no radioactive release or losses among the civilian population, the responsible commanders could not have reasonably determined, with any degree of certainty, that such effects would not result from the attack.[165]

Supplementing other regulations on nuclear safety and nuclear security, Article 56 specifically refers to situations in which a nuclear power plant is the subject of an attack in the context of an IAC. When consolidating this regulation, only "nuclear power generating stations" are explicitly mentioned.[166] Hence, AP-I does not refer to other related infrastructures that are the object of several INL instruments, such as spent fuel storage facilities or research reactors.[167] There is also an open question as to whether shut down nuclear power plants, such as Chernobyl, are included. The ambiguity surrounding the inclusion of these installations is significant, as facilities under decommissioning still contain dangerous forces, such as spent nuclear fuel in storage, the release of which could be potentially harmful to local populations and the environment.[168]

2. Nuclear facilities in times of non-international armed conflict

Additional Protocol II to the 1949 Geneva Conventions (AP-II), also adopted in 1977,[169] extended the rules of IHL to non-international conflicts, which had previously only been regulated by one article common to all four GCs of 1949, Article 3. Focused on internal wars – situations of conflict that are far more frequent than IACs – AP-II includes fewer substantial obligations than the GCs and AP-I. However, as with AP-I, there is a specific provision dealing with facilities that could eventually release dangerous forces if destroyed or attacked:

> Works or installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, shall not be made the object of attack, even where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population.[170]

162. According to an official press release, "… pursuant to Executive Order 494 of the President of the Russian Federation dated October 16, 2019, the Russian Embassy in the Swiss Confederation sent a note to the Federal Department of Foreign Affairs on the withdrawal of the USSR's declaration accepting the competence of the International Fact-Finding Commission formed under Protocol I". The Ministry of Foreign Affairs of the Russian Federal, Press Release, "Press release on the withdrawal of the declaration to Protocol Additional to the 1949 Geneva Conventions and relating to the protection of victims of international armed conflicts (Protocol I) on Russia's acceptance of the competence of the International Fact-Finding Commission" (22 Oct. 2019), available at: www.mid.ru/en/foreign_policy/news/1473198 (accessed 9 Sept. 2024).
163. Moore, G.M. (2022), *supra* note 24.
164. Dannenbaum, T. (2022), "The Attack at the Zaporizhzhia Nuclear Plant and Additional Protocol I", *Articles of War*, Lieber Institute West Point, https://lieber.westpoint.edu/attack-zaporizhzhia-nuclear-plant; Duliba, Y. (2022), *supra* note 4, p. 321; Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 17.
165. Zeith, A. and E. Giorgou (2022), "Dangerous Forces: The Protection of Nuclear Power Plants in Armed Conflict"', ICRC: Humanitarian Law and Policy Blog, https://blogs.icrc.org/law-and-policy/2022/10/18/protection-nuclear-power-plants-armed-conflict/.
166. AP-I, *supra* note 147, Article 56.
167. Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 25.
168. Morgandi, T. and B. Betin (2022), *supra* note 119.
169. AP-II, *supra* note 152.
170. *Ibid.*, Article 15.

As informed in the 1987 ICRC Commentary to this provision, however, "unlike Article 56 of Protocol I (…), [Article 15] expresses the general principle without providing for any exceptions, which means that the rule is stated more categorically".[171] This means that, whenever a state in whose territory a NIAC is taking place has nuclear power plants under its jurisdiction, these plants cannot be the subject of attack. Similar to the situation of these installations in IACs, the article here is not ideal, as it focuses exclusively on nuclear power plants and excludes other possible nuclear facilities where radioactive materials or sources are kept.

3. Nuclear facilities under customary international humanitarian law

In addition to the conventional provisions indicated in the APs to the GCs, the ICRC has also identified a state practice accompanied by *opinio juris* that has endorsed the emergence of an international customary legal rule, stating:[172]

> Particular care must be taken if works and installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, and other installations located at or in their vicinity are attacked, in order to avoid the release of dangerous forces and consequent severe losses among the civilian population.

Interestingly, the nature of this customary rule is different from the text of the conventional provisions valid both for IACs and NIACs. Without making any distinction in the type of conflict where this norm applies, the intention behind customary international law is not to prohibit the attack, but rather to instruct states to take "particular care" when carrying out such operations.[173] According to the ICRC study, even if the conventional provisions have been expressly limited to nuclear electrical generating stations, "the considerations explained above should equally apply to other installations, such as chemical plants and petroleum refineries".[174] Following this rationale, the scope of the customary rule could be extended in order to cover other facilities where radioactive material is stored.

As previously said, this rule is based upon existing state practice, including that of Russia, since the country had accepted the prohibition against targeting of military facilities in the 1990 Union of Soviet Socialist Republics (USSR) Military Manual and reinforced it through the adoption of the rules of application of IHL in the protection of especially dangerous goods.[175]

4. Nuclear facilities in instruments related to nuclear weapons and disarmament

Other treaties, related to nuclear weapons proliferation and disarmament, are also relevant to this discussion. A prohibition of attacks against nuclear power plants, for example, is included in a general provision of the Pelindaba Treaty that created a nuclear-weapon-free zone (NWFZ) in the African continent,[176] providing: "Each Party undertakes not to take (…) any action aimed at an armed attack by conventional or other means against nuclear installations in the African nuclear-weapon-free zone".[177]

171. Sandoz, Y., C. Swinarski and B. Zimmerman (1987) (eds.), *supra* note 159, p. 1462.
172. Henckaerts, J.-M. and L. Doswald-Beck (2005), *Customary International Humanitarian Law* Vol. 1, Rules, ICRC, Geneva, pp. 139-142.
173. Sethi, M. (2023), "Nuclear Power Plants in War Zones: Risks and Remedies", Institute of Peace and Conflict Studies, www.ipcs.org/comm_select.php?articleNo=5845.
174. Henckaerts, J.M. and L. Doswald-Beck (2005), *supra* note 172, pp. 141-142.
175. Dolzikova, D. and J. Watling (2023), *supra* note 5, p. 26.
176. On this treaty as a historical landmark for Africa, see Ogunbanwo, S. (1996), "The Treaty of Pelindaba: Africa Is Nuclear-Weapon-Free", *Security Dialogue*, Vol. 27, No. 2, Peace Research Institute, Oslo, pp. 185-200.
177. African Nuclear-Weapon-Free Zone Treaty (1996), 35 I.L.M. 698, entered into force 15 July 2009 (Pelindaba Treaty).

Interestingly, this article does not qualify or limit the type of nuclear facility that falls under the prohibition. Much larger in scope than conventional rules of IHL, the Pelindaba treaty specifically defines "nuclear installation" as:

> a nuclear-power reactor, a nuclear research reactor, a critical facility, a conversion plant, a fabrication plant, a reprocessing plant, an isotope separation plant, a separate storage installation and any other installation or location in or at which fresh or irradiated nuclear material or significant quantities of radioactive materials are present.[178]

The broad scope of protected facilities included in the Pelindaba Treaty helps to justify a comprehensive interpretation of the IHL customary rule on sites containing dangerous forces. Following this flexible reading of the subject of the norm, it was agreed that – to ensure the regional efficacy of the provision – the protection of nuclear installations should be granted not only to state parties to the treaty or to facilities safeguarded by the IAEA, but to all nuclear-related facilities in all states in the nuclear-weapons-free zone.[179]

The Pelindaba Treaty is quite unique and currently no other nuclear-weapons-free zone treaty contains such a provision.[180] Nevertheless, there is another binding treaty that postulates a similar commitment: the 1988 Agreement on the Prohibition of Attack against Nuclear Installations and Facilities, concluded between India and Pakistan. This treaty also has an unqualified prohibition that applies to all nuclear facilities in the following terms:

> Each party shall refrain from undertaking, encouraging or participating in, directly or indirectly, any action aimed at causing the destruction of, or damage to, any nuclear installation or facility in the other country.[181]

Here again, the scope is broader than in conventional IHL instruments applicable to IACs and NIACs, as:

> The term "nuclear installation or facility" includes nuclear power and research reactors, fuel fabrication, uranium enrichment, isotopes separation and reprocessing facilities as well as any other installations with fresh or irradiated nuclear fuel and materials in any form and establishments storing significant quantities of radioactive materials.[182]

During the 1970s, in the course of the disarmament talks related to a treaty on radiological weapons, Sweden presented a draft of the treaty that would have prohibited attacks on nuclear facilities with enough material to generate "mass destruction" if released.[183] Similarly, in the 1980s, the Conference on Disarmament elaborated some draft articles for a future multilateral treaty prohibiting attacks on nuclear facilities.[184] Peru led an effort to advance such an instrument in 1989, but negotiations did not lead to an agreement.[185]

The unsuccessful history of these diplomatic efforts might indicate that most states do not believe that non-nuclear facilities need to be given express protection. They certainly show that there have been attempts to overcome shortcomings of the traditional IHL framework. The existence of several proposals actively seeking to remedy them is proof of degree of concern shared by those who stand behind the initiatives.

178. *Ibid*., Article 2.
179. Fedchenko, V. (2023), *supra* note 28, p. 7.
180. Carlson, J. (2022), *supra* note 12, p. 3.
181. India-Pakistan Agreement on the Prohibition of Attack Against Nuclear Installations and Facilities (1988), entered into force 1 Jan. 1991 (India-Pakistan Non-Attack Agreement).
182. *Ibid*., Article 1.2.
183. Lamm, V. (2003), *supra* note 30.
184. Carlson, J. (2022), *supra* note 12, p. 3.
185. *Ibid*.

IV. Nuclear facilities and the legal regime of belligerent occupation

The current situation of the ZNPP has created a debate on the obligations arising from the *de facto* control of a nuclear installation in the context of war.[186] Russia's seizing of Ukraine's main nuclear power plant has been publicly denounced by several international organisations. In addition to the previously cited decision of the IAEA Board of Governors, it is worth considering the public statement issued by the European Nuclear Safety Regulators Group (ENSREG) in October 2022:

> ENSREG stands by the Ukrainian nuclear safety regulator and its staff, and the Ukrainian personnel at ZNPP who continue to operate under extremely difficult circumstances. We are ready to provide support as needed.
>
> ENSREG considers that the Russian Federation's illegal seizure of the ZNPP and its actions in and around the site is the root cause of the current threats to nuclear safety there and that the risks of nuclear incidents will remain high as long as the Russian Federation remains present at the ZNPP site. Consequently, ENSREG calls for the withdrawal of the Russian forces and their military equipment from the ZNPP and for the plant to be handed back without delay to its rightful owner, under the supervision of the Ukrainian nuclear safety authorities.[187]

The risk to the ZNPP is directly related to the active presence of Russian forces at the site. The legal foundations of belligerent occupation suggest that the illegal capture of a nuclear power plant should not be considered a *de facto* situation. On the contrary, since there is a comprehensive legal regime created to regulate the conduct of a state deploying its authority over the territory of another country, the cases of military occupation are *de jure* scenarios governed by specific rules of IHL. In the author's opinion, this analysis expands the INL and IHL rules and provides sufficient ground to deal with some of the complex features of nuclear safety and nuclear security in the ZNPP, especially concerning a Russian obligation to protect the installations as long as the installations remain under their physical or material control.

1. *The legal notion of belligerent occupation*

The legal concept of belligerent occupation is not new, having received significant attention in IHL literature.[188] The Hague Regulations provide that: "Territory is considered occupied when it is actually placed under the authority of the hostile army. The occupation extends only to the territory where such authority has been established and can be exercised."[189] This provision establishes the components of a legal test for determining the

186. For the purposes of this article, the expression "*de facto*" refers to a situation which occurs in practice but does not entail a legal status as a consequence.
187. ENSREG (2022), "Statement on the Safety of the Zaporizhzhia Nuclear Power Plant in Ukraine", available at: https://ensreg.eu/sites/default/files/attachments/ensreg_statement_on_ukraine_4_october_2022.pdf.
188. See Kolb, R. and S. Vité (2009), *Le droit de l'occupation militaire: perspectives historiques et enjeux juridiques actuels*, Bruylant, Brussels; Arai-Takahashi, Y. (2009), *The Law of Occupation: Continuity and Change of International Humanitarian Law, and its Interaction with International Human Rights Law*, Martinus Nijhoff, The Hague; Spoerri, P. (2014) "The Law of Occupation", in Clapham, A. and P. Gaeta (eds.), *The Oxford Handbook of International Law in Armed Conflict,* Oxford University Press, Oxford, pp. 182-205. For a bibliographical survey, see Sassòli, M., A. Bouvier and A. Quintin (2011), *How Does Law Protect in War?,* Vol. 1, ICRC, Geneva, pp. 232-235. For a short historical overview of *occupation bellica*, see also Cumin, D. (2014), *Manuel de droit de la guerre*, Larcier, Brussels, pp. 231-232.
189. The 1907 The Hague Convention IV respecting the Laws and Customs of War on Land: Regulations concerning the Laws and Customs of War on Land, entered into force 26 Jan. 1910 (Hague Regulations), Annex.

existence of an occupation for the purposes of IHL.[190] The concept of occupation – as defined here – constitutes the basis for the application of Geneva Convention IV, where the rights and duties of the occupying power are codified.[191]

There is notably a practical dimension in the identification of cases of occupation, since an exercise of "authority" is required. This authority derives not from a right to control, but rather from the fact of control that depends on an objective determination of the occupant's effective control over certain territory.[192] The test, as it has been acknowledged, requires effective control by hostile foreign forces for an occupation to exist.[193]

National and international jurisprudence has developed interesting inputs to understand the specificities of these standards. It has been established, for example, that the "exercise of authority" necessitates the exclusion of the established government.[194] Since the occupying power ought to be in a position to substitute its own authority for that of the occupied authority,[195] then it follows that belligerent occupations are characterised by their non-consensual nature.[196] In other words, as a consequence of the invasion, the authority of the occupying power is exclusive and unique; therefore the country that lost control of that territory as a result of the foreign invasion is no longer in a position to ensure the respect of rules in force in that area. Unlike annexation, occupation does not amount to the deprivation of sovereignty or statehood but is only an interference in another country's power to exercise its rights.[197]

Nevertheless, the relationship between the ousted local authorities and the foreign forces can vary and should be considered on a case-by-case basis; there is usually some degree of mutual influence in decision-making.[198] To overcome this problematic reciprocity, a legal test of "overall control" was developed by international criminal tribunals when faced with the need to identify provisions applicable to a specific armed conflict. The International Criminal Tribunal for the Former Yugoslavia (ICTY) has argued

190. Von Glahn, G. (1957), *The Occupation of Enemy Territory: A Commentary on the Law and Practice of Belligerent Occupation,* University of Minnesota Press, Minneapolis, pp. 28-29; Ferraro, T. (2012), "Determining the beginning and end of an occupation under international humanitarian law", *International Review of the Red Cross*, Vol. 94, No. 885, Cambridge University Press, Cambridge, p. 136.
191. Geneva Convention IV Relative to the Protection of Civilian Persons in Time of War (1949), entered into force 21 Oct. 1950, 75 UNTS 287 (GC-IV).
192. Benvenisti, E. (2012), *The International Law of Occupation*, Oxford University Press, Oxford, p. 43.
193. Ferraro, T. (2012), *supra* note 190, pp. 139-140. It is noteworthy that the standard of "effective control" of Russia over Crimea has been recently acknowledged by the Case of Ukraine v. Russia (Re: Crimea), (Application nos. 20958/14 and 38334/18), European Court of Human Rights (ECtHR), Grand Chamber, Judgment, para. 918:
    > [i]n these circumstances, the Court considers that the factual basis on which the respondent State obtained extraterritorial jurisdiction and continued to exercise it throughout the relevant period(s) on the basis of 'effective control' over Crimea, militate in favour of taking account of the relevant provisions of IHL when interpreting the Convention rights in issue in this case, as provided for by Article 31 § 3 (c) of the Vienna Convention.

    See Milanovic, M. (2024), "Some Additional Comments on the ECtHR Crimea Judgment: Occupation, Sovereignty, and 'Law'", EJIL:Talk! https://ejiltalk.org/some-additional-comments-on-the-ecthr-crimea-judgment-occupation-sovereignty-and-law.
194. The UN War Crimes Commission (1949), *Law Reports of Trials of War Criminals,* Vol. VIII, pp. 55-56.
195. Ferraro, T. (2012), *supra* note 190, pp. 141.
196. Dinstein, Y. (2019), *The International Law of Belligerent Occupations*, 2nd ed., Cambridge University Press, Cambridge, p. 39. See also Spoerri, P. (2014), *supra* note 186, pp. 190-192.
197. Blank, L. and G.P. Noone (2019), *supra* note 141, p. 185.
198. Vité, S. (2009), *supra* note 151, p. 75.

that occupation exists when a state has "overall control" of the local agents, actually exercising "effective control" over the territory in question.[199]

In accordance with IHL, belligerent occupation amounts to an IAC. As declared in common Article 2(2) to the GCs: "The Convention shall also apply to all cases of partial or total occupation of the territory of a High Contracting Party, even if the said occupation meets with no armed resistance".[200] In terms of the GCs, then, it is not necessary to have performed a military invasion for a belligerent occupation to be configured.[201] When one of the belligerents succeeds in gaining the upper hand over his adversary, by any means, then an IAC may take the form of occupation.[202]

2. The legal obligations of the occupying power

The 1907 Hague Regulations describe the rights and duties of the occupying power:

> The authority of the legitimate power having in fact passed into the hands of the occupant, the latter shall take all the measures in his power to restore, and ensure, as far as possible, public order and safety, while respecting, unless absolutely prevented, the laws in force in the country.[203]

As outlined in these regulations, an occupying power enjoys a certain latitude to determine the best ways to warrant compliance with "public order and safety", but, as a principle, it cannot alter the legal regime of the occupied territory.[204] The law of occupation, thus, is both permissive (since it acknowledges that the occupier should be able to exercise some power) and prohibitive (in the sense that it restricts the occupier's actions).[205]

The forces belonging to a state exercising authority in a foreign territory have the right to take possession of local property for use in their military operations.[206] Seizure and destruction of property are prohibited unless imperatively demanded by the necessities of war.[207] These rights do not grant the occupying power any legal ownership. This is because a state deploying a belligerent occupation can only behave as a temporary administrator or usufructuary of the property temporarily under its control.[208] The consequence of this

199. Prosecutor v. Tihomir Blaskic, International Criminal Tribunal for the Former Yugoslavia (ICTY), Case No. IT-95-14-T, Judgment (Trial Chamber), para. 149; Prosecutor v. Mladen Naletilić and Vinko Martinović, ICTY, Case No. IT-98-34-T, Judgment (Trial Chamber), 31 Mar. 2003, paras. 181-188,197-202.
200. GC I-IV, Article 2(2).
201. Clapham, A. (2021), *War*, Clarendon Law Series, Oxford University Press, Oxford, p. 246.
202. Vité, S. (2009), *supra* note 151, p. 73.
203. Hague Regulations, *supra* note 189, Article. 43.
204. On the general obligations of the occupying power ICTY, Prosecutor v. Mladen Naletilić and Vinko Martinović, *supra* note 199, paras. 215-216.
205. Spoerri, P. (2014), *supra* note 188, p. 186; See also Chinkin, C. and M. Kaldor (2017), *International Law and New Wars,* Cambridge University Press, Cambridge, p. 353.
206. Hague Regulations, *supra* note 189, Article 53:
> An army of occupation can only take possession of cash, funds, and realizable securities which are strictly the property of the State, depots of arms, means of transport, stores and supplies, and, generally, all movable property belonging to the State which may be used for military operations. All appliances, whether on land, at sea, or in the air, adapted for the transmission of news, or for the transport of persons or things, exclusive of cases governed by naval law, depots of arms, and, generally, all kinds of munitions of war, may be seized, even if they belong to private individuals, but must be restored and compensation fixed when peace is made…
207. *Ibid.*, Article 23(g). See Blank, L. and G.P. Noone (2019), *supra* note 141, p. 211.
208. Hague Regulations, *supra* note 189, Article 55:
> The occupying State shall be regarded only as administrator and usufructuary of public buildings, real estate, forests, and agricultural estates belonging to the hostile State, and situated in the occupied country. It must safeguard the capital of these properties and administer them in accordance with the rules of usufruct…

See Green, L.C. (1993), *supra* note 150, p. 251.

obligation is that an occupying power cannot adopt measures that would result in permanent changes;[209] the preservation of the *status quo* is a key feature of the law of occupation.[210]

Under relevant international caselaw, a state exercising territorial authority has a more specific legal obligation to respect international human rights law and IHL, protecting the local population from acts of violence.[211] In its 2005 judgment in a case between the Democratic Republic of Congo (DRC) and Uganda, the International Court of Justice (ICJ) clearly elaborated on this protective duty:

> The Court thus concludes that Uganda was the occupying Power in Ituri at the relevant time. As such it was under an obligation, according to Article 43 of the Hague Regulations of 1907, to take all the measures in its power to restore, and ensure, as far as possible, public order and safety in the occupied area, while respecting, unless absolutely prevented, the laws in force in the DRC. This obligation comprised the duty to secure respect for the applicable rules of international human rights law and international humanitarian law, to protect the inhabitants of the occupied territory against acts of violence, and not to tolerate such violence by any third party.[212]

The overarching obligation to respect the rights of the population in occupied territories, a topic that received attention in human rights tribunals,[213] has generated a legal presumption that everything occurring there (even when performed by third states) should fall within the responsibility of the occupying power:

> The Court is of the opinion that, in analysing the causal nexus, it must make a distinction between the alleged actions and omissions that took place in Ituri, which was under the occupation and effective control of Uganda, and those that occurred in other areas of the DRC, where Uganda did not necessarily have effective control, notwithstanding the support it provided to several rebel groups whose actions gave rise to damage. The Court recalls that Uganda is under an obligation to make reparation for all damage resulting from the conflict in Ituri, even that resulting from the conduct of third parties, unless it has established, with respect to a particular injury, that it was not caused by Uganda's failure to meet its obligations as an occupying Power…[214]

Similar to the justification, under INL, for the channelling of liability towards the operator of a nuclear installation, the occupying power should be obliged to repair all damage arising from armed conflict in the territory under its exclusive control, as it is the entity in the best position to prevent such damage from occurring.

The ICJ previously interpreted that the harm prevention principle has a due-diligence nature, meaning states are obliged to use all methods and strategies at their disposal to avoid it. In 2010, this was specifically indicated in the case of environmental harm in the decision on Uruguay's authorisation for construction of a pulp mill on the Uruguay river:

209. Orkin, M. and T. Ferraro (2022), "IHL and Occupied Territory", Humanitarian Law and Policy Blog, https://blogs.icrc.org/law-and-policy/2022/07/26/armed-conflict-ukraine-ihl-occupied-territory.
210. Kolb, R. (2003), *Ius in bello. Le droit international des conflits armés*, Helbing & Lichtenhahn/Bruylant, Basel/Brussels, pp. 192-196, paras. 448-458. See also Thürer, D. (2011), *International Humanitarian Law: Theory, Practice, Context,* Hague Academy of International Law, The Hague, p. 149.
211. *Ibid*., pp. 191-192, paras. 444-447; Spoerri, P. (2014), *supra* note 188, pp. 198-205.
212. Case Concerning Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Uganda), Judgment of 9 Feb. 2022, *ICJ Reports 2005*, p. 168.
213. Chinkin and Kaldor deal with some of the issues raised in domestic and international courts when the extraterritorial application of human rights obligations was discussed in situations of belligerent occupation. Chinkin, C. and M. Kaldor (2017), *supra* note 205, pp. 355-361.
214. Democratic Republic of the Congo v. Uganda, *supra* note 212, p. 48-49.

> The Court points out that the principle of prevention, as a customary rule, has its origins in the due diligence that is required of a State in its territory. It is "every State's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States" (*Corfu Channel (United Kingdom v. Albania), Merits, Judgment, I.C.J. Reports 1949, p. 22*). A State is thus obliged to use all the means at its disposal in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing significant damage to the environment of another State.[215]

The same tribunal explicitly mentioned the responsibility of an occupying power towards other states in its 1971 Advisory Opinion on Namibia:

> South Africa, being responsible for having created and maintained a situation which the Court has found to have been validly declared illegal, has the obligation to put an end to it. It is therefore under obligation to withdraw its administration from the Territory of Namibia. By maintaining the present illegal situation, and occupying the Territory without title, South Africa incurs international responsibilities arising from a continuing violation of an international obligation. It also remains accountable for any violations of its international obligations, or of the rights of the people of Namibia. The fact that South Africa no longer has any title to administer the Territory does not release it from its obligations and responsibilities under international law towards other States in respect of the exercise of its powers in relation to this Territory. Physical control of a territory, and not sovereignty or legitimacy of title, is the basis of State liability for acts affecting other States.[216]

In addition, the obligation of an occupying power to prevent transboundary damage and harm has been widely accepted by the international community. The replacement of the sovereign authorities in the territory effects upon the occupying power a two-fold duty not to harm other states and not to allow others – such as private actors – to use the controlled territory to harm other states, as shown also in the state practice related to the occupation of Iraq.[217]

The example of environmental protection is useful to understand the concrete nature of the occupying power's obligation vis-à-vis third parties. In this regard, the 2019 Draft Principles of the Protection of the Environment in Relation to Armed Conflicts, adopted by the International Law Commission, specifically address the issue: "An Occupying Power shall exercise due diligence to ensure that activities in the occupied territory do not cause significant harm to the environment of areas beyond the occupied territory".[218]

These obligations that fall upon the head of the occupying power are of diligent conduct, not of result,[219] and can be easily expanded by analogy to justify the existence of legal duties in occupied territories regarding important matters such as climate change[220]

215. Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, *ICJ Reports* 2010, p. 14.
216. Legal Consequences for States of the Continued Presence of South Africa in Namibia (South West Africa) notwithstanding Security Council Resolution 276 (1970) Advisory Opinion, 21 June 1971, *ICJ Reports* 1971, p. 42.
217. Longobardo, M. (2018), *The Use of Armed Force in Occupied Territory*, Cambridge University Press, Cambridge, p. 174.
218. International Law Commission (ILC) (2022), "Draft Principles on the Protection of the Environment in Relation to Armed Conflicts", Report of the International Law Commission, A/77/10, p. 92.
219. Longobardo. M. (2018), *supra* note 217.
220. Pezzot, R.E. (2023) "IHL in the era of climate change: The application of the UN climate change regime to belligerent occupations", *International Review of the Red Cross*, Vol. 105, No. 923, Cambridge University Press, Cambridge, pp. 1071-1091.

or health.[221] The same reasoning can be applied in the case of safety and security when a nuclear installation is under the control of a foreign country.

It could be logically concluded that, in the Russian-Ukrainian war, Russia would be subject to a duty to prevent transboundary harm arising from a nuclear incident in an occupied nuclear power plant such as Zaporizhzhia.[222] If, according to the Hague Regulations, an occupying power has to take all feasible measures to ensure public order and safety, it stands to reason that when controlling a nuclear power plant the occupying power should respect (and ensure respect for) relevant standards – provided in hard law and soft law instruments – regarding nuclear safety and nuclear security. As pointed out by ICRC legal advisers Abby Zeith and Eirini Giorgou:

> Such measures must include as a matter of priority those enabling the safe and secure operation of the power plant, notably: ensuring the functional maintenance of critical components, including back-up generators; ensuring operational staff can access the plant and/or critical components and are able to perform their tasks without undue restrictions, physical or psychological coercion, or any other form of unlawful treatment, and ensuring proper food and hygiene standards; if the safe and secure operation of the facility cannot be guaranteed, shutting down the power plant partly or fully (with due consideration to the impact this would have on civilians, notably on electricity provision and subsequent availability of clean water and heating, etc.).[223]

In other words, the party to the conflict that controls a nuclear power plant has a mandate, both under conventional and customary IHL rules, to implement nuclear safety and nuclear security during the time in which the nuclear installation is under its authority or control.[224] As correctly expressed by Mr Mapako, "since the seizure of Zaporizhzhia by Russia is undisputed, Russia has the responsibility to ensure the safety and continued operation of the nuclear facility".[225]

As illustrated in the Draft Articles on Responsibility of States for Internationally Wrongful Acts, adopted in 2001 by the International Law Commission, acting in violation of this obligation would amount to state responsibility for the violation of international rules.[226] As concluded by an ICRC expert meeting report, unless an occupying power actually loses control over the territory in question, it cannot escape its obligations by choosing not to exercise effective control.[227]

3. The ZNPP and Russian occupation: Legal rights and obligations

It is clear that Russia is, as of this writing, exercising control over the ZNPP. On 5 October 2022, President Vladimir Putin signed a presidential decree dealing with different aspects related to the legal regulation in the field of use of atomic energy in the territory of the Zaporizhzhia region. According to the decree, it was decided to:

221. Longobardo, M. (2022), "The duties of occupying powers in relation to the prevention and control of contagious diseases through the interplay between international humanitarian law and the right to health", *Vanderbilt Journal of Transnational Law*, Vol. 55, No. 3, pp. 757-804.
222. Morgandi, T. and B. Betin (2022), *supra* note 119.
223. Zeith, A. and E. Giorgou (2022), *supra* note 165.
224. Fedchenko, V. (2023), *supra* note 28, p. 6.
225. Mapako, K. (2022), *supra* note 80, p. 4.
226. ILC (2001), "Draft Articles on Responsibility of States for Internationally Wrongful Acts", *Yearbook of the International Law Commission, 2001,* Vol. II, Part II, United Nations, New York. The Draft Articles were adopted by the United Nations General Assembly (UNGA). UNGA (2002), "Responsibility of States for internationally wrongful acts", UN Doc. A/RES/56/83, 28 Jan. 2002.
227. Ferraro, T. (2012), *ICRC Expert Meeting: Occupation and Other Forms of Administration of Foreign Territories,* ICRC, Geneva, p. 19. See also Melzer, N. (2016), *supra* note 140, p. 60.

> … grant the joint stock company "Operating Organisation of Zaporizhzhia NPP" the status of an operating organisation in the field of atomic energy use, which carries out activities on operation and decommissioning of atomic energy use facilities of Zaporizhzhia Nuclear Power Plant by its own forces or with involvement of other organisations.[228]

The Decree also states that existing licences and work permissions would only be valid until their replacement by new documents issued according to Russian legislation:

a) permits (licences) for the right to conduct operations in the field of atomic energy use issued in respect of Zaporizhzhia Nuclear Power Plant before 30 September 2022 shall continue to be valid until permits (licences) are issued in accordance with the legislation of the Russian Federation in the field of atomic energy use, taking into account the peculiarities stipulated by subparagraph "f" of paragraph 3 of this Decree;

b) permits for the right to perform works in the field of atomic energy use, issued to the employees of Zaporizhzhia Nuclear Power Plant before 30 September 2022, shall continue to be valid until issuance of permits in accordance with the legislation of the Russian Federation in the field of atomic energy use, taking into account the peculiarities stipulated by subparagraph "f" of paragraph 3 of this Decree.

Further, this decree specifies that the Russian government considers the ZNPP to be its "federal property" and created a federal enterprise, "Zaporizhzhia NPP", to control the activities taking place in the facility:

The Government of the Russian Federation shall:

a) ensure that the nuclear power facilities of the Zaporizhzhia Nuclear Power Plant and other property necessary for the implementation of its activities are accepted into federal ownership;

b) to take measures aimed at establishing a federal state unitary enterprise "Zaporizhzhia NPP" in order to ensure safety of nuclear power facilities of the Zaporizhzhia Nuclear Power Plant;

The same article also determined the date of 1 January 2028 as the deadline to organise and implement the necessary supervision related to safety and security, as well as the formal issuance of permits and licences:

d) to determine for the period until 1 January 2028 the specifics of the use by the joint stock company "Operating Organisation of Zaporizhzhia NPP" of financial, material and other resources required to ensure safety of nuclear installations, radiation sources, storage facilities for nuclear materials and radioactive substances, storage facilities, radioactive waste storage facilities and proper management of nuclear materials and radioactive substances;

e) to determine for the period until 1 January 2028 the specifics of organisation and implementation of federal state supervision in the field of atomic energy use and industrial safety with respect to Zaporizhzhia Nuclear Power Plant, including the specifics of control (supervisory) activities, safety expertise (safety justification expertise), and industrial safety expertise by the authorised state safety regulatory authority;

228. Presidential Decree No. 711 of 5 Oct. 2022. Unofficial translation of the original Russian text.

f) to determine for the period until 1 January 2028 the specifics of issuance by the authorised body of state safety regulation of permits (licences) for the right to perform works in the field of nuclear energy use in relation to Zaporizhzhia Nuclear Power Plant, permits for the right to perform works in the field of nuclear energy use to employees of Zaporizhzhia Nuclear Power Plant and termination (cancellation) of such permits (licences);

g) to determine for the period until 1 January 2028 the peculiarities of state regulation of safety in the use of atomic energy and state regulation of industrial safety with respect to Zaporizhzhia Nuclear Power Plant, including financial support of the authorised body of state safety regulation;

h) to ensure issuance of permits (licences) for the right to perform works in the field of atomic energy use in respect of Zaporizhzhia Nuclear Power Plant, permits for the right to perform works in the field of atomic energy use to employees of Zaporizhzhia Nuclear Power Plant.

As the decree clarifies, the Russian President has designated the ZNPP as "federal property", which means that the full supervision of the plant was transferred to Russia.[229] According to the official website of the newly created company, the "Operating Organisation of Zaporizhzhia NPP",[230] the organisation "is designed to ensure both safe operation of the NPP and professional activity of the existing plant personnel". Besides, the same website recognises that "currently, the property complex of ZNPP is the property of the Russian Federation". Nevertheless, it should be said that, since the nuclear power plant is in the territory of another recognised sovereign state, in spite of the language used here, the region in which the ZNPP is situated has not been permanently transferred to Russia; the legal situation, therefore, corresponds to a belligerent occupation as indicated above.

Russia's nuclear power operator Rosenergoatom[231] said in a statement last year that it would conduct an assessment of how to repair damage and transfer all existing Ukrainian employees to a new Russian-owned organisation with the aim of ensuring the safe operation of the plant.[232] The explicit reference in these sources to the necessity of a "safe operation" of the ZNPP is, of course, reassuring. However, a close observation of recent events suggests that Russia appears to have failed to act fully in accordance with its duties arising from its military occupation of the ZNPP.

In August 2023, for example, Russia blocked the adoption of the outcome document of the 10th Review Conference of the Parties to the NPT, citing the proposed inclusion of language noting concerns about nuclear safety matters at Zaporizhzhia.[233] This raises questions as to the political implications of the military seizure of the nuclear power plant. Although Russian authorities have been updating the IAEA about their oversight of the reactors,[234] communications from the Permanent Mission of Ukraine to the IAEA have

229. Przybylak, J. (2023), *supra* note 4, p. 5.
230. See Zaporzhye NPP (n.d.) "About Zaporzhye NPP", https://znpp.ru.
231. Created in 1992, since 2001 all Russian civil nuclear power plants, as well as all supporting companies, were incorporated into Rosenergoatom. In 2008 Rosenergoatom was reorganised into an open joint stock company and renamed Energoatom, but the following year the previous name was reestablished. See https://rosenergoatom.ru/en/about-us/history.
232. Jones, J. and D. Ljunggren (2023), "Putin asserts control over Ukraine nuclear plant, Kyiv disagrees", Reuters, https://reuters.com/world/europe/zaporizhzhia-plant-operate-under-russian-supervision-after-annexation-ria-2022-10-05.
233. NPT, *supra* note 126.
234. As shown in the different IAEA information circulars distributing the official notes presented by the Russian delegation, the last one dated on 8 December 2023. See e.g. IAEA (2023), *Communication from the Permanent Mission of the Russian Federation to the Agency*, INFCIRC/1163.

expressed serious concerns over the strategic and tactical manipulation of the occupied ZNPP.[235]

A coherent reading of the applicable legal frameworks (i.e. INL, IHL and the law of occupation) provides that the responsibility for the materials and installations of the ZNPP, now under the control of Russian forces, cannot be reasonably attributed to Ukraine but rather belongs to the occupying power, and that Russia's international responsibility will continue as long as the occupation lasts.

V. Conclusion

When war breaks out, it is imperative that the protection of nuclear and radiological facilities be guaranteed at all times. In practical terms, it is the opinion of this author that parties to the conflict ought to immediately shut down the nuclear installations under their jurisdiction to reduce the risk of uncontrolled emission of radioactive material due to the conduct of hostilities. This protective measure should be performed as a method of precaution.[236] Other practical steps that could be taken include granting a "demilitarised-zone" status to nuclear power plants during the hostilities.[237]

That said, this article's focus is on the legal aspects involved in the exceptional case of nuclear facilities found in violence-stricken regions traversed by international armed conflicts, civil unrest or military clashes, situations in which both INL and internation IHL become relevant. However, instruments belonging to these two different regimes offer insufficient grounds to ensure adequate protections. For instance, INL has not paid enough attention to the phenomena of warfare that could seriously affect the activities potentially ongoing during a normal fuel cycle. Meanwhile, IHL has traditionally limited its interests to nuclear energy generating installations (as opposed to facilities and radioactive materials in storage or disposal sites, as well as activities associated with nuclear energy generating installations, such as transport of fuel) and only addressed those facilities containing dangerous forces with the intent of restricting attacks that could be launched against them.

The conclusion of this legal scrutiny under INL and IHL is that it is necessary to strengthen those international agreements currently in force to ensure nuclear safety and security during armed conflicts.[238] This framework should also apply to research reactors, advanced and small modular reactors, conversion and enrichment facilities, waste management sites and vehicles used for transportation of nuclear material. In times of international or internal armed conflict, the capture, seizure or destruction of any of these installations or means of transport could endanger the civilian population and put the environment in grave risk.[239]

Until a new, binding instrument specifically dealing with nuclear security and nuclear safety during armed conflict is adopted – an instrument that could eventually be concluded between the IAEA and all member states[240]– the seven pillars and five principles elaborated by the Director-General of the IAEA constitute soft legal standards that could, and should, be viewed as customary regulations that parties to a conflict are bound to accept.

235. See, for example, its *note verbale*, dated 29 November 2023, which Ukraine asked to be circulated to all IAEA Member States. IAEA (2023), Communication from the Permanent Mission of Ukraine to the Agency, INFCIRC/1161.
236. Lamm, V. (2003), *supra* note 30. See also Dienelt, A. (2022), *supra* note 161.
237. Alkış, A. (2022), *supra* note 122.
238. Burke, A. (2022), *supra* note 26.
239. Alkış, A. (2022), *supra* note 122.
240. This Protocol "would help the IAEA overcome the challenges of gaining the consent of warring states, or states undergoing civil strife, to send a technical mission at the very start of hostilities". *Ibid*.

In this legal puzzle, the law of belligerent occupation should play a relevant role. If the accidents at Chernobyl and the Fukushima Daiichi Nuclear Power Plant triggered legal changes in the domain of nuclear safety,[241] and if the terrorist attacks in the United States on 11 September 2001 incited the need for stronger commitments on nuclear security, the Russian-Ukrainian war is likely to open new discussions that will spur progress in the field of international responsibility for the operation of nuclear facilities under belligerent occupation.

The principles of nuclear liability law included in the relevant treaties indicate that an operator can be exonerated from liability in cases of interstate war or internal strife. In these cases, it is the installation state that will have to respond in case of accidents or incidents that are directly due to military action. In those situations of belligerent occupation, it should be affirmed that responsibility lies with the occupying power.

Together with the seven pillars identified in 2022 in order to deal with the challenging situation of nuclear power plants under crossfire, a complementary pillar should be included that would confirm that, in a circumstance in which one state is exercising control over any type of nuclear installation, according to the international law of occupation, that state shall be deemed absolutely and uniquely responsible for the observation of relevant nuclear law instruments, and this should be the case as long as it holds "authority" over that facility. Imposing obligations upon a state party that is no longer in control of nuclear facilities or materials, on the basis of its continued sovereignty over its national territory, could create a false impression that an installation is safe and secure, whereas, in reality, an illegal occupier is in charge of its daily operation without being internationally accountable for the respect of all relevant legal provisions.

Additionally, holding Russia responsible for whatever happens in or around ZNPP would not indicate an acceptance or endorsement of the legality of its territorial annexation. On the contrary, as is generally the case with IHL provisions, an objective attribution of responsibility does not entail any consequence as to the legality of the use of force employed during the occupation and does not affect the legal status of the parties to the conflict.

These proposals, the result of a comprehensive review of existing legal standards, would go far towards overcoming some of the difficulties, and resolving some of the ambiguities, that emerge when dealing with the effects of armed conflict on nuclear activities. It is the author's hope that they will motivate more thoughts into the pressing issue of nuclear installations and materials suddenly placed in the uncertainty of active conflict and belligerent occupation. Nuclear safety and nuclear security should not be compromised by political disputes in times of warfare, precisely at a time where clear and objective legal principles are most needed.

241. Burns, S.G. (2022), *supra* note 90, pp. 87-93.

Nuclear rhetoric and response: A historical analysis of Australia's nuclear law evolution considering global events and the AUKUS partnership

*by Kirsty Braybon**

1. Introduction

In the realm of the global nuclear fuel cycle, Australia's experience stands distinct. Blessed with abundant uranium resources and a legacy of robust mining, Australia's engagement with nuclear technology has been nuanced and restrained. The nation exports all its mined uranium without venturing into nuclear power generation or enrichment. Its contribution to nuclear medicine is globally recognised, yet it grapples with the absence of established pathways for waste disposal. This cautious, somewhat paradoxical approach to nuclear engagement reflects a broader narrative of complex political, legal and societal dynamics.

The announcement of the AUKUS partnership on 16 September 2021 heralded a defining moment in Australia's nuclear narrative.[1] This trilateral security agreement involving Australia, the United Kingdom and the United States signalled a profound shift in Australia's approach to nuclear technology.[2] At the heart of AUKUS is Australia's commitment to acquiring and constructing conventionally-armed nuclear-powered submarines.[3] This strategic decision not only strengthens Australia's alignment with key global powers but also positions the nation as a pivotal defender of its Pacific neighbours.[4] Moreover, this initiative marks a paradigm shift in Australia's nuclear sector, expanding its scope beyond nuclear medicine production that began in the 1950s.[5] This move represents a crucial step in Australia's evolving role on the global nuclear stage, enhancing its strategic capabilities[6] and ushering in a new era of nuclear industry development.

Understanding the evolution of nuclear law in Australia requires an appreciation of the country's political landscape, dominated by two major parties: the Coalition of the Liberal Party of Australia and National Party of Australia (Coalition) and the Australian Labour Party (ALP). The interplay between these parties, each with its unique and, at times, polarising stance on nuclear policy, has significantly influenced the course of legislative and policy developments in the nuclear domain. Additionally, the country operates under a federal system, with distinct layers of state and territory and federal governments. This creates added complexity in the national development of nuclear law, as the demarcation of powers under the Constitution often leads to intricate legal and policy interplays between various levels of government.

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1. Prime Minister Scott Morrison, Minister for Defence Peter Dutton and Minister for Foreign Affairs and Minister for Women Marise Payne, Press Release, "Joint Media Statement: Australia to Pursue Nuclear-Powered Submarines Through New Trilateral Enhanced Security Partnership" (16 Sept. 2021).
2. *Ibid*.
3. *Ibid*.
4. Australian Government Department of Defence (Defence) (2023), "National Defence: Defence Strategic Review 2023", www.defence.gov.au/about/reviews-inquiries/defence-strategic-review (accessed 24 Sept. 2024).
5. Australian Nuclear Science and Technology Organisation (ANSTO) (n.d.), "Our History", www.ansto.gov.au/about/what-we-do/our-history (accessed 24 Sept. 2024).
6. Defence (2023), *supra* note 4.

The trajectory of nuclear law in Australia has been anything but linear; it has been marked by turbulence, political manoeuvring and, at times, radical shifts. The narrative spans from imposing moratoriums on uranium mining to contentious land acquisitions and litigations between state and federal governments. Each element illustrates the nature of Australia's dynamic and often contentious nuclear law and policy.

In delving into this analysis, the aim is to unravel the complexities of this journey, exploring how Australia has navigated the challenging terrain of nuclear law, shaped by a confluence of historical events, political decisions and strategic partnerships. This journey, especially in light of the transformative AUKUS partnership, offers a unique perspective on Australia's evolving role in the global nuclear arena and the shaping of its domestic nuclear law.

2. Uranium mining

The narrative of uranium mining in Australia is not just a tale of resource extraction; it is interwoven with the country's strategic positioning in the global nuclear fuel cycle and the shifting tides of international diplomacy and domestic policy. In the current landscape, Australia is a leading player in the global uranium market, boasting significant reserves and playing a pivotal role as a world supplier.[7] The country's uranium resources are abundant and of high quality, placing Australia in a unique position to influence the global nuclear energy sector.[8] Despite this vast potential, Australia's involvement in the nuclear fuel cycle has been predominantly confined to the mining and export of uranium. Several factors underpin this distinctive role: Australia is not a nuclear weapons state, it operates no nuclear power plants,[9] it lacks facilities for uranium enrichment and has no centralised radioactive waste repository.

Without a broader nuclear industry, the focus on uranium mining reflects a deliberate policy choice influenced by a complex interplay of political, environmental, economic and strategic considerations. This approach has been shaped by various domestic and international events, ranging from the heightened awareness of nuclear proliferation risks to global environmental movements and shifts in the international energy market. The political discourse around uranium mining has also been a key factor, with successive Australian governments navigating the balance between harnessing the economic benefits of uranium exports and addressing the associated environmental and security concerns. The following analysis aims to unravel the legal developments that define uranium mining in Australia. It seeks to provide a comprehensive understanding of how Australia has managed its significant uranium resources within the broader context of the global nuclear fuel cycle and the implications of its choices on both the domestic and international stage.

a. Development of law for regulating uranium mining in Australia

The discovery of nuclear fission in 1938 came against the backdrop of increasing global tensions that would culminate in World War II.[10] The war catalysed an urgent push, particularly by the United States, to harness the power of atomic energy for military purposes.[11] The Manhattan Project, a covert research and development initiative by the United States, was instrumental in this, leading to the development of the first atomic bomb.[12] One of the essential components for these bombs was uranium, leading to a spike

7. Nuclear Energy Agency (NEA) and International Atomic Energy Agency (IAEA) (2023), *Uranium 2022: Resources, Production and Demand*, OECD Publishing, Paris, pp. 22-25, 75.
8. *Ibid*.
9. While Australia has a research reactor in Sydney for the purpose of producing medical isotopes, Australia does not have a nuclear power reactor.
10. Cockburn, S. and D. Ellyardm (1981), *Oliphant: The Life and Times of Sir Mark Oliphant*, Axiom Books, Adelaide, Australia, p. 369.
11. *Ibid*.
12. *Ibid*.

in demand for the critical mineral and initiating a worldwide scramble to secure substantial stockpiles.[13] Australia's pivotal role in this era was defined by its contribution to uranium supply, particularly from Rum Jungle in the Northern Territory and Radium Hill in South Australia.[14] The uranium extracted was crucial for supporting the United Kingdom and United States weapons programmes, and the first deliveries of uranium oxide occurred in 1954.[15]

The genesis of uranium regulation in Australia can be traced back to 1945, with the amendment of the South Australian Mining Act to facilitate the development of the Radium Hill uranium deposit.[16] This legislative move granted the state government of South Australia control over the mining, treatment and utilisation of uranium and thorium ores, asserting state ownership of these strategic minerals.[17] In recognising the unique and potent nature of uranium and thorium, the Parliament concluded that these materials necessitated safety, security and safeguards measures and a level of regulation beyond that applied to other minerals in the state, ensuring that their extraction and use were conducted under the strictest standards to prevent misuse and promote safe, beneficial applications such as power generation.[18] In parallel, the Australian federal government recognised nuclear energy's national and international significance and sought greater control over atomic materials.[19] The Atomic Energy (Control of Materials) Act 1946 marked the federal government's early attempts to regulate nuclear energy, which was further developed with the Atomic Energy Act 1953.[20] The 1953 Act, drawing inspiration from the 1946 US Atomic Energy Act,[21] established the Australian Atomic Energy Commission (AAEC), focusing on ensuring the safety and security of nuclear materials.[22]

These legislative reforms, enacted at state and federal levels, underscored the constitutional demarcation between state and federal regulations. Specifically, while the state retains ownership of the uranium and regulates extraction within the state, the federal government regulates export controls and trade, with the exception of the territories where the federal government retained ownership and regulation of uranium in those jurisdictions.[23] This distinction was further solidified by the South Australian Uranium Mining Act 1949, which required state consultation with the federal Prime Minister for the sale or disposal of uranium ore.[24]

The 1950s represented a crucial juncture for Australia's uranium sector, with significant discoveries initiating mining operations at Rum Jungle in the Northern Territory and Mary Kathleen near Mount Isa in Central West Queensland.[25] These locations, supplemented by smaller mines in the Northern Territory, swiftly set up direct supply

13. *Ibid*.
14. Robers, M.G. (1978), "Government Participation in the Minerals Industry", *Australian Mining and Petroleum Law Journal*, Vol. 1, No. 2, Copyright Agency, Sydney, p. 285.
15. *Ibid*.
16. Mining Act Amendment Act 1945 (SA).
17. *Ibid*.
18. Parliament of South Australia, Legislative Council (1945), "Second Reading Speech – Mining Act Amendment Bill", *Hansard*, 16 Oct. 1945, p. 482.
19. Atomic Energy (Control of Materials) Act of 1946 (Cth); Atomic Energy Act 1953 (Cth) (No. 31 of 1953).
20. *Ibid*.
21. Atomic Energy Act of 1946, 42 USC § 2011 et seq.
22. Atomic Energy Act 1953 (Cth), (No. 31 of 1953); Commonwealth Government of Australia, House of Assembly (1953), "Second Reading Speech – Atomic Energy Bill 1953", 26 Mar. 1953, p. 1673.
23. Australian Constitution Act 1901 (Cth), ss. 51(vi), 122; Carney, G. (2007), "Constitutional Framework for Regulation of the Australian Uranium Industry", *Australian Resources and Energy Law Journal*, Vol. 26, Energy & Resources Law Association, Melbourne, p. 2007.
24. Uranium Mining Act 1949 (SA).
25. Nicholson, R.D. (1979), "Commonwealth and State Controls Over Uranium Exploration and Production", *Australian Mining and Petroleum Law Journal*, Vol. 1, No. 2, Copyright Agency, Sydney, pp. 33-53.

agreements with key global powers, including the United Kingdom and the United States, maintaining Australia's prominence on the global uranium stage.[26] As the sector continued to flourish, the 1970s heralded an era of unprecedented discovery, with substantial deposits identified at Ranger, Jabiluka, Nabarlek and Koongarra in the Northern Territory, followed by Olympic Dam in South Australia.[27] It was a period marked by proactive governmental policies aimed at stimulating uranium exploration and extraction; however, beneath the surface of this economic boom, safety, security and safeguards concerns began to emerge.[28]

As the 1960s drew to a close, Australia faced escalating tensions over safeguards risks associated with foreign ownership of its uranium resources. Concerns peaked with fears that the Nabarlek uranium mine might fall into foreign hands due to high share turnover. The Australian government responded in 1972 with the Companies (Uranium Mining Companies) Ordinance, imposing a 15% cap on foreign shareholding in uranium mines.[29]

The 1970s and 1980s marked a paradigm shift in Australia's approach to uranium. The early 1970s saw the ALP ascend to power after 23 years, advocating for Australian ownership in uranium mining.[30] This period was characterised by an outright denial of foreign involvement in uranium exploration and mining, coupled with strict controls on strategic mineral exports and later transitioning to state-controlled operations.[31] While existing contracts were honoured, a significant uranium export embargo was introduced.[32] However, this shift faced international challenges,[33] particularly following the 1973 oil embargo by the Organization of the Petroleum Exporting Countries (OPEC), which necessitated a revaluation of Australia's energy policy.[34]

The environmental, social and geopolitical discourse around uranium mining in Australia significantly intensified due to global concerns around nuclear energy, its proliferation, and the associated environmental and health risks.[35] Triggered by events like the French atmospheric nuclear testing in the Pacific,[36] which heightened regional fears over radioactive contamination and environmental degradation, the discourse on nuclear energy took a critical turn. Further international incidents, such as the Three Mile Island nuclear accident in 1979[37] in the United States, fuelled global anxieties about the safety of nuclear technologies. Additionally, the rejection by the Unites States of détente in favour of a "rollback" strategy during the Cold War exacerbated fears of nuclear war, influencing public and political opinion

26. Berkemeier, M. et al. (2014), "Governing Uranium in the United Kingdom", *Danish Institute for International Studies* (DIIS) Report 2014:02, DIIS, Copenhagen, pp. 11-14.
27. Mascher, S. (2007), "Too Hot to Handle? Uranium and Nuclear Power in Australia's Energy Mix", *Australian Resources and Energy Law Journal*, Vol. 26, No. 3, Energy & Resources Law Association, Melbourne, p. 334.
28. Robers, M. G. (1978), *supra* note 14, p. 286; The Parliament of the Commonwealth of Australia (1997), *The Report of the Senate Select Committee on Uranium Mining and Milling – Uranium Mining and Milling in Australia*.
29. Swarts, R.W. MP and Greenwood, I.J. QC, Press Release, "ACT Companies (Uranium Mining Companies) Ordinance 1970" (15 Mar. 1972).
30. Nicholson, R. D. (1979), *supra* note 25.
31. *Ibid*.
32. Johns, K. (2005), "Uranium in South Australia – Politics and Reality", *Journal of Australasian Mining History*, Vol. 3, University of Western Australia, Crawley, Sept. 2005, p. 177.
33. Australian House of Representatives (1977), "Commonwealth Parliamentary Debates (CPD), House of Representatives," *Hansard,* 23 Mar. 1977, p. 484.
34. Clarke, M. (2012), "The Fraser Government's 'Uranium Decision' and the Foundations of Australian Non-Proliferation Policy: A Reappraisal", *Australian Journal of Politics and History*, Vol. 58, No. 2, Wiley, Brisbane, p. 226.
35. Leask, A. and D. Mason (2007), "International Law and Australian Implementation of Controls on the Production and Export of Uranium Ore Concentrate", *Australian Resources and Energy Law Journal*, Vol. 26, No. 3, Energy & Resources Law Association, Melbourne, p. 260.
36. Nuclear Tests (Australia v. France), *International Court of Justice (ICJ) Reports 1974* and Nuclear Tests (New Zealand v. France), *ICJ Reports 1974*.
37. US Nuclear Regulatory Commission (NRC) (1979), "TMI-2 Lessons Learned Task Force Final Report", NUREG-0585.

against nuclear advancements.[38] In response, the Australian government initiated the Ranger Uranium Environmental Inquiry (Fox Inquiry) in July 1975.[39] The inquiry sought a balanced approach to land use in the Alligator Rivers Region, addressing conflicts between uranium mining, environmental preservation and Indigenous land rights.[40] The government adopted the Fox Inquiry's recommendations, establishing a comprehensive regulatory framework.[41] The return of the Coalition to federal power in 1983 led to the lifting of uranium embargoes, the end of government-controlled operations and the recommencement of extraction and exports of uranium under the post-Fox Inquiry uranium regulations, known as the Fraser government "Uranium Decision" due to its historical significance.[42]

In 1977, the federal opposition, ALP, responded to the Fox Inquiry by announcing a moratorium on uranium mining and treatment.[43] This stance was echoed by South Australia, which had an ALP state government at the time, implementing a moratorium in state law but allowing retention leases for explorers to preserve their investments, pending future policy shifts.[44] This nuanced approach by South Australia played a crucial role in maintaining a foothold for uranium mining in the region despite the broader political divides and shifting policies at the federal level.

Despite the post-Fox Inquiry legal reform to improve environmental regulation to mitigate risks and address concerns, the uranium industry was not without its incidents. The Church Rock Spill of 1979 in the United States underscored the catastrophic potential of uranium mining, drawing parallels with Australian projects such as Koongarra, Jabiluka and Ranger.[45] Ranger experienced a similar spill in 1981, further intensifying the call for reform and scrutiny.[46] The incidents at Ranger and Church Rock, along with the backdrop of India's first nuclear test[47] and the Three Mile Island accident,[48] further intensified the scrutiny of the nuclear industry and uranium mining. These events overshadowed the industry and propelled rigorous debates in Australia, driving policy towards a more conservative stance.

The 1984 "Three Mines Policy" represented a watershed moment in the history of uranium mining in Australia, with its impacts still resonating today. Implemented by the ALP government, this policy aimed to restrict the operation of uranium mines in the

38. Gaddis, J.L. (2005), *Strategies of Containment: A Critical Appraisal of American National Security Policy during the Cold War*, Oxford University Press, New York.
39. Johns, K. (2005), *supra* note 32, p. 177; The Parliament of the Commonwealth of Australia (1976), "Ranger Uranium Environment Inquiry, First Report", Oct. 1976; The Parliament of the Commonwealth of Australia (1977), "Ranger Uranium Environment Inquiry, Second Report", May 1977.
40. *Ibid.*; Mascher, S. (2007), *supra* note 27.
41. Commonwealth Government of Australia (1977), "Uranium – Australia's Decision: Statement by the Prime Minister the Right (Rt.) Hon. Malcom Fraiser, CH, MP", Aug. 1977, transcript available at: https://pmtranscripts.pmc.gov.au/sites/default/files/original/00006007.pdf.
42. Clarke, M. (2012), *supra* note 34.
43. Panter, R.A. and P. Kay (1994), "Chronology of ALP Uranium Policy 1950-1994", Background paper No. 17, Australian Department of the Parliamentary Library, Parliamentary Research Services, Canberra.
44. Mining Act Amendment Act 1978 (No. 34 of 1978) (SA).
45. Parliament of Australia, House of Assembly (1981), "Second Reading Speech – Koongarra Project Area Bill 1981", 3 June 1981, p. 3065.
46. Shadow Minister for Environment and Conservation, the Hon. Stewart West, Press Release, "Regulation of Uranium Mining in the Northern Territory is not Working" (24 Nov. 1981).
47. Perkovich, G. (1999), *India's Nuclear Bomb: The Impact on Global Proliferation*, University of California Press, Berkeley.
48. NRC (1980), "Three Mile Island: A Report to the Commissioners and to the Public", NUREG/CR-1250, Volume I.

country to just three.[49] Further international incidents like Chernobyl[50] and domestic concerns the Mirarr Indigenous People raised regarding the Jabiluka uranium deposit in Kakadu[51] further contributed to the rhetoric underlying this policy on uranium mining. This policy was later adjusted in the 1990s, allowing previously approved mines to proceed, and was eventually abandoned altogether in 2007.[52]

While the cessation of French nuclear testing in the Pacific,[53] the recommendations from the Canberra Commission on the elimination of nuclear weapons,[54] and the removal of nuclear weapons from RAF Greenham Common at the turn of the century initially alleviated public concerns about nuclear development,[55] the Fukushima Daiichi Nuclear Power Plant accident in 2011 marked a turning point. This event triggered a global reassessment of nuclear energy safety and led to a significant decline in uranium demand as countries re-evaluated their nuclear policies and the public's acceptance of nuclear power diminished.[56] Amidst this backdrop of heightened scrutiny and shifting paradigms, the South Australian State Government initiated the Nuclear Fuel Cycle Royal Commission (Royal Commission) in 2015, a comprehensive inquiry to explore opportunities to expand the state's involvement in the nuclear fuel cycle.[57] This focused on several key areas across the fuel cycle, including the expanded exploration, extraction and milling of minerals containing radioactive materials. The Commission's findings underscored that existing administrative and regulatory processes effectively support safe and expanded uranium mining activities, and these activities should continue with regulatory enhancements.[58] The State Government embraced the Commission's recommendations on uranium mining, leading to significant amendments to the Mining Act 1971 (SA) in 2019.[59] These amendments aligned the state's assessment processes more closely with the federal Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act),[60] recognised as assessment approaches under the Assessment Bilateral Agreement between

49. Australia Labor Party (1984), "Australian Labor Party Platform, Constitution and Rules as approved by the 36th National Conference", Canberra 1984, p. 174.
50. NEA (2002), *Chernobyl: Assessment of Radiological and Health Impacts*, OECD Publishing, Paris; IAEA (1996), "One Decade after Chernobyl: Summing up the Consequences of the Accident", Proceedings of an International Conference Held in Vienna, Austria, 8-12 April 1996, STI/PUB/1001, IAEA, Vienna.
51. Minister for Aboriginal Affairs, Senator the Hon. Peter Baume, Press Release, "Alligator Rivers Stage 2 Land Claim" (8 Mar. 1982), available at: https://parlinfo.aph.gov.au/parlInfo/download/media/pressrel/HPR10013892/upload_binary/HPR10013892.pdf (accessed 24 Sept. 2024).
52. Australian Labor Party (2007), *National Platform and Constitution, 2007*, p. 55, Australian Labor Party, Canberra available at: https://parlinfo.aph.gov.au/parlInfo/download/library/partypol/1024541/upload_binary/1024541.pdf (accessed 24 Sept. 2024).
53. See Nuclear Tests (Australia v. France), Judgment of 20 December 1974, Summary 1974/3, *ICJ Reports 1974*, p. 253; Nuclear Tests (New Zealand v. France) Judgment of 20 December 1974, Summary 1974/4, *ICJ Reports 1974*, p. 457.
54. The Canberra Commission on the Elimination of Nuclear Weapons (1996), *Report Of The Canberra Commission On The Elimination Of Nuclear Weapons*, Aug. 1996, National Capital Printers, Canberra, Australia.
55. Borger, J., "Death of the Treaty That Removed Missiles from Greenham Common", *The Guardian*, 1 Aug. 2019.
56. Lochbaum, D., E. Lyman and S.Q. Stranahan (2015), *Fukushima: The Story of a Nuclear Disaster*, The New Press, New York.
57. Grey, K. (2016), "A Nuclear Future for Australia: The South Australian Nuclear Fuel Cycle Royal Commission Releases Final Report", *Australian Resources and Energy Law Journal*, Vol. 35, No. 2, Energy Resources and Law Association, Melbourne, pp. 131-141.
58. Nuclear Fuel Cycle Royal Commission, Government of South Australia (2016), "Nuclear Fuel Cycle Royal Commission Report 2016", available at: https://inis.iaea.org/collection/NCLCollectionStore/_Public/51/087/51087045.pdf?r=1 (accessed 24 Sept. 2024).
59. Mining (Mineral Resources) Amendment Act 2019 (SA); Nuclear Fuel Cycle Royal Commission Consultation and Response Agency, Department of the Premier and Cabinet, Government of South Australia (2016), "Response to the Nuclear Fuel Cycle Royal Commission 2016", available at: https://inis.iaea.org/collection/NCLCollectionStore/_Public/51/087/51087046.pdf?r=1 (accessed 24 Sept. 2024).
60. Environment Protection and Biodiversity Conservation Act 1999 (Cth).

the state of South Australia and the Commonwealth.[61] These amendments enhanced the Minister of Energy and Mining's authority to collect and release geophysical data and improved financial assurance measures for the complete lifecycle of uranium mining projects.[62] These reforms reflected a commitment to a balanced approach in uranium mining, considering economic development and environmental sustainability.[63]

Following the federal ALP government's decision to move away from its uranium policy in 2007 and considering the Royal Commission's positive outlook on expanding uranium mining in 2016, one might have expected a more streamlined approach to uranium mining nationwide.[64] Yet, the reality presents a varied and complex legal mosaic. Currently, uranium mining is legally permitted in South Australia, Tasmania and the Northern Territory. However, with the closure of the Ranger Mine in the Northern Territory[65] and no uranium deposits in Tasmania, South Australia remains the sole active player, hosting the Olympic Dam, Honeymoon, Beverley and Four Mile mines.[66] The situation in Western Australia is particularly intriguing. The state, under the previous Coalition government, greenlit several uranium projects. In contrast, the current state ALP government introduced a "no uranium" policy stipulation on new mining leases, effectively halting the initiation of any new uranium mining ventures.[67] Victoria and New South Wales stand on the firmer ground of prohibition, with longstanding state laws explicitly barring uranium exploration.[68] Queensland, meanwhile, lifted its ban in 2012 under a Coalition government, but this was swiftly replaced in 2015 by an ALP government policy refusing to issue mining leases for uranium extraction and prohibiting the processing or handling of uranium within the state.[69]

Adding another layer of complexity, Port Adelaide in South Australia is the only port currently authorised for uranium exports,[70] presenting logistical challenges for potential mining operations in other states. The Port of Darwin was previously licensed under the Nuclear Non-Proliferation (Safeguards) Act 1987 (Cth) (Safeguards Act) to export uranium,[71] but with no operating mines in the Northern Territory and prohibitions in the neighbouring states of Western Australia and Queensland, the licence lapsed. Significant progress remains elusive despite efforts to untangle these legislative and policy knots since departing from the Three Mines Policy.[72]

61. Braybon, K (2019), "Renegotiating The Bilateral Agreement Between The State of South Australia And The Commonwealth Under The Environment Protection And Biodiversity Conservation Act (Cth) 1999", *Australian Resources and Energy Law Journal*, Vol. 38, No. 1, Energy & Resources Law Association, Melbourne.
62. *Ibid*.
63. *Ibid*.
64. Australian Broadcasting Company (ABC) News (2007), "ALP uranium policy change aids acceptance", ABC News, www.abc.net.au/news/2007-05-15/alp-uranium-policy-change-aids-acceptance/2549166 (accessed 24 Sept. 2024).
65. Energy Resources of Australia Ltd, Press Release, "Closure of Ranger Mine" (8 Jan. 2021).
66. Department for Energy and Mining, South Australia (n.d.), "Uranium", www.energymining.sa.gov.au/industry/minerals-and-mining/mineral-commodities/uranium (accessed 24 Sept. 2024).
67. Department of Energy, Mines, Industry Regulation and Safety, Western Australia (n.d.) "Uranium" www.dmp.wa.gov.au/Uranium-1459.aspx (accessed 24 Sept. 2024).
68. Uranium Mining and Nuclear Facilities (Prohibitions) Act 1986 (NSW), sec. 7; Nuclear Activities (Prohibitions) Act 1983 (Vic), sec. 5.
69. Sky News (2015), "QLD Uranium Mining Ban Again", Sky News, original webpage no longer active, archived page available at: https://web.archive.org/web/20150716140551/http://www.skynews.com.au/news/national/2015/03/15/qld-uranium-mining-ban-on-again.html (accessed 24 Sept. 2024).
70. Department for Energy and Mining (n.d.), *supra* note 66.
71. *Ibid*.
72. Uranium Mining and Nuclear Facilities (Prohibitions) Repeal Bill 2019 (NSW); Victoria's Legislative Council Environment and Planning Committee (2020), "Inquiry in Nuclear Prohibition", available at: www.parliament.vic.gov.au/get-involved/inquiries/inquiry-into-nuclear-prohibition (accessed 24 Sept. 2024); Shaw, A. (n.d.). "Chamber Calls for Lift of Western Australia Mining Ban", Mining Technology, www.mining-technology.com/news/chamber-calls-for-lift-of-western-australia-mining-ban.

b. AUKUS and Australian uranium

The 2024 AUKUS partnership, which includes the construction of "SSN-AUKUS" nuclear-powered submarines in Adelaide, South Australia, presents an interesting dynamic in the context of Australian uranium. Despite the proximity of these submarine construction activities to South Australia's uranium resources, the nuclear fuel for these submarines will not be derived from Australian uranium. This situation is primarily due to two key factors.

Firstly, Australia does not enrich uranium as this is an activity currently banned in Australia,[73] a critical process for producing the type of nuclear fuel required for these submarines. It has been confirmed that Australia will not enrich uranium or reprocess spent fuel as part of the AUKUS programme.[74] Secondly, the uranium mined in Australia is strictly earmarked for export, intended solely for use in civilian nuclear energy generation and research reactors.[75] Uranium exports are governed by stringent international agreements and protocols.[76]

Under the current regulatory framework, Australian uranium can only be exported to nations that accept Australia's comprehensive safeguards conditions[77] and, at a minimum, have established a nuclear co-operation agreement with Australia. These agreements explicitly mandate that Australian uranium be used exclusively for peaceful purposes, unequivocally excluding military applications.[78] Furthermore, recipient countries must have a comprehensive safeguards agreement and an additional protocol or voluntary offer agreement and additional protocol with the IAEA.[79] These measures ensure that the use of Australian uranium aligns with international non-proliferation standards and is consistently monitored by the IAEA to prevent diversion to military programmes, including those related to nuclear submarines.

The situation surrounding Australian uranium and the AUKUS submarine programme is rich with irony, exemplifying a striking paradox between national capabilities and legislative constraints. Although Australia is set to commence the construction of SSN-AUKUS submarines at the Osborne Naval Shipyard in South Australia,[80] remarkably close to major uranium mining operations, the country's own uranium resources remain untapped for this purpose. The authorised port for all Australian uranium exports is a mere six-minute drive from the Osborne base where these submarines will be built.[81] This proximity underscores a peculiar juxtaposition: while Australia stands on the brink of advancing its military capabilities through a sophisticated submarine programme, its stringent policies ensure that domestically mined uranium cannot contribute to this advancement.

Moreover, while Australian law prohibits uranium enrichment within its borders – a key process for producing the specialised nuclear fuel needed for submarines – Australian innovation flourishes in this area abroad. Silex Systems Limited, an Australian company, is a leader in the development of laser uranium enrichment technology.[82] However, due to the

73. Australian Radiation Protection and Nuclear Safety Act 1998 (Cth) s. 10. Environment Protection and Biodiversity Conservation Act 1999 (Cth) ss. 37J, 140A, 146M and 305.
74. Defence (2023), "The AUKUS Nuclear Powered Submarine Pathway: A Partnership for the Future", p. 35.
75. Australian Government Department of Foreign Affairs and Trade (DFAT) (n.d.), "Australia's Uranium Export policy", www.dfat.gov.au/international-relations/security/non-proliferation-disarmament-arms-control/policies-agreements-treaties/australias-uranium-export-policy (accessed 24 Sept. 2024).
76. *Ibid*.
77. Leask, A. and D. Mason (2007), *supra* note 35, p. 263. As an example, see Agreement between the Government of Australia and the Government of the United States of America concerning Peaceful Uses of Nuclear Energy, entered into force 22 Dec. 2010, Article 2(k).
78. *Ibid,* Article 8.
79. DFAT (n.d.), *supra* note 75.
80. Defence (2023), *supra* note 74.
81. Department for Energy and Mining (n.d.), *supra* note 66.
82. Silex Ltd. (n.d.), "Silex Uranium Enrichment Technology", www.silex.com.au/silex-technology/silex-uranium-enrichment-technology/ (accessed 24 Sept. 2024).

regulatory environment, this cutting-edge technology is deployed exclusively overseas.[83] This scenario not only highlights the contradictions within Australia's nuclear policy but also raises questions about the implications of such disparities for national security and technological sovereignty. As Australia deepens its involvement in nuclear-powered defence through the AUKUS alliance, these legislative incongruities could prompt a re-evaluation of national policies to better align Australia's rich resource base with its strategic objectives.

c. Conclusion

The journey of uranium mining law in Australia is a story of continuous adaptation to domestic and international events, shaped significantly by political rhetoric. The narrative showcases a "yo-yo effect" of policies, particularly between the Coalition and ALP governments. Despite the ALP abandoning its anti-uranium mining policy in 2007,[84] the legacy of these policy fluctuations continues to influence the current legal and operational landscape of the uranium mining sector in Australia. The controversy over bans on uranium mining in Western Australia resurfaced in 2024.[85] Upon its emergence, ALP Premier Roger Cook swiftly dismissed the proposal, while environmentalists cited the 2011 Fukushima Daiichi accident, which involved a plant powered by Australian uranium, as a stark reminder of the inherent risks associated with nuclear energy.[86]

Australia's abundance of high-grade uranium resources positions it as a potential global nuclear energy market leader. However, the legacy of historical government policies, fluctuating with the changing tides of political leadership, has led to a complex and often restrictive regulatory environment. This situation has locked up significant potential, hindering Australia from fully capitalising on its uranium wealth. The result is a dichotomy where Australia, despite being one of the world's largest holders of uranium reserves,[87] maintains a cautious approach to developing and exploiting these resources. The current legal framework reflects a cautious equilibrium, balancing economic opportunities with societal concerns.

The bipartisan support for the AUKUS partnership, combined with the well-established uranium mining industry in South Australia, known for its robust safety culture, brings to the fore a critical question for Australia's uranium regulatory framework. As the world increasingly leans towards nuclear power as a key component of sustainable energy strategies – underscored by the commitment of leading global economies at the recent COP28 summit to triple nuclear generation – the demand for uranium is poised to escalate.[88] This surge in global demand for uranium beckons Australia to re-evaluate its stance, particularly in jurisdictions like Western Australia and Queensland, which harbour considerable uranium deposits yet remain constrained by restrictive legal frameworks. The current geopolitical and environmental climate presents a unique opportunity for these states to reconsider their positions on uranium mining. With Australia holding some of the world's largest reserves of high-grade uranium,[89] the country is at a crossroads: Will it step up as a significant player in the global nuclear energy market, leveraging its uranium wealth to meet the burgeoning international demand, or will it continue to tread the cautious path set by its historical policy and regulatory fluctuations? The answer to this

83. *Ibid*.
84. Australian Labor Party (2007), *supra* note 52.
85. Robinson, T. (2024), "Uranium mining has long divided Western Australia, but industry observers say a viable trade could be established", ABC News, www.abc.net.au/news/2024-03-17/uranium-mining-ban-or-viable-trade-in-western-australia/103592520.
86. *Ibid*.
87. NEA and IAEA (2023), *supra* note 7.
88. Donovan, J. (2023), "Nuclear Power Finally Has its Moment at UN Climate Summit", IAEA News, www.iaea.org/newscenter/news/nuclear-power-finally-has-its-moment-at-un-climate-summit.
89. World Nuclear Association (2022), "World Uranium Mining Production", https://world-nuclear.org/information-library/nuclear-fuel-cycle/mining-of-uranium/world-uranium-mining-production.aspx.

holds significant implications not only for Australia's economic and strategic positioning but also for its contribution to the global pursuit of sustainable and secure energy solutions.

3. Weapons testing, safeguards and non-proliferation

Australia's approach to safeguards and non-proliferation laws has undergone a significant transformation, moving from a period marked by early involvement in nuclear weapons testing to a current focus on key international treaties. This shift is evident in its stance on key international treaties such as the Nuclear Non-Proliferation Treaty (NPT),[90] the Comprehensive Nuclear Test Ban Treaty (CTBT)[91] and the Treaty on the Prohibition of Nuclear Weapons (TPNW).[92] Today, Australia's commitment to nuclear non-proliferation is evident in its active participation in numerous bilateral, plurilateral and multilateral treaties and arrangements aimed at reducing or eliminating nuclear weapons and preventing their proliferation.[93] The country has consistently worked to bolster support for the NPT through initiatives like the Non-Proliferation and Disarmament Initiative, advancing nuclear disarmament verification and promoting risk reduction measures.[94] Furthermore, Australia's influential role in advocating for the CTBT and its commitment to the South Pacific Nuclear Free Zone Treaty Act 1986 ratifying the South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga)[95] underscores its dedication to global disarmament efforts.

a. Safeguards and the Nuclear Non-Proliferation Treaty (NPT)

Safeguards and non-proliferation are aimed at preventing the diversion of nuclear material for non-peaceful purposes, ensuring the peaceful use of nuclear energy and inhibiting the spread of nuclear weapons through comprehensive international regulation and monitoring.[96] Although the term "non-peaceful" is not explicitly defined in international agreements, the IAEA classifies military applications, including nuclear propulsion in submarines, as non-peaceful activities.[97]

In the aftermath of World War II, as the international community grappled with the implications of atomic energy, Australia emerged as a proactive participant in global atomic discussions. The establishment of the United Nations Atomic Energy Commission in 1946, with Australia's Dr H.V. Evatt as its first chairman, signified the country's early and

90. Treaty on the Non-Proliferation of Nuclear Weapons (1968), IAEA Doc. INFCIRC/140, 729 UNTS 169, entered into force 5 Mar. 1970.
91. Comprehensive Nuclear-Test-Ban Treaty (1996) (not yet entered into force), available at: www.ctbto.org/fileadmin/content/treaty/treaty_text.pdf (accessed 24 Sept. 2024).
92. Treaty on the Prohibition of Nuclear Weapons (2017), UN Doc A/CONF.229/2017/8, adopted 7 July 2017, opened for signature 20 Sept. 2017, entered into force 22 Jan. 2021.
93. DFAT (n.d.), "Non-proliferation, Disarmament and Arms Control", www.dfat.gov.au/international-relations/security/non-proliferation-disarmament-arms-control/nuclear-weapons (accessed 24 Sept. 2024).
94. DFAT (n.d.), "Nuclear Weapons", DFAT, www.dfat.gov.au/international-relations/security/non-proliferation-disarmament-arms-control/nuclear-weapons (accessed 24 Sept. 2024).
95. South Pacific Nuclear Free Zone Treaty Act 1986 (Cth); South Pacific Nuclear Free Zone Treaty (1985), 1445 UNTS 177, entered into force 11 Dec. 1986, ratified by Australia on 11 Dec. 1986.
96. Stoiber, C., et al. (2003), *Handbook on Nuclear Law*, IAEA, Vienna, p. 125.
97. Shea, T. (2017), "The Non-proliferation and Disarmament Challenges of Naval Nuclear Propulsion", Federation of American Scientists, Washington, DC; Rockwood, L. (2017), "Naval Propulsion and IAEA Safeguards", Federation of American Scientists, Washington, DC; Desjardins, M.F. and T. Rauf (1988), "Opening Pandora's Box? Nuclear Powered Submarines and the Spread of Nuclear Weapons", Aurora Papers 8, The Canadian Centre for Arms Control and Disarmament.

influential role in shaping the international atomic energy discourse.[98] This period marked the beginning of Australia's journey in nuclear non-proliferation, balancing the dual aspects of atomic energy's potential for immense destruction and unprecedented progress.

The atomic bombings in Japan during World War II were a catalyst for this global awakening to the need for atomic energy regulation.[99] In response to these events, nations worldwide, including the United States and the United Kingdom, enacted legislation to control and manage atomic energy. The United States passed the Atomic Energy Act of 1946, establishing civilian control over atomic energy development.[100] Similarly, the United Kingdom's Atomic Energy Authority Act of 1954[101] set up the Atomic Energy Authority to oversee its civil nuclear programme.[102] These international legislative responses greatly influenced Australia's approach to nuclear law and policy.

Domestically, the Atomic Energy (Control of Materials) Act of 1946 marked Australia's initial legislative step in managing atomic energy – predominately uranium.[103] Australia's legal and policy framework continued to evolve in response to international trends. The Atomic Energy Act 1953, inspired by the US and UK approach, enhanced governance and security over nuclear materials and established the AAEC.[104] This period also saw Australia's increased engagement in global disarmament discussions and its accession to the IAEA in 1957, reflecting its commitment to peaceful nuclear use and non-proliferation.[105]

The late 1950s and the 1960s were a period marked by heightened international efforts to establish a more formalised system for preventing the spread of nuclear weapons. This led to the proposal of the NPT.[106] The NPT, entering into force in 1970, was a landmark international treaty with the primary objectives to prevent the spread of nuclear weapons and weapons technology, to promote co-operation in the peaceful uses of nuclear energy and to further the goal of achieving nuclear disarmament.[107] The treaty represented a significant commitment by the signatory states to curb the proliferation of nuclear weapons while also recognising the rights of all states to access nuclear technology for peaceful purposes under appropriate safeguards.[108]

The 1950s and 1960s were also marked by a series of domestic events that further shaped Australia's nuclear policy. The British nuclear tests at Montebello Islands, Maralinga and Emu Field, sanctioned by the Australian government, played a pivotal role in aligning Australia with the United Kingdom's nuclear ambitions.[109] These tests, pivotal in advancing nuclear capabilities, also precipitated profound health, environmental and geopolitical concerns. Their legacy significantly influenced public opinion and policy in

98. Commonwealth of Australia, House of Representatives (1946), "United Nations – Atomic Energy Commission – Statement of Australia's Participation", Parliamentary Debates, 1 Aug. 1946.
99. Haakansson, A. and T. Jonter (2007), "An Introduction to Nuclear Non-Proliferation and Safeguards", SKI Report 2007:44, Swedish Nuclear Power Inspectorate, p. 20.
100. Atomic Energy Act of 1946, Pub. L. No. 79-585, 60 Stat. 755 (enacted 1 Aug. 1946).
101. Atomic Energy Authority Act 1954, c. 32 (UK).
102. Reynolds, W. and D. Lee. (2013), "Australia and the Nuclear Non-Proliferation Treaty 1945-1974", DFAT, p. 17.
103. Atomic Energy (Control of Materials) Act of 1946 (Cth), s. 6.
104. Senate, Parliament of Australia, "Second Reading Speech – Atomic Energy (Control Of Materials) Bill 1952 Debates", 3 June 1952, pp. 1191-1193.
105. Anderson, D. (1997), "The Report of the Senate Select Committee on Uranium Mining and Milling in Australia", Chapter 12, Safeguards, Parliament of Australia.
106. Reynolds, W. and D. Lee (2013), *supra* note 102, p. 17.
107. Greig, D. (1975), "The Interpretation of Treaties and Article IV.2 of the Nuclear Non-Proliferation Treaty", *Australian International Law Journal*, Vol. 6, Australia International Law Association, Sydney, p. 77.
108. Stoiber, C., et al. (2003), *supra* note 96.
109. Reynolds, W. and D. Lee (2013), *supra* note 102, p. 19.

Australia, casting a lasting shadow on the societal acceptance of Australia's involvement in the nuclear fuel cycle to this day.[110]

International events such as the Cuban Missile Crisis in 1962 and the escalating Cold War nuclear arms race further underscored the urgent need for international controls on nuclear weapons.[111] These events and growing public concern over nuclear proliferation played a pivotal role in shaping Australia's approach to the NPT.[112]

Despite initial reservations,[113] Australia's decision to sign the NPT in 1970 was driven by various factors, including the anticipated international support for its peaceful nuclear programme and the need to maintain strong alliances, particularly with the United States.[114] This move demonstrated Australia's commitment to playing a significant role in the global non-proliferation landscape. The subsequent ratification of the NPT in 1973 under the Federal Whitlam Government was a pivotal moment, marking Australia's formal commitment to the global non-proliferation regime.[115] Australia implemented the Safeguards Act and, as a non-nuclear weapons state, entered into a Comprehensive Safeguards Agreement with the IAEA.[116] Under the safeguards agreement, Australia reports what nuclear material it holds, the location of that material and allows IAEA inspectors to verify and inspect the material independently.

After ratifying the NPT, Australia shifted its focus towards effectively implementing NPT safeguards, a move significantly influenced by key global nuclear events and strategic alliances. Notably, the 1974 Indian nuclear test,[117] which utilised plutonium from an unsafeguarded reactor,[118] underscored the dual-use nature of nuclear technology and posed a stark challenge to the international non-proliferation regime.[119] Moreover, France's persistent atmospheric nuclear testing in the Pacific further strained this regime.[120] In response, Australia, alongside New Zealand, brought the landmark Nuclear Tests case to the International Court of Justice,[121] a significant step that not only reinforced its commitment to disarmament but also highlighted the vital role of international legal frameworks in addressing nuclear proliferation challenges.[122]

During this period, Australia's approach to nuclear non-proliferation and safeguards was also profoundly shaped by the broader international nuclear landscape, particularly the policies of the Carter administration in the United States.[123] Recognising its critical role as a major uranium supplier, Australia responded to the US focus on curbing the spread of

110. ABC (2005), "Chronology-Australia's Nuclear Political History", Four Corners, original webpage no longer active, archived page available at: https://web.archive.org/web/20100420055808/http://www.abc.net.au/4corners/content/2005/20050822_nuclear/nuclear-chronology.htm (accessed 24 Sept. 2024).
111. Niemann, G. (2013), "Nuclear Weapons and the Civilian Use of Nuclear Energy", *Flinders Law Journal*, Vol. 15, Flinders Academic Commons, Adelaide, p. 196.
112. Reynolds, W. and D. Lee (2013), *supra* note 102, p. 52.
113. Walsh, J. (1997), "Surprise Down Under: The Secret History of Australia's Nuclear Ambitions", *The Nonproliferation Review*, Vol. 5, Middlebury Institute of International Studies at Monterey, Washington, DC, p. 1; Reynolds, W. and D. Lee (2013), *supra* note 102, p. 53.
114. *Ibid*., p. 45.
115. *Ibid*., p. 49.
116. Agreement Between Australia and the Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (13 Dec. 1974) (Safeguards Agreement).
117. Perkovich, G. (1999), *supra* note 47.
118. India is not a party to the Non-Proliferation Treaty (NPT).
119. Reynolds, W. and D. Lee (2013) *supra* note 102, p. 26.
120. Nuclear Tests (Australia v. France) and Nuclear Tests (New Zealand v. France), *supra* note 36.
121. *Ibid*.
122. Rowe, R. (2021) "The Diplomatic Dimension: Australia and the 'Nuclear Tests Case'" *Melbourne Journal of International Law*, Vol. 21, No. 3, Melbourne Law School, Melbourne, pp. 536-52.
123. Clarke, M. (2012), *supra* note 34.

reprocessing technology and the associated risks of a "plutonium economy". The US policy aimed to shift global nuclear energy reliance towards uranium enrichment technologies, a strategy that later revealed its own proliferation risks. The federal Fraser Coalition government's "Uranium Decision" in 1977,[124] a direct response to these international dynamics and US policies, underscored Australia's moral responsibility to contribute to global non-proliferation efforts, given its vast uranium reserves. This decision emphasised rigorous safeguards for uranium exports, requiring that recipient countries be parties to the NPT and assure the non-diversion of nuclear materials for military use.

These pivotal events and the influence of international developments spurred a significant shift in Australia's engagement with international nuclear law and policy, leading to the creation of more robust legal mechanisms for regulating nuclear materials and activities. This period marked a proactive stance in Australia's nuclear policy, shaping future legal responses to nuclear challenges. The establishment of the Australian Safeguards Office within the AAEC represented a major advancement in Australia's legal and institutional framework for nuclear non-proliferation, setting the stage for the later formation of the Australia Safeguards and Non-Proliferation Office (ASNO) in 1998.[125]

Australia's ongoing commitment to nuclear non-proliferation and disarmament has been evident in its early adoption of enhanced NPT safeguards under the Model Additional Protocol in 1997.[126] The Additional Protocol is not a stand-alone agreement but rather an extension to Australia's existing safeguards agreement with the IAEA, providing additional tools for verification.[127] In an effort to ensure more effective checks against the diversion of nuclear materials for weaponisation, the Additional Protocol enhances the IAEA's capacity to monitor and verify nuclear activities by granting broader access to both nuclear and non-nuclear sites, as well as requiring more comprehensive reporting of nuclear material.[128]

In January 2023, this enduring commitment was further underscored as the Australian government commemorated the 50th anniversary of Australia's ratification of the NPT. This milestone was marked by public statements reaffirming Australia's dedication to the principles of the treaty. The government reiterated its commitment to nuclear disarmament and the global effort to eliminate nuclear weapons, highlighting Australia's role as a responsible member of the international community in the pursuit of a nuclear weapons-free world.[129]

The development of Australia's nuclear law in relation to the NPT is a narrative of strategic adaptation, legal evolution and diplomatic engagement in response to changing global nuclear landscapes. From its initial legislative responses to the atomic age to its current role in international non-proliferation efforts, Australia's journey reflects a dynamic balance between national interests and international commitments. As Australia continues to navigate the complex interplay of domestic legal frameworks and international treaties, its experience offers valuable insights into the challenges and opportunities inherent in the pursuit of a safe, secure and non-proliferated nuclear future.

124. *Ibid*.
125. Anderson, D. (1997), "The Report of the Senate Select Committee on Uranium Mining and Milling in Australia", Parliament of Australia, Chapter 12, Safeguards.
126. IAEA (1998), "Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards", IAEA Doc. INFCIRC/540 (Corr.).
127. Leask, A. and D. Mason (2007), *supra* note 35, p. 251.
128. Stoiber, C. (2006), "Nuclear Safety, Security and Safeguards in a New Century: Legal Issues and Approaches", *Australian Mining and Petroleum Law Association (AMPLA) Yearbook*, Energy & Resources Law Association, Melbourne, p. 22.
129. Minister for Foreign Affairs, Senator the Honourable (Hon.) Penny Wong (2023) "AUKUS won't undermine Australia's stance against nuclear weapons", www.foreignminister.gov.au /minister/penny-wong/opinion/aukus-wont-undermine-australias-stance-against-nuclear-weapons (accessed 24 Sept. 2024).

b. Comprehensive Nuclear Test Ban Treaty (CTBT)

The CTBT[130] is, as the name suggests, a comprehensive international agreement aimed at prohibiting all nuclear test explosions, including those for military and civilian purposes.[131] The treaty's objective is to curb the development and qualitative improvement of nuclear weapons and to prevent the proliferation of these weapons in both nuclear and non-nuclear states.[132] However, the treaty is yet to enter into force because it requires ratification by 44 specific states that participated in the negotiations of the treaty and possess nuclear research or power reactors.[133] As of now, several key states, such as the People's Republic of China, Egypt, India, the Islamic Republic of Iran, Israel, Korea, Pakistan, the Russian Federation and the United States, have either not signed or not ratified the CTBT, thus impeding its global legal enactment and enforcement.[134]

Australia played a pivotal role in the advocacy and drafting of the CTBT.[135] This involvement was part of a broader Australian commitment to nuclear disarmament and non-proliferation, a stance consistent with the country's foreign policy.[136] Australia ratified the treaty in 1998.[137] The Comprehensive Nuclear-Test-Ban Treaty Act 1998 (CTBT Act)[138] prohibits any nuclear explosion within Australian jurisdiction or by Australian nationals anywhere in the world, with severe penalties for violations.[139] Although the CTBT has not yet entered into force internationally due to the pending ratifications by certain Annex II countries, Australia's domestic CTBT Act is operational, except for a few provisions related to the establishment of the Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).[140] Australia has been actively engaged in the provisional application of the CTBT, particularly through significant participation in the Preparatory Commission for the CTBTO and the International Monitoring System (IMS).[141] With Australia hosting the third-largest number of IMS stations worldwide,[142] it plays a pivotal role in bolstering the CTBT's verification regime, thereby demonstrating its strong and practical commitment to fulfilling the treaty's aims and objectives. Moreover, the CTBT Act empowers the Australian government to establish and operate IMS stations and to provide data crucial for CTBT monitoring purposes.[143] It also facilitates the government's authority to make arrangements with the CTBTO, enhancing Australia's role in international monitoring and verification efforts.

Australia's journey with the CTBT and domestic implementation via the CTBT Act showcases the country's consistent and progressive stance on nuclear issues. Through its legal, diplomatic and practical measures, Australia continues to play a significant role in the global movement towards a world free from nuclear testing, aligning with its broader objectives of promoting international peace, security and a safer global environment.

130. Comprehensive Nuclear-Test-Ban Treaty, *supra* note 91.
131. *Ibid*., preamble.
132. *Ibid*.
133. *Ibid*., Annex 2; Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) (2023), "States Signatories", www.ctbto.org/our-mission/states-signatories (accessed 24 Sept. 2024).
134. *Ibid*.
135. Australia Safeguards and Non-Proliferation Office (ASNO) (2020), "Annual Report 2019-2020", DFAT, www.dfat.gov.au/sites/default/files/asno_annual_report_2019-2020.pdf.
136. Minister for Foreign Affairs, Senator the Hon. Marise Payne (ret.) (2021), "Australian elected Executive Secretary of the Comprehensive Nuclear-Test-Ban Treaty Organization", www.foreignminister.gov.au/minister/marise-payne/media-release/australian-elected-executive-secretary-comprehensive-nuclear-test-ban-treaty-organization.
137. Commonwealth of Australia (1998) "Response to the Parliament of the Commonwealth of Australia Joint Standing Committee on Treaties Fifteenth Report", June 1998, p. 6.
138. Comprehensive Nuclear-Test-Ban Treaty Act 1998 (Cth).
139. *Ibid*, sec. 8.
140. *Ibid*, sec. 2.
141. ASNO (2020) *supra* note 135.
142. DFAT (n.d.) *supra* note 94.
143. Comprehensive Nuclear-Test-Ban Treaty Act 1998 (Cth), *supra* note 138, part 4.

c. Treaty on the Prohibition of Nuclear Weapons (TPNW)

The TPNW, which came into force in 2021 and has garnered the support of 93 nations, represents a significant step towards global nuclear disarmament.[144] The treaty aims to comprehensively prohibit nuclear weapons and establish legal obligations for their elimination, marking a pivotal development in international efforts to address the threat posed by nuclear arms.[145]

Despite the momentum behind the TPNW and its alignment with Australia's longstanding advocacy for nuclear disarmament, Australia has not signed the treaty.[146] This decision reflects a complex interplay of strategic, diplomatic and security considerations, particularly in the context of Australia's alliances and its role in the international security landscape.

In December 2018, while in opposition government, the current Prime Minister of Australia, the Honourable (Hon.) Anthony Albanese, introduced a motion at the ALP national conference committing the party to sign and ratify the TPNW upon forming the government. In his speech, Mr Albanese emphasised the moral imperative behind the treaty and the historical role of ALP governments in championing international disarmament initiatives. The motion, which highlighted nuclear weapons as "the most destructive weapons ever invented", was adopted by the party, signalling a strong commitment to the treaty's objectives.[147] Despite this commitment, which notably came before the AUKUS announcement, the federal Albanese government, upon assuming power, has adopted a more cautious approach. While acknowledging the shared goals with parties to the TPNW and expressing a desire to engage constructively in discussions around nuclear disarmament, the government has emphasised the need for realistic pathways to achieve these goals.[148] The Australian government's stance reflects a pragmatic approach, considering the treaty systematically and methodically within its broader agenda to advance nuclear non-proliferation and disarmament.

Australia's attendance as an observer at the first and second meetings of state parties to the TPNW further demonstrates its interest in understanding the treaty's implementation and the perspectives of its signatories.[149] This engagement, while not amounting to endorsement or participation as a state party, indicates Australia's willingness to stay informed about the treaty's developments and its potential impact on global disarmament efforts.

The position of Australia's key ally, the United States, along with other nuclear-armed nations that oppose the TPNW, undoubtedly influences Australia's approach.[150] The alignment with these nations, particularly the United States, has been a critical factor in shaping Australia's foreign policy and strategic decisions, including its stance on nuclear weapons treaties.

144. Comprehensive Nuclear-Test-Ban Treaty, *supra* note 91.
145. United Nations (2017), "Treaty on the Prohibition of Nuclear Weapons" (A/CONF.229/2017/8, 7 July 2017); Peart, I. (2021) "The Treaty on the Prohibition of Nuclear Weapons and the Fragmentation of Nuclear Disarmament Law: Creating Conflict or Filling the Gaps?", *Australian International Law Journal*, Vol. 28, pp. 33-52.
146. Minister for Foreign Affairs, Senator the Hon. Penny Wong, Press Release, "Second Meeting of States Parties to the Treaty on the Prohibition of Nuclear Weapons", Media Statement of the Foreign Minister of Australia (26 Nov. 2023); Wright, T. (2009), "Negotiations for a Nuclear Weapons Convention Distant Dream or Present Possibility", *Melbourne Journal of International Law*, Vol. 10, No. 1, Melbourne Law School, Melbourne, pp. 217-45.
147. Karp, P. (2022), "Australia yet to sign up to treaty banning nuclear weapons but will attend UN meeting as observer", The Guardian, www.theguardian.com/australia-news/2022/jun/20/australia-yet-to-sign-up-to-treaty-banning-nuclear-weapons-but-will-attend-un-meeting-as-observer.
148. Senator the Hon. Penny Wong, *supra* note 146.
149. *Ibid*.
150. Hood, A. and C. Monique (2020), "Can Australia Join the Nuclear Ban Treaty without Undermining ANZUS?", *Melbourne University Law Review*, Vol. 44, No. 1, Melbourne Law School, Melbourne, pp. 132-161.

Australia's relationship with the TPNW is indicative of the challenges and complexities inherent in balancing moral imperatives, strategic alliances and security considerations. While Australia's commitment to nuclear disarmament and non-proliferation remains steadfast, its cautious approach to the TPNW highlights the multifaceted nature of international diplomacy and the need to navigate diverse perspectives and interests in pursuing global security and peace.

d. Safeguards and AUKUS

The initiation of the AUKUS programme, notably involving Australia's acquisition of nuclear-powered submarines, has initiated a critical phase in the evolution of nuclear safeguards laws in Australia. This development necessitates a detailed re-evaluation of Australia's legal commitments under its comprehensive safeguards agreement with the IAEA as it relates to nuclear material to be used in defence activity.

The comprehensive safeguards agreement between Australia and the IAEA and the Additional Protocol form the cornerstone of Australia's commitments to nuclear non-proliferation. Within this framework, Article 14 of the agreement deals with the "non-application of safeguards to nuclear material to be used in non-peaceful activities", which becomes particularly relevant in the context of the AUKUS programme.[151] While the term "non-peaceful activities" is not explicitly defined in the agreement, it is a longstanding position of the IAEA that nuclear propulsion in submarines is a non-peaceful activity and falls within the scope of Article 14.[152]

The procedures outlined in Article 14 require that before any nuclear material can be withdrawn from the safeguards framework for use in non-peaceful activities, the IAEA and the state must negotiate an arrangement.[153] This arrangement ensures that safeguards continue to apply, albeit in an altered framework that balances the protection of sensitive military information with the prevention of material diversion for prohibited purposes.[154]

The communication from Australia's Foreign Minister to the IAEA on 10 March 2023, signifying the intention to commence negotiations for such an arrangement and an acknowledgement by Australia that nuclear propulsion is a "non-peaceful activity", is a pivotal moment in Australia's nuclear law history.[155] This negotiation process is not just a formality but a critical step in ensuring that Australia's move into naval nuclear propulsion adheres to its longstanding policy of non-proliferation and commitment to nuclear disarmament, as reaffirmed during the 50th-anniversary celebrations of the NPT ratification in January 2023.[156]

These discussions, which involve complex technical and legal considerations, highlight Australia's challenges in aligning its strategic defence interests with international non-proliferation commitments. The influence of AUKUS partners, both nuclear weapons states with voluntary offer agreements and additional protocols,[157] adds another layer to these negotiations, noting Australia has advised it will consult its AUKUS

151. Safeguards Agreement, *supra* note 116, Article 14.
152. Shea, T. (2017), *supra* note 97; Rockwood, L. (2017), *supra* note 97; Desjardins, M.F. and T. Rauf (1988), *supra* note 97.
153. Safeguards Agreement *supra* note 116, Article 14.
154. Rockwood, L. (2021) "Australia-UK-U.S. Submarine Deal: Submarines & Safeguards", Arms Control Association, www.armscontrol.org/act/2021-12/features/australia-uk-us-submarine-deal-submarines-and-safeguards.
155. IAEA (2023), "Communication dates 14 March 2023 received from the Permanent Mission of Australia to the Agency" INFCIRC/1079.
156. Senator the Hon. Penny Wong (2023), *supra* note 129.
157. Nuclear weapon states that are party to the NPT are not required to conclude safeguards agreements with the IAEA. However, each of the five nuclear weapon states, including the United States and United Kingdom have entered into Volunteer Offer Agreements with the IAEA. IAEA (n.d.), "More on Safeguards agreements", IAEA, www.iaea.org/topics/safeguards-legal-framework/more-on-safeguards-agreements.

partners during the negotiations.[158] It raises questions about how Australia will balance its longstanding non-proliferation stance with the security considerations necessitated by the AUKUS programme.

The legal and political narratives emerging from the AUKUS partnership and the impending safeguards arrangement negotiations extend beyond a bilateral dialogue between Australia and the IAEA, attracting global attention.[159] The manner and outcome of these discussions will critically shape Australia's role within the international non-proliferation regime and influence its diplomatic relations. The transparency of the process and whether the arrangement's terms will be publicly disclosed are being closely watched by the international community.

The AUKUS partnership marks a significant juncture in Australia's legal and political history concerning nuclear non-proliferation. The ongoing negotiations and the resulting arrangement will not only redefine Australia's safeguards obligations but also mirror its capacity to align strategic defence interests with international legal commitments. This scenario underscores the dynamic nature of international nuclear law and the ongoing necessity for adaptive legal and diplomatic strategies in global non-proliferation efforts.

e. Conclusion

The realm of safeguards and non-proliferation in Australian nuclear law presents a unique landscape of political consensus, distinct from other areas of nuclear policy. Historically, this field has largely transcended partisan divides, with both major political parties demonstrating a consistent commitment to non-proliferation principles and the implementation of stringent safeguards. This bipartisan approach reflects a unified national stance on a crucial aspect of global security and non-proliferation efforts.

However, the TPNW represents a notable exception in this otherwise bipartisan landscape. The TPNW has elicited divergent views within Australian politics, mirroring broader international debates and highlighting the complexities of aligning national policy with evolving global disarmament initiatives.

International politics and the management of strategic alliances heavily influence the political rhetoric in the domain of safeguards and non-proliferation in Australia. Australia's approach in this arena is not driven solely by domestic policy considerations but is also shaped by its role and relationships on the global stage. The careful management of these international relationships, particularly with key allies and within multilateral frameworks, is critical to Australia's strategic approach to nuclear non-proliferation.

The AUKUS partnership and the consequent safeguards arrangements and negotiations represent a critical juncture for Australia, challenging its capacity to uphold its longstanding commitment to stringent non-proliferation standards as an early and proactive adopter of comprehensive safeguards. Simultaneously, Australia must navigate its strategic defence interests. This delicate balancing act is poised to provide valuable perspectives on the dynamic interplay between national security priorities and the principles of international nuclear law, underscoring the evolving complexities in this vital global arena.

As Australia continues to navigate these complex and evolving challenges, its commitment to nuclear non-proliferation and disarmament remains a central pillar of its foreign policy. The country's ability to maintain this commitment while adapting to changing geopolitical dynamics and technological advancements will be crucial in shaping its future in the international nuclear landscape.

158. Defence (2023), *supra* note 74, p. 9.
159. Rockwood, L. (2021), *supra* note 154.

4. Safety and security

This analysis delves into the evolution of nuclear safety and security laws in Australia, exploring how domestic factors and international events have shaped these critical areas of nuclear law. In the context of nuclear law, nuclear safety is defined as achieving proper operating conditions, preventing or mitigating accident consequences, and protecting workers, the public and the environment from undue radiation hazards.[160] On the other hand, nuclear security involves preventing, detecting and responding to criminal or unauthorised acts involving nuclear material, facilities or activities.[161] While there is a broad overlap, "security" generally deals with intentional human acts of a criminal nature, whereas "safety" encompasses broader risks of harm from radiation, regardless of the cause. Nuclear safety and security serve as the bedrock of nuclear law, pivotal in ensuring that nuclear technology is utilised responsibly and safely under the common goal of protecting people, society and the environment.

a. Nuclear safety

Under the Australian Constitution, nuclear safety regulation is divided between the federal and state governments. Nuclear safety is regulated by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) under the Australian Radiation Protection and Nuclear Safety Act 1998 (Cth) (ARPANS Act)[162] at the federal level for nuclear activities of government entities and its contractors or on Commonwealth land or declared places. State-based environmental and health regulators oversee nuclear safety within their jurisdictions.[163] Historically, nuclear safety laws focused on uranium mining, medical radiation and the oversight of research reactors like the High Flux Australian Reactor (HIFAR) and MOATA, established in 1958 and 1961, respectively.[164] At the time, state and territory government regulators enforced safety in uranium mining and medical radiation, seeking consistency through bodies like the National Radiation Advisory Committee and the Australasian Radiation Protection Society. The federal government's role in nuclear safety, under the Atomic Energy (Control of Materials) Act of 1946 (Cth) and later the Atomic Energy Act 1953 (Cth), was primarily executed by the AAEC.[165] The governance of radiation safety at the federal level dates back to 1935 with the Commonwealth X-Ray and Radium Laboratory, later evolving into the Commonwealth Radiation Laboratory and then the Australian Radiation Laboratory until 1999.[166] In 1999, the Australian Radiation Laboratory merged with the Nuclear Safety Bureau to form a single agency, ARPANSA, which now oversees both radiation protection and nuclear safety in Australia.[167] This article concentrates on the development of national nuclear safety law and not the states and territories of Australia. In 1987, the AAEC was replaced by the Australian Nuclear Science and Technology Organisation (ANSTO), as it is known today, shifting the focus

160. IAEA (2022), *IAEA Nuclear Safety and Security Glossary, 2022 (Interim) Edition*, IAEA, Vienna, pp. 139-140.
161. *Ibid.*, p. 140.
162. Australian Radiation Protection and Nuclear Safety Act 1998 (Cth).
163. See Australian Capital Territory Health Protection Services; New South Wales Environmental Protection Authority; Northern Territory Department of Health; Queensland Department of Health; South Australian Environmental Protection Authority; Tasmanian Department of Health and Human Services; Victorian Department of Health; and Western Australian Radiological Council.
164. ANSTO (n.d.), *supra* note 5.
165. Atomic Energy (Control of Materials) Act of 1946 (Cth); Atomic Energy Act 1953 (Cth).
166. Holland, I. (2003), "Radioactive Waste and Spent Nuclear Fuel Management in Australia", Parliamentary Library of Australia, Information and Research Services, p. 7.
167. Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) (n.d.), "Our History", www.arpansa.gov.au/sites/default/files/legacy/pubs/annualreport/2013-14/ourhistory.pdf (accessed 24 Sept. 2024).

towards peaceful applications of nuclear technology.[168] The Atomic Energy Act 1953 (Cth), which initially established the AAEC, was amended to limit the scope of the Act to regulate uranium mining in the Northern Territory and uranium exports.[169]

The Chernobyl accident in 1986 was a pivotal event,[170] underscoring the reality that the safety risks associated with nuclear activities were not confined within national borders but had far-reaching, international ramifications.[171] The aftermath of this catastrophe spurred a newfound era of global collaboration in the realm of nuclear safety. This international response, orchestrated under the guidance of the IAEA, resulted in the formulation and adoption of four key nuclear safety conventions.[172] These conventions marked a significant shift in the approach to nuclear safety, emphasising the need for international standards and co-operation to manage and mitigate nuclear risks effectively. Australia swiftly adopted and ratified these international instruments, reflecting its commitment to global nuclear safety standards.

The 1986 Convention on the Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency were among the first responses to Chernobyl by the international community.[173] These conventions established frameworks for international notification and assistance in the event of a nuclear accident or radiological emergency. ARPANSA administers Australia's obligations under these conventions today and is responsible for maintaining a link to the IAEA to provide or receive information relating to an accident.

The subsequent significant international development was the Convention on Nuclear Safety (CNS),[174] ratified by Australia in December 1996. Although Australia had no nuclear power plants, its involvement in the CNS negotiations and early ratification reflected its dedication to improving global nuclear safety standards and voluntarily applying those standards to its medical reactors.[175] In 1998, Australia passed the ARPANS Act,[176] introducing a comprehensive regulatory framework for all federal government radiation and nuclear activities. This Act closed regulatory gaps created by the constitutional division of powers and merged the Australian Radiation Laboratory with the Nuclear Safety Bureau to form ARPANSA, enhancing oversight and uniformity in radiation and nuclear safety across Australia.[177]

168. Australian Nuclear Science and Technology Organisation Act 1987 (Cth); Minister for Resources and Energy, Senator Gareth Evans Q.C., Press Release, "Australian Atomic Energy Commission to be Replaced" (15 Oct. 1985).
169. Atomic Energy Amendment Act 1987 (Cth).
170. IAEA (1996), *supra* note 50.
171. Davies, J. and P. Sullivan (2011), "Nuclear Power Post-Fukushima A Framework for an Australian Nuclear Future", *Australian Resources and Energy Law Journal*, Vol. 30, No. 2, Energy & Resources Law Association, Melbourne, p. 203; Stoiber, C. (2006) *supra* note 128, pp. 4-5.
172. Tonhauser, W., A. Wetherall and L. Thiele (2022) "International Legal Framework on Nuclear Safety: Developments. Challenges and Opportunities", in Nick, K.S. and S.G. Burns (eds.), *Principles and Practice of International Nuclear Law*, OECD Publishing, Paris, p. 123.
173. Convention on Early Notification of a Nuclear Accident (1986), IAEA Doc. INFCIRC/335, 1439 UNTS 276, entered into force 27 Oct. 1986, ratified by Australia on 22 Sept. 1987; Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986), IAEA Doc. INFCIRC/336, 1457 UNTS 134, entered into force 26 Feb. 1987, ratified by Australia on 22 Sept. 1987.
174. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293, entered into force 24 Oct. 1996, ratified by Australia on 24 Dec. 1986.
175. *Ibid.*; Minster for Foreign Affairs, Senator the Hon. Alexander Downer AC (ret.), Press Release, "Australia Ratifies Nuclear Safety Convention" (31 Dec. 1996).
176. Australian Radiation Protection and Nuclear Safety Act 1998 (Cth).
177. Commonwealth of Australia, House of Representatives, Parliament of Australia (1998), "Second Reading Speech of Australian Radiation Protection and Nuclear Safety Bill 1998", Hansard, 11 Nov. 1998, p. 89.

Following the CNS, Australia ratified the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention).[178] This convention, ratified in August 2003, commits countries to maintain high safety standards in managing spent fuel and radioactive waste,[179] further embedding Australia in the global nuclear safety regime.

In the wake of the Fukushima Daiichi accident, while hard legal reforms were limited internationally and domestically, there were notable soft law improvements.[180]

The announcement of the AUKUS partnership in 2021 brought the next major development in Australia's nuclear safety law. The Australian government announced in 2023 the establishment of a new statutory regulator to oversee the nuclear safety and radiological protection of Australia's nuclear-powered submarine enterprise, effectively creating two distinct nuclear safety regulators in the country, ARPANSA and the proposed Australian Naval Nuclear Power Safety Regulator (ANNPSR).[181] The Australian Naval Nuclear Power Safety Act 2024 (Cth) establishes a regulatory framework for the nuclear safety of activities related to AUKUS submarines.[182] This includes ANNPSR to oversee nuclear safety across the submarines' lifecycle, harmonising with existing work health and safety, nuclear non-proliferation and civilian nuclear safety schemes.

In 2023, Australia's nuclear safety protocols were tested and criticised,[183] with the first significant incident to make international headlines.[184] A radioactive source was lost during transit from a mine site in the Pilbara region, in the north of Western Australia, to a repair facility in Perth. Despite the capsule's small size, the ceramic radioactive material it contained posed a potential hazard if someone were to be exposed to it for an extended period. The recovery of the capsule, found two metres off a highway after a detailed and collaborative search by ARPANSA, ANSTO and the Western Australian Government, showcased the efficacy of Australia's inter-agency collaboration and emergency response protocols.

Rio Tinto, responsible for the transit, conducted an internal review of the incident, although the findings were not made public.[185] This raises pressing questions about the adequacy of existing safety standards, highlighting how, under all the layers of regulatory oversight, a radioactive capsule could still literally fall off the back of a truck. This incident underscores the importance of stringent management, safety protocols and regulation of radioactive materials, highlighting the risks of accidental exposure and the need for prompt, co-ordinated action to respond to such challenges.

The development of Australia's nuclear safety laws has been primarily influenced by significant international incidents and has aligned with global safety standards, rather than being a subject of political contention. This approach is underpinned by Australia's longstanding tradition of rigorous safety culture in its mining, energy and manufacturing industries. Australia's history with these sectors has fostered a comprehensive framework

178. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997), IAEA Doc. INFCIRC/546, 2153 UNTS 357, entered into force 18 June 2001 and ratified by Australia on 5 Aug. 2003 (Joint Convention).
179. *Ibid*.
180. Burns, S.G. (2012), "The Fukushima Daiichi Accident: The International Community Responds", *Washington University Global Studies Law Review*, Vol. 11, No. 4, Washington University, St. Louis, pp. 739-779.
181. Minister for Defence, the Hon. Richard Marles MP (2023), "AUKUS nuclear-powered submarine pathway", House of Representatives, Parliament of Australia.
182. Australian Naval Nuclear Power Safety Act 2024 (Cth).
183. Ho, C. and A. Searson (2023), "Prime minister slams 'ridiculously low' penalty for mishandling radioactive material", ABC News, www.abc.net.au/news/2023-02-01/anthony-albanese-lost-radioactive-capsule-western-australia/101915640.
184. ARPANSA (2023), "Australian Radiation Protection and Nuclear Safety Agency Annual Report 2022-23", ARPANSA, Case Study 3: Radioactive source.
185. Bourke, K. (2023), "Rio Tinto won't be fined over the lost radioactive capsule, authorities confirm", ABC News, www.abc.net.au/news/2023-07-20/rio-tinto-escapes-fine-over-radioactive-capsule/102628148.

of work health and safety laws and environmental safety regulations. In the context of nuclear safety, this background has lent itself to adopting the highest level of regulation without significant political dispute, as nuclear energy is perceived as requiring stringent oversight to ensure safety and public confidence.

However, the established rhetoric around nuclear safety is beginning to evolve, particularly in the uranium mining sector. Industry voices are increasingly questioning the necessity of additional layers of environmental safety laws, specifically those under the Environmental Protection and Biodiversity Conservation (EPBC) Act concerning the nuclear trigger.[186] The EPBC Act mandates that federal environmental legislation will apply to state and territory regulated activities, requiring duplicative assessments if the proposed activity interacts with the nuclear fuel cycle.[187] This shift indicates a growing dialogue on balancing the stringent regulatory environment with the operational realities and safety track record of the uranium mining industry.

While the path of nuclear safety law in Australia has been largely non-political and deeply influenced by international standards and incidents, a debate appears to be emerging in specific sectors, such as uranium mining, and is likely to further develop as the AUKUS pathway continues. This shift reflects a broader re-evaluation of the balance between stringent safety regulations and industry efficiency within Australia's well-established safety culture and regulatory framework.

b. Nuclear security

In Australia, nuclear materials and facilities are regulated and managed by multiple agencies, with specific roles delineated under distinct mandates. ASNO is tasked with implementing safeguards obligations under the NPT and Safeguards Act.[188] ASNO also enforces security obligations under the Convention on the Physical Protection of Nuclear Material (CPPNM), which are reflected in the Safeguards Act.[189] This broad mandate underscores ASNO's integral role in both safeguarding and securing nuclear materials. Meanwhile, ARPANSA primarily focuses on radiation protection and nuclear safety, addressing security concerns to the extent that they overlap with safety issues.[190] Before the establishment of these specialised bodies, nuclear security was managed under the broader umbrella of uranium regulation, nuclear safety and safeguards, primarily within the jurisdiction of the ASNO under the AAEC.[191]

As discussed in detail in Section 2, following decades of restrictions on uranium mining, the federal government agreed to reopen uranium mining and exports in 1977 with the promise of enhanced safety, safeguards and security measures.[192] This commitment sought to assure the public that uranium and its use in nuclear energy, a potentially dangerous energy source, would be managed safely and protected against criminal or unauthorised human acts that could cause harm. This development reflected an increasing awareness of the need for robust security measures in the nuclear sector.

In 1987, Australia ratified the CPPNM, which aimed to protect nuclear materials and facilities from theft and threat, thereby bolstering global nuclear security.[193] The

186. Wilkinson, L. (2018), "Mining and the EPBC Act Nuclear Trigger. A Review of its Rationale and Operation", Policy Paper, Minerals Council of Australia.
187. Environment Protection and Biodiversity Conservation Act 1999 (Cth), sec. 22.
188. ASNO (n.d.), "Australian Safeguards and Non-Proliferation Office: About Us", DFAT: ASNO, www.dfat.gov.au/international-relations/global-security/asno/about-us.
189. *Ibid*.
190. *Ibid*.
191. ASNO (n.d.), "50 years of commitment to non-proliferation: 1974 – 2024", ASNO, www.asno.gov.au/#vision.
192. Clarke, M. (2012), *supra* note 34.
193. Convention on the Physical Protection of Nuclear Material (1980), IAEA Doc. INFCIRC/274 Rev. 1, 1456 UNTS 125, entered into force 8 Feb. 1987 and ratified by Australia on 22 Sept. 1987 (CPPNM).

2005 Amendment to the CPPNM (A/CPPNM) expanded its scope to include protection against theft and sabotage of nuclear material in use, storage and transport, as well as measures for rapid recovery of missing or stolen material.[194] Australia ratified the A/CPPNM in 2008.[195] The Safeguards Act, in addition to giving effect to the NPT and Australia's safeguards agreement with the IAEA, provides a domestic legal framework to support the objectives of the A/CPPNM.[196] Part 2, Division 2 of the Safeguards Act, set out the offences related to the A/CPPNM, including a comprehensive set of offences carrying significant penalties. These include theft and smuggling of nuclear material, threats or attempts to use nuclear material to inflict public harm, actions threatening or causing damage to nuclear facilities, the use of nuclear material to cause harm, injury or death and illegal possession of nuclear material.[197]

Australia's nuclear security regime has been tested through various incidents, emphasising the importance of robust security measures. Notable incidents[198] include:

- In 1983, explosive materials were discovered within an electrical substation at a nuclear facility, marking a serious security breach.
- In 1984, there was a threat to attack the HIFAR research reactor using an aircraft, an incident that highlighted vulnerabilities in aerial security.
- In 1985, an act of vandalism led to the discharge of radioactive material into a nearby river, raising concerns about environmental safety and the promptness of incident reporting.
- The Sydney Olympics in 2000 saw heightened security concerns, with thwarted plots linked to international terrorists targeting nuclear facilities.
- In 2001, multiple co-ordinated arrests of terror suspects in Sydney and Melbourne revealed that the Lucas Heights reactor was a potential target, demonstrating the ongoing threat to nuclear installations.

These incidents have served as critical learning experiences, prompting enhancements in policies, procedures and legal frameworks, including amendments to the Safeguards Act.

Australia's stance on nuclear security extends beyond its borders, as evidenced by its international policy objectives. This is demonstrated through its ratification of the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT) in 2012.[199] Furthermore, Australia is a founding member of the Global Initiative to Combat Nuclear Terrorism and participates in the Global Partnership and Proliferation Security Initiative. Additionally, the report of the Canberra Commission on the Elimination of Nuclear Weapons, presented to the United Nations in 1996, and the Conference on Disarmament in 1997, further illustrates Australia's longstanding commitment to global nuclear security and non-proliferation.[200] These international engagements underscore Australia's proactive role in shaping a safer world free from the threat of nuclear weapons.

With respect to the AUKUS programme, the ANNPS Bill has provided some certainty on the path forward for nuclear safety and invoking the Article 14 process to negotiate a safeguards arrangement has provided some certainty on the pathway forward for nuclear

194. Amendment to the Convention on the Physical Protection of Nuclear Material (2005), IAEA Doc. INFCIRC/274/Rev.1/Mod.1, entered into force 8 May 2016 (A/CPPNM), ratified by Australia on 17 July 2008.
195. Non-Proliferation Legislation Amendment Act 2007, an Act to amend the Safeguards Act.
196. Nuclear Non-Proliferation (Safeguards) Act 1987 (Cth).
197. *Ibid.*, secs. 33, 34, 34A, 35, 35A, 36, and 37.
198. Ruff, T. (2006), "Nuclear Terrorism", Energy Science Coalition, www.energyscience.org.au/FS10%20Nuclear%20Terrorism.pdf.
199. International Convention for the Suppression of Acts of Nuclear Terrorism (2005), 2445 UNTS 137, entered into force 7 July 2007, ratified by Australia 16 Mar. 2012.
200. Canberra Commission on the Elimination of Nuclear Weapons (1996), *supra* note 54.

safeguards;[201] however, there is a distinct lack of clarity regarding the regulation of nuclear security. While the discussion paper released by the Commonwealth to explain the ANNPS Bill confirms that the ANNPS Bill would not displace the operation of the Safeguards Act,[202] and regulatory responsibility for safeguards and physical security of nuclear material will remain with ASNO, the military exclusions in the A/CPPNM and the NPT tell a different story. Both the A/CPPNM and the NPT, along with Australia's safeguards agreement, apply to nuclear material used for peaceful purposes only. Article 2 of the A/CPPNM explicitly excludes military applications from its scope, thus exempting nuclear materials used in military contexts, such as those in submarines, from its provisions.[203] This exclusion raises questions about the application of nuclear security measures under Australian law, particularly in military contexts. Moreover, the definitions of "nuclear material" and "nuclear facility" in section 32 of the Safeguards Act are consistent with those in the A/CPPNM, effectively excluding military nuclear materials and facilities, such as submarines, from its scope of offences. This disconnect may have significant implications for how nuclear security is applied to military nuclear assets in Australia.

In addition, the comprehensive security measures provided under the Defence Act 1903 (Cth),[204] the Crimes Act 1914 (Cth)[205] and the Control of Naval Waters Act 1918 (Cth)[206] all contribute to a robust military base security framework. These provisions empower the Australian Defence Force to arrest and use force to ensure security on military bases,[207] which will play a critical role in safeguarding nuclear materials and facilities under the AUKUS partnership.

In its 2023 publication, "The AUKUS Nuclear-Powered Submarine Pathway: A Partnership for the Future", Australia pledged to adopt a "strong security posture" and to meet "IAEA security requirements for nuclear material as part of Australia's safeguards agreements".[208] This commitment further emphasises "the highest security culture within its own nuclear-powered submarine enterprise, in close partnership with UK and US security and intelligence agencies, as well as defence industry and academia".[209] Although the Department of Defence undoubtedly possesses the capability to manage nuclear material securely, the current arrangement, which may circumvent oversight by an independent regulator with enforcement authority or limit its enforcement capabilities, introduces uncertainties. While focused on internal management, this approach does not explicitly exclude ASNO from playing a role. ASNO's involvement, given its mandate in implementing the NPT, safeguards agreements and obligations under ICSANT, may still play a role within the broader scope of the AUKUS programme. However, the precise nature of ASNO's involvement and how it will interface with the Department of Defence and international partners in the context of nuclear security within the AUKUS framework remains unknown.

The development of nuclear security law in Australia epitomises the nation's dynamic response to evolving threats and shifting international norms, underscoring a steadfast commitment to mitigating criminal and unauthorised acts. By enacting progressive legislation, participating actively in global non-proliferation efforts and incorporating lessons from past incidents, Australia has crafted a comprehensive nuclear security infrastructure. This framework adeptly harmonises national priorities with international

201. Agreement Between Australia and the Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons, Article 14.
202. Defence (2023), "Discussion Paper: The legal and regulatory framework to support Naval Nuclear Power Safety", www.defence.gov.au/sites/default/files/2023-11/Discussion-Paper-The-legal-and-regulatory-framework-to-support-Naval-Nuclear-Power-Safety.pdf (accessed 24 Sept. 2024), p. 7.
203. A/CPPNM, *supra* note 194, Article 2.
204. Defence Act 1903 (Cth), part VIA and part III.AAA.
205. Crimes Act 1914 (Cth).
206. Control of Naval Waters Act 1918 (Cth).
207. See Defence Act 1903, *supra* note 204; Crimes Act 1914, *supra* note 205; Control of Naval Waters Act 1918, *supra* note 206.
208. Defence (2023), *supra* note 74.
209. *Ibid*.

responsibilities, ensuring the safe and secure management of nuclear resources and facilities. Nevertheless, the advent of the AUKUS partnership introduces new complexities and uncertainties in the nuclear security domain, signalling a need for further refinement and adaptation in regulatory measures and transparency on regulatory approaches to adeptly navigate this emerging landscape.

c. Conclusion

Reflecting upon the development of nuclear safety and security laws in Australia reveals a journey marked by responsiveness to global standards and domestic necessities. The comprehensive Australian Naval Nuclear Power Safety Act 2024 is a testament to this evolution, introducing robust compliance and enforcement tools, stringent offence regulations and a rigorous licensing process. Contrary to initial apprehensions, the Bill establishes a strong regulatory framework, which, while operating under the Minister for Defence, endeavours to maintain functional autonomy, thus dispelling fears of it being a mere "toothless tiger".

The AUKUS partnership, while heralding exciting advancements in nuclear capabilities, also brings to the fore new challenges in the realm of nuclear security. There remains a degree of uncertainty in the regulatory framework governing the security aspects of the AUKUS programme. This uncertainty underscores the need for continuous refinement of Australia's nuclear laws to ensure they remain adept at addressing both current and emerging challenges in nuclear safety and security.

As Australia progresses with its nuclear-powered submarine programme and maintains its commitments under various international nuclear treaties, it becomes increasingly imperative to develop a cohesive and transparent approach to nuclear security. This approach must adeptly accommodate both military and civilian applications, ensuring the safe, secure and responsible management of nuclear materials and technologies. The ongoing evolution of Australia's nuclear safety and security laws is a clear indication of the nation's commitment to maintaining the highest standards in these crucial domains, balancing national interests with international obligations and safeguarding against the myriad risks associated with nuclear technology.

5. Reactors and nuclear energy

The development of nuclear law and policy in Australia, particularly in the context of reactors and nuclear power, has been a journey marked by varying shifts in political rhetoric and legislative evolution. This journey mirrors the nation's complex relationship with nuclear technology, balancing scientific advancement, energy considerations and non-proliferation commitments.

In 1953, the federal government established the AAEC, marking the country's initial engagement with nuclear technology, primarily for research purposes.[210] The AAEC operated the HIFAR research reactor from 1958 and the MOATA low-power reactor from 1961, focusing on peaceful applications such as medical isotope production.[211]

The conversation around nuclear power in Australia reached a peak in the 1970s under the Federal Coalition Gorton Government with a push for a nuclear power station at Jervis Bay, Australian Capital Territory.[212] Significantly, there was speculation that the proposed reactor fuelled by natural uranium would have produced plutonium as a by-product, providing Australia with the potential to acquire sufficient fissile material to develop a nuclear weapon.[213] This speculation stems from the global context of the time, where

210. Atomic Energy Act 1953 (Cth).
211. ANSTO (n.d.) *supra* note 5.
212. Davies, J. and P. Sullivan (2011), *supra* note 171, p. 206; Jervis Bay Territory Acceptance Act 1915 (Cth).
213. Walsh, J. (2023) *supra* note 113; ABC (2005), *supra* note 110.

nuclear capabilities were a significant aspect of international power dynamics. While this was never explicitly stated as a goal, the possibility of such an ambition adds a layer of complexity to the narrative of nuclear development in Australia. Ultimately, the ambitious plan for the Jervis Bay nuclear power plant, despite progressing to substantial planning stages, was shelved due to cost concerns and a subsequent shift in political leadership.[214] In parallel, the early 1970s saw proposals for a uranium enrichment plant.[215] Uranium enrichment is the process by which the capacity of naturally existing uranium is increased to fuel a nuclear chain reaction, either for use in a nuclear power reactor or nuclear weapon. These proposals, most notably the Urenco-Centec plant at Port Pirie in South Australia's Mid-North region,[216] did not materialise into operational facilities largely due to loss of political momentum as a result of unrelated budgetary controversies.[217]

The discourse on nuclear power experienced a notable revival in 1998 under the federal Coalition Howard government. This resurgence led to a significant, albeit unexpected, amendment to the Australian Radiation Protection and Nuclear Safety Bill.[218] At that time, the Howard government was endeavouring to garner legislative backing for the construction of the Open Pool Australian Lightwater (OPAL) reactor at Lucas Heights. Facing no immediate plans for constructing a nuclear power station, the government acquiesced to the amendment to facilitate progress on the new research reactor, which began operations in 2007. The debate on this crucial amendment was brief, lasting less than ten minutes.[219] This amendment effectively instituted a prohibition on the development of all nuclear facilities in Australia.

Political rhetoric around nuclear energy continued to ebb and flow in the late 1990s and into the 2000s. In 2006, the federal Howard ALP government reignited the debate, advocating for a discussion on nuclear power.[220] This call led to the establishment of a prime ministerial taskforce to explore the potential of nuclear energy in Australia.[221] The taskforce's findings highlighted possible scenarios for nuclear power but also emphasised the need for community support and bipartisan agreement.

In discussing Australia's nuclear ambitions, it is crucial to acknowledge the profound impact that past nuclear accidents have had in undermining public confidence in nuclear energy.[222] The catastrophic explosion at the Chernobyl nuclear power plant in 1986,[223] which resulted in fatalities, long-term health issues and widespread radioactive contamination, sent shockwaves around the world. This accident, along with the 2011 Fukushima Daiichi nuclear accident, in which a tsunami triggered a meltdown at a coastal nuclear plant in Japan, significantly altered the global perspective on nuclear energy. Notably, in the aftermath of the Fukushima Daiichi accident, German Chancellor Angela Merkel made a decisive move to reverse the extension of the operational life of several

214. Davies, J. and P. Sullivan (2011), *supra* note 171.
215. Reynolds, W. (2008), "Australia's Quest to Enrich Uranium and the Whitlam Government's Loans Affair", *Australian Journal of Politics and History*, Vol. 54, No. 4, John Wiley & Sons, Brisbane, pp. 562-578; Reynolds, W. (2011), "The Yellow Cake Road: Malcolm Fraser, the Ranger Enquiry and Australia's Role in the US International Fuel Cycle Project", *Australian Journal of Politics and History*, Vol. 58, No. 4, John Wiley & Sons, Brisbane, pp. 511-525.
216. Johns, K. (2005), *supra* note 32.
217. Reynolds, W. and D. Lee (2013), *supra* note 102, p. 51.
218. Senator Matt Canavan (2022), "Second Reading Speech – Environment and Other Legislation Amendment (Removing Nuclear Energy Prohibitions) Bill 2022", Commonwealth of Australia, Senate, Parliament of Australia, p. 1413.
219. *Ibid*.
220. Davies, J. and P. Sullivan (2011), *supra* note 171.
221. Commonwealth of Australia (2006), "Uranium Mining, Processing and Nuclear Energy - Opportunities for Australia", Report to the Prime Minister by the Uranium Mining, Processing and Nuclear Energy Review Taskforce, p. I.
222. Niemann, G. (2013), *supra* note 111.
223. IAEA (1996), *supra* note 50.

nuclear plants in Germany, signalling a major shift in nuclear policy.[224] These incidents have had a direct and profound impact on the nuclear debate in Australia. In 2013, it was formally confirmed to the federal parliament that Australian uranium was being used in the Fukushima Daiichi complex at the time of the accident.[225] This revelation, coupled with declining uranium prices and escalating demand for gas, significantly influenced the political narrative, steering it away from nuclear ambitions. While advocates of nuclear technology continue to assert its safety and argue that the risk of accidents is decreasing due to technological advancements, these historical accidents have ingrained a deep-seated caution and scepticism within the Australian public and policymakers alike. The shadow of Chernobyl[226] and Fukushima Daiichi looms large in the nuclear discourse, shaping policy decisions and public opinion and contributing to the ongoing reluctance to fully embrace nuclear energy as a significant component of Australia's energy strategy.

Against the backdrop of these developments, significant legislative frameworks, namely the ARPANS Act and the EPBC Act, have firmly maintained prohibitions on licensing civil nuclear power production in Australia.[227] These laws, alongside state and territory legislations, form the cornerstone of Australia's nuclear regulatory regime, ensuring that most nuclear activities are effectively banned and those that are allowed, align with safety, environmental and non-proliferation standards.[228]

The conversation around nuclear power in Australia, historically marked by fluctuating interest and strategic considerations, took a significant turn with the establishment of the Royal Commission by the South Australian state government in 2015.[229] This independent investigation was initiated to explore the potential for increasing South Australia's participation in the nuclear fuel cycle. The Commission focused on four key areas, but most notably the use of nuclear fuels for electricity generation. The Commission's findings and recommendations underscored the potential role of nuclear technology in Australia's energy and economic landscape.[230] It emphasised the need to pursue the removal of prohibitions on nuclear power generation, recognising its potential contribution to a low-carbon electricity system. Additionally, the report advocated for the promotion and collaboration in the development of a comprehensive national energy policy, which would allow all technologies, including nuclear, to contribute to a reliable and low-carbon electricity network.[231]

Though invigorated somewhat by the Royal Commission, the discussion around nuclear energy in Australia remained relatively dormant until 2021. The announcement of Australia's decision to acquire nuclear-powered submarines marked a pivotal moment. This decision rekindled the nuclear debate, bringing the topic to the forefront of national discourse and highlighting the potential role of nuclear technology in Australia's strategic future. The AUKUS partnership garnered unprecedented bipartisan political support, marking a radical shift from Australia's historical stance on nuclear policy. This changing political landscape was further evidenced by the passage of the Defence Legislation Amendment (Naval Nuclear Propulsion) Act 2023, which amended existing laws to remove nuclear prohibitions to allow for the development of conventionally armed nuclear-powered submarines. This shift in policy heralded a reinvigorated interest in nuclear

224. BBC News (2011), "Germany: Nuclear power plants to close by 2022", BBC News, www.bbc.com/news/world-europe-13592208.
225. Commonwealth of Australia, Senate, Parliament of Australia (2013) "Notice Paper – Government Business" No. 129, 13 Mar. 2013, p. 8.
226. IAEA (1996), *supra* note 50.
227. Australian Radiation Protection and Nuclear Safety Act 1998 (Cth), sec. 10; Environment Protection and Biodiversity Conservation Act 1999 (Cth), secs. 37J, 140A, 146M and 305.
228. Uranium Mining and Nuclear Facilities (Prohibitions) Act 1986 (NSW); Nuclear Facilities Prohibition Act 2007 (Qld); the Nuclear Activities (Prohibitions) Act 1983 (Vic); Nuclear Waste Storage Facility (Prohibition) Act 2000; Nuclear Waste Storage and Transportation (Prohibition) Act 1999; Nuclear Waste Transport, Storage and Disposal (Prohibition) Act 2004.
229. Grey, K. (2016) *supra* note 57.
230. Nuclear Fuel Cycle Royal Commission, Government of South Australia (2016), *supra* note 58.
231. Grey, K. (2016) *supra* note 57.

energy, fuelled by a confluence of factors: the pressing imperative to combat climate change, the need for decarbonisation in energy and manufacturing, rising national energy costs, and the practicalities of supporting a defence-based nuclear programme without a parallel civilian nuclear infrastructure. Amidst this backdrop, a grassroots movement led by the then 16-year-old founder of "Nuclear for Australia", William Shackel, has been advocating for change, reflecting a growing public sentiment towards considering nuclear energy as a viable option.[232]

Amid the growing momentum for nuclear energy in Australia, underscored by the AUKUS partnership[233] and the global resurgence of nuclear energy demonstrated at COP28,[234] the Coalition unveiled its energy policy in July 2024, in the lead-up to the 2025 Australian federal election.[235] Their plan identified seven potential sites, previously occupied by coal-fired power stations, for a phased nuclear energy development. The proposal begins with two pilot projects in the mid-2030s, followed by an extensive rollout of additional projects stretching to 2050. If elected, the initial phase will involve the development of two projects, utilising either small modular reactors or modern larger plants such as the AP1000 or APR1400.

Historically, Australia has explored the possibility of adopting nuclear power but has never fully committed to implementing such technologies. However, the current shift in the nuclear energy debate is marked by the unprecedented bipartisan support for a defence nuclear programme spurred by the AUKUS partnership. This political alignment may serve as a crucial catalyst for broader changes in Australia's approach to nuclear energy, potentially paving the way for its integration into the national energy mix.

If Australia maintains its reluctance to develop a domestic civil nuclear industry, this might impact its position on the IAEA Board of Governors, particularly in representing the Southeast Asia and Pacific region.[236] As neighbouring countries like Indonesia advance their nuclear programmes[237] and Singapore explores nuclear options,[238] they demonstrate a proactive engagement with nuclear technology. This shift in the regional nuclear landscape could challenge Australia's longstanding position on the Board, where current trends and active participation in civil nuclear technology are significant. If Australia continues to maintain its distance from nuclear energy development, its authority and relevance as the regional representative on the Board could be questioned. In contrast, countries actively pursuing nuclear initiatives might seek greater representation to align with their evolving nuclear profiles, potentially redefining the regional leadership within the IAEA.

As Australia stands at a potential crossroads in its energy policy, the Coalition's recent proposal for nuclear development unveiled in July 2024 adds a critical layer to the national discourse. Their plan, targeting seven former coal-fired power station sites for a phased development of nuclear energy, could significantly shift the dynamic within the international nuclear community. This election policy comes in response to pressures of

232. Shackel, W. (n.d.) "Nuclear for Australia", Nuclear for Australia, www.nuclearforaustralia.com/will_shackel.
233. Defence (2023), *supra* note 74.
234. Donovan, J. (2023), *supra* note 88.
235. Liberal Party of Australia (2024), "Our Plan For Zero-Emissions Nuclear as part of cheaper, clearer and consistent energy future", Liberal Party of Australia, Barton, available at: www.rowanramsey.com.au/wp-content/uploads/2024/06/Pt-A-Energy-Plan_1st-Policy-Release.pdf (accessed 26 Sept. 2024).
236. IAEA (1996), "Article VI of the Statute (b) Composition of Regional Groups", Report by the Board of Governors, GC (40)/11; South Australian Chamber of Mines and Energy and Minerals Council of Australia (2023), "Nuclear Energy Thought Leadership Breakfast", Panel Session held 15 Nov. 2023 in Adelaide, South Australia.
237. For instance, see World Nuclear News (WNN) (2023), "USA, Indonesia announce partnership on SMRs", WNN, www.world-nuclear-news.org/Articles/USA,-Indonesia-announce-partnership-on-SMRs.
238. See Singapore Business Review (2023) "Singapore yet to decide on nuclear energy deployment", *Singapore Business Review*, https://sbr.com.sg/energy-offshore/news/singapore-yet-decide-nuclear-energy-deployment.

climate change, energy security concerns and technological advancements in nuclear energy, including small modular reactors (SMRs). It also seeks to position the country to alter its stance on the development of civil nuclear energy. Should these projects proceed, they could bolster Australia's role and influence on the IAEA Board of Governors, aligning with the active nuclear advancements of regional neighbours such as Indonesia and Singapore. The Coalition's energy policy could thus be a decisive factor in whether this generation will witness a definitive turn in Australia's nuclear narrative. With political will, evolving public opinion and the strategic imperatives of international nuclear diplomacy all in play, "watch this space" remains an apt directive for observers and stakeholders in the unfolding debate over nuclear power in Australia and its broader regional implications.

6. Management of radioactive waste

Radioactive waste requires specialised management and disposal protocols to ensure the protection of human health and environmental integrity.[239] Australia's landscape of radioactive waste, accumulating over the last seven decades, stems from varied sources. Foremost among these is the waste generated from the ANSTO-operated OPAL research reactor and the decommissioning of the HIFAR research reactor.[240] The employment of radioactive materials in medical settings, particularly for diagnostic and therapeutic purposes, further augments the national accumulation of radioactive waste. Additionally, naturally occurring radioactive materials (NORMs) resulting from industrial endeavours, such as mining and petroleum extraction, exacerbate the generation of radioactive waste, encompassing waste rock, tailings from mining operations and sludge from petroleum processing.[241]

The governance of radioactive waste in Australia is characterised by a nuanced and intricate jurisdictional division. Typically, radioactive waste situated on commonwealth land, or that which is under the custody or control of the commonwealth or its contractors, falls under the regulatory oversight of ARPANSA, the federal regulator.[242] In contrast, state and territory governments are responsible for regulating radioactive waste in all other locations and categories, including waste generated by the industrial sector and NORMs.[243] This delineation of responsibilities, however, is significantly more intricate than initially outlined. The regulatory landscape is further complicated by the ability to transfer radioactive waste across different jurisdictions, introducing additional layers of regulatory complexity.[244] Predominantly, the federal-level waste is produced and maintained by entities such as ANSTO, the Department of Defence, the commonwealth Scientific and Industrial Research Organisation (CSIRO) and ARPANSA.[245] On the other hand, the waste under state and territorial oversight primarily derives from the mining and petroleum industries, healthcare facilities and various industrial sectors employing radioactive materials.[246]

239. IAEA (2011), "Disposal of Radioactive Waste Specific Safety Requirements", Safety Standards Series No. SSR-5, IAEA, Vienna.
240. Australian Radioactive Waste Agency (2021), "Australia's National Inventory of Radioactive Waste 2021", www.industry.gov.au/sites/default/files/2022-09/australias-national-inventory-of-radioactive-waste-2021.pdf (accessed 24 Sept. 2024).
241. ARPANSA (2020), "Seventh Australian National Report prepared for the Seventh Review Meeting of the Joint Convention on the Safety of Spent Fuel and on the Safety of Radioactive Waste Management", National Report of the Commonwealth of Australia.
242. Australian Radiation Protection and Nuclear Safety Act 1998 (Cth) sec. 13; National Radioactive Waste Management Act 2012 (Cth) sec. 4A; Australian Nuclear Science and Technology Organisation Act 1987 (Cth) sec. 3.
243. Radiation Protection Act 2006 (ACT); Radiation Control Act 1990 (NSW); Radiation Protection Act 2004 (NT); Radiation Safety Act 1999 (QLD); Radiation Protection and Control Act 2021 (SA); Radiation Protection Act 2005 (TAS); Radiation Act 2005 (VIC); Radiation Safety Act 1975 (WA).
244. Australian Radiation Protection and Nuclear Safety Regulations 1998 (Cth), r 65; ARPANSA (n.d.) "Prescribed Form 1699, Part B".
245. Australian Radioactive Waste Agency (2021), *supra* note 240.
246. *Ibid.*

As per the 2021 Australian National Inventory of Radioactive Waste (compiled on 2020 data), Australia harbours an estimated 2 490 cubic metres (m^3) of radioactive waste earmarked for near-surface disposal and classified as low-level waste (LLW).[247] Whereas, the 2020 National Report of the Commonwealth of Australia under the Joint Convention estimated that Australia held 4 146 m^3 of LLW.[248] It appears the discrepancy is predominately due to the unknown quantities of lightly contaminated soil from uranium ore-processing by CSIRO that are stored in the Woomera Protected Area. Examples of LLW types accounted for in the inventory are operational waste at the ANSTO facility, operational waste at CSIRO sites, and assorted waste encompassing contaminated items and medical apparatus.[249] In addition, the current stockpile of intermediate-level waste (ILW) stands at approximately 1 611 – 2 061 m^3.[250] This includes diverse waste types, from irradiation cans and ion exchange resins to irradiated aluminium from spent fuel assemblies, alongside residues from radiopharmaceutical production and liquid waste from Mo-99 production at ANSTO.[251] Also included is ILW repatriated from overseas reprocessing facilities and miscellaneous waste stored across various Australian sites.[252] It is also pertinent to note that ANSTO's OPAL reactor, Australia's sole operational nuclear reactor, produces spent fuel that is temporarily housed on-site before being shipped to La Hague, France, for reprocessing.[253] The waste derived from this reprocessing, classified as ILW, is returned to Australia, adding to the existing inventory of radioactive waste.[254] Importantly, these estimations exclude waste that has already been consigned to legacy disposal facilities such as the Mount Walton East Intractable Waste Disposal Facility in Western Australia, the South Alligator Disposal Facility in the Northern Territory and other sites including Radium Hill and Maralinga, in South Australia, and the Little Forest, in New South Wales.[255]

This introductory overview lays the foundation for an in-depth exploration of Australia's legislative and infrastructural journey in the realm of radioactive waste management, an area of critical importance in the context of national and environmental safety.

a. Australia's waste management journey

Australia's journey in managing radioactive waste, characterised by its intersection with evolving nuclear law and dynamic political rhetoric, presents a multifaceted narrative of legislative progressions, government initiatives, and societal responses. Over the past seven decades, this journey has seen numerous shifts, driven by both domestic challenges and international events, as Australia grappled with the complex task of safely and securely disposing of its radioactive waste.

In the initial phase, radioactive waste management in Australia was primarily focused on the Little Forest Legacy Site near Lucas Heights.[256] From 1960 to 1968, the AAEC operated this site for the experimental borehole disposal of LLW, laying the groundwork for more systematic waste management methods.[257] The issue of radioactive waste disposal garnered significant political and public attention in 1978 following the New South Wales government's proposal to relocate contaminated soil from a uranium smelter in Hunters

247. *Ibid*.
248. ARPANSA (2020), *supra* note 241, p. 15.
249. *Ibid*. Australian Radioactive Waste Agency, *supra* note 240.
250. ARPANSA (2020), *supra* note 241; Australian Radioactive Waste Agency (2021), *supra* note 240.
251. *Ibid*.
252. *Ibid*.
253. *Ibid*.
254. *Ibid*.
255. ARPANSA (2020), *supra* note 241.
256. ANSTO (n.d.), "Little Forest Legacy Site", www.ansto.gov.au/little-forest-legacy-site (accessed 24 Sept. 2024).
257. *Ibid*.

Hill, Sydney, to an inland location.[258] This proposal was met with substantial resistance from both local communities and government entities, highlighting the contentious nature of radioactive waste management. The New South Wales Premier's request to South Australia to accommodate the waste at the decommissioned Radium Hill uranium mine was declined by the South Australian Premier.[259] In response to these challenges, the Federal Government committed in 1978 to spearhead a national strategy for the handling of Australia's radioactive waste.[260] It was, however, not until 1985 that a concerted effort was made, with state and territory governments being called upon to identify suitable locations for a national radioactive waste management facility.[261]

The domestic efforts to establish a radioactive waste management facility in Australia following the Chernobyl accident[262] have been a convoluted and often contentious process, marked by political, legal and community challenges. The decades since have seen various sites proposed, debated and ultimately rejected, reflecting the complexity of finding acceptable solutions for radioactive waste disposal in a politically and socially sensitive environment.

In the late 1980s, the Northern Territory government initially suggested a site for radioactive waste disposal but withdrew it in 1991.[263] This withdrawal was not due to technical deficiencies but stemmed from domestic political considerations, highlighting the significant role of local and regional politics in the decision-making process for radioactive waste management.[264] The absence of a national solution led the ANSTO to accept 2 000 m^3 of radioactive soil from Victoria at its Lucas Heights site.[265] Plans were also made to relocate an additional 17 m^3 of defence waste from St Mary's.[266] However, these plans were halted when the Land and Environment Court of New South Wales ordered ANSTO to stop transporting radioactive waste to Lucas Heights.[267] In response, the Federal Government introduced the Australian Nuclear Science and Technology Organisation Amendment Act (Cth) in 1992, which granted ANSTO immunity from future court actions and allowed the government to store radioactive waste temporarily until a national repository could be built.[268]

From 1992 to 2004, the Australian government embarked on a comprehensive national search for appropriate locations to construct a near-surface repository for low-level and short-lived intermediate-level radioactive waste.[269] This initiative was a crucial part of Australia's strategy to develop a sustainable long-term management plan for its radioactive waste. During this period, the Woomera Protected Area (WPA) in South Australia emerged as a key area of interest for the potential facility, particularly between 2000 and 2002.[270] The WPA, one of the world's largest land-based test ranges, spans

258. Nagztaam, G. and A. Newman (2005), "Merely unpicking the Gordian Knot: The Ongoing Quest to Build a Federal Low Level Radioactive Waste Disposal Facility in Australia", *The Australian Journal of Natural Resources Law and Policy*, Vol. 1, No. 1, International Bar Association, London, p. 27.
259. *Ibid*.
260. Department of Industry, Science, Energy and Resources, Australian Government (2020), "Site Assessment National Radioactive Waste Management Facility 2020", p. 5.
261. *Ibid*.
262. IAEA (1996), *supra* note 50.
263. Department of Industry, Science, Energy and Resources (2020), *supra* note 260.
264. Nagztaam, G. Newman, A. (2005) *supra* note 258, p. 28.
265. Panter, R. (1992) "Radioactive Waste Disposal in Australia", Science, Technology & Environment Group, Issues Paper No. 6.
266. *Ibid*.
267. *Ibid*.
268. Australian Nuclear Science and Technology Organisation Amendment Act 1992 (Cth).
269. Department of Industry, Science, Energy and Resources, Australian Government (2020), *supra* note 260.
270. *Ibid*.

approximately 122 000 square kilometres.[271] Originally established in 1947 as a joint Australian-British venture, the WPA was primarily used for aerospace and missile testing, including activities in the Maralinga nuclear weapons test area.[272] Over the years, its role expanded beyond military purposes to encompass civilian and commercial uses such as satellite launching and tracking, scientific research, exploration and mining.[273] In 2002, an Environmental Impact Assessment conducted under the EPBC Act identified three potential sites for the radioactive waste facility, with one located within the WPA.[274] The following year, the Australian government selected a specific site inside the WPA for the repository.[275] However, this decision was met with significant opposition from the South Australian state government, which enacted the Nuclear Waste Storage Facility (Prohibition) Act 2000 (SA) to prohibit the facility's establishment in the state.[276] The state government further attempted to thwart the project by designating the proposed site as a conservation park.[277] In a controversial move, the federal government resorted to compulsory land acquisition in 2003 under the Land Acquisition Act 1969, a decision that escalated tensions with the South Australian government.[278] This action led to a legal challenge in the Federal Court by the state government.[279] In 2004, the court deemed the land acquisition process invalid, culminating in the abandonment of the WPA site for the radioactive waste facility.[280]

In 2005, the Australian government enacted the Commonwealth Radioactive Waste Management Act 2005 (Cth),[281] initially earmarking three Department of Defence locations for a proposed radioactive waste facility. The Act underwent a significant evolution during parliamentary debates, culminating in an amendment that allowed consideration of lands managed by Indigenous Land Councils in the Northern Territory and non-Indigenous lands, giving appropriate notice to relevant Indigenous Land Councils.[282] This shift in strategy marked a critical departure from the previous policy of compulsory acquisition of land, moving towards a more inclusive approach that actively involved Indigenous communities in decisions about radioactive waste management. Attention then turned to Muckaty Station in the Northern Territory, identified in 2007 as a prospective site.[283] This decision ignited significant controversy and opposition, particularly from local Indigenous communities, culminating in legal challenges against the site selection. The contentious plans for Muckaty Station were eventually scrapped in 2014 after an out-of-court settlement.[284]

271. Defence (n.d.) "History of the Woomera Prohibited Area", www.defence.gov.au/bases-locations/sa/woomera/about (accessed 24 Sept. 2024).
272. *Ibid*.
273. Morton, P. (1989), *Fire Across the Desert: Woomera and the Anglo-Australian Joint Project 1946-1980*, Australian Government Publishing Service, Canberra.
274. Department of Industry, Science, Energy and Resources, Australian Government (2020), *supra* note 260.
275. *Ibid*.
276. Nuclear Waste Storage Facility (Prohibition) Act 2000 (SA); Parliament of South Australia, House of Assembly (2000), "Nuclear Waste Storage Facility (Prohibition) Bill", 13 Apr. 2000.
277. Brown, A J. (2007) "When Does Property Become Territory: Nuclear Waste, Federal Land Acquisition and Constitutional Requirements for State Consent", *The Adelaide Law Review*, Vol. 28, Nos. 1-2, Adelaide Law School, Adelaide, pp. 113-138.
278. *Ibid*.
279. *Ibid*.
280. *Ibid*.
281. Commonwealth Radioactive Waste Management Act 2005 (Cth).
282. Commonwealth of Australia, House of Assembly (2006) "Second Reading Speech – Commonwealth Radioactive Waste Management Legislation Amendment Bill 2006", 29 Nov. 2006, p. 12.
283. Department of Industry, Science, Energy and Resources, Australian Government (2020) *supra* note 260; Minister for Education, Science and Training, the Hon. Julie Bishop MP, Press Release, "Radioactive Waste Facility Site Nomination" (25 May 2007).
284. Department of Industry, Science and Technology (2023) "Freedom of Information Disclosure Log: 17/006 – Documents related to Muckaty Staton in the Northern Territory", available at: www.industry.gov.au/sites/default/files/2022-09/disclosure-log-17-006.pdf.

The contentious developments surrounding Muckaty Station precipitated the repeal of the Commonwealth Radioactive Waste Management Act 2005 (Cth). It was superseded by the National Radioactive Waste Management Act 2012 (Cth),[285] which introduced a voluntary nomination mechanism for site selection.[286] As a result of this new framework, 30 sites were initially nominated under the 2012 Act, with Napandee, Lyndhurst and Wallerberdina eventually emerging as the leading sites after thorough assessments.[287] This new approach marked a significant shift from the previous, more authoritarian method of site selection, aiming to enhance community involvement and consent, albeit not the consent of the Government of South Australia. The Nuclear Waste Storage Facility (Prohibition) Act 2000, which prohibited establishing a nuclear waste facility in South Australia, remained in force. To address this prohibition, the National Radioactive Waste Management Act 2012 incorporated legislative overrides to circumvent potential legal conflicts with the state.[288] These overrides stipulate that any state laws, whether written or unwritten, that aimed to regulate, hinder, prevent or interfere with the federal government's efforts to establish a waste facility would be rendered ineffective.[289] The constitutional authority of the federal government, anchored in section 109 of the Commonwealth of Australia Constitution Act 1901, forms the basis for establishing the primacy of Commonwealth laws in instances where they conflict with state legislation.[290]

Parallel to these developments, the Royal Commission was tasked with investigating the potential for South Australia's increased participation in the nuclear fuel cycle, including the storage and disposal of domestic and overseas radioactive waste.[291] The Commission recommended South Australia pursue the establishment of waste storage and disposal facilities and repeal the legislative constraint of the Nuclear Waste Storage Facility (Prohibition) Act 2000.[292] The Commission's analysis was not limited to domestic practices but also included a thorough evaluation of previous international attempts to establish nuclear waste facilities.[293] However, the proposal was met with mixed reactions and significant public opposition, particularly concerning the disposal of high-level nuclear waste from other countries, and ultimately, it led to the disbanding of the Royal Commission Consultation and Response Advisory (CARA) Board and no notable implementation of the recommendations.[294]

Following the Royal Commission, the federal government announced Napandee near Kimba in South Australia in 2020 as the preferred site for the national radioactive waste management facility.[295] Following the announcement, the government sought to amend the National Radioactive Waste Management Act 2012 to specify Napandee as the site for the proposed facility legislatively, shifting the decision-making process from the ministerial level to the parliamentary level.[296] This approach, however, faced strong opposition, primarily due to concerns over the lack of judicial review opportunities if the decision was entrenched in legislation. In response to these concerns, the government

285. National Radioactive Waste Management Act 2012 (Cth).
286. Minister for Resources and Energy, the Hon. Martin Ferguson AM (ret.), Press Release, "Fairness Restored to Radioactive Waste Process" (23 Feb. 2010).
287. Department of Industry, Science, Energy and Resources, Australian Government (2020), *supra* note 260.
288. National Radioactive Waste Management Act 2012 (Cth), secs. 11 and 24.
289. *Ibid*.
290. Commonwealth of Australia Constitution Act 1901 (Cth), sec. 109.
291. Grey, K. (2016) *supra* note 57.
292. Nuclear Fuel Cycle Royal Commission, Government of South Australia (2016), *supra* note 58.
293. *Ibid*.
294. Grey, K. (2016), *supra* note 57.
295. Department of Industry, Science, Energy and Resources, Australian Government (2020), *supra* note 260.
296. National Radioactive Waste Management Amendment (Site Specification, Community Fund and Other Measures) Bill 2020 (Cth).

reverted to the traditional ministerial declaration approach under the Act.[297] Subsequently, the Minister formally declared and acquired the land known as Napandee as the site for the facility and commenced site works in 2021.[298] However, this decision was challenged in court, citing apprehended bias in the decision-making process.[299] The challenge by the Barngarla Determination Aboriginal Corporation RNTBC (BDAC), representing the Indigenous people in the region, led to a ruling by the federal court against the government's decision in 2023, resulting in the project being abandoned.[300] BDAC's resistance was bolstered by support from anti-nuclear activists, environmental groups, and eventually the South Australian Government.[301] This series of events represents another setback in Australia's more than four-decade-long struggle to establish a radioactive waste facility. It highlights the complexities and sensitivities in site selection, underscoring the necessity for transparent, equitable processes that respect the views and rights of all stakeholders, including Indigenous communities.

As of the date of publication, Australia is grappling with a significant challenge in radioactive waste management. Despite decades-long endeavours, the country still does not have a dedicated national facility for disposing of radioactive waste produced or overseen by the federal government. The withdrawal of the proposed Napandee site project in South Australia has exacerbated this issue, leaving Australia without a definitive strategy for managing its radioactive waste. This impasse highlights the enduring complexities and sensitivities involved in establishing such facilities within Australia. Currently, radioactive waste in Australia is scattered across approximately 100 locations, including those managed by ANSTO, hospitals, industrial operations and mining activities.[302] This decentralised storage system often results in ad-hoc and less-than-ideal conditions, raising concerns about potential risks to human health and the environment. The persistent challenges in finding a widely acceptable national solution for waste disposal underscore the delicate interplay of technical expertise, environmental stewardship, social responsibility and political diplomacy inherent in nuclear law and policy development. This multifaceted issue necessitates a holistic approach, considering diverse perspectives and balancing various concerns to achieve an effective and sustainable solution for radioactive waste management in Australia.

In contrast to the Australian government's repeated challenges in managing radioactive waste, the private sector has shown promising progress. Tellus Holding Limited, a private entity, has made notable strides in this domain. It operates the Sandy Ridge hazardous waste facility in Western Australia, which is licensed for the permanent disposal of low-level radioactive waste.[303] This facility, situated near the Mount Walton East Intractable Waste Disposal Facility, a historically government-operated site in Western Australia, marks a significant private-sector contribution to addressing aspects of Australia's radioactive waste management challenge.[304] Further extending its efforts, Tellus is also developing a project in the Northern Territory, known as the Chandler facility

297. National Radioactive Waste Management Amendment (Selection, Community Fund and Other Measures) Act 2021 (Cth).
298. Minister for Resources and Northern Australia, the Hon. Keith Pitt MP, Press Release, "National Radioactive Waste Management Facility to be delivered near Kimba in South Australia" (29 Nov. 2021).
299. Barngarla Determination Aboriginal Corporation (RNTBC) v. Minister for Resources [2023] FCA 809 (18 July 2023).
300. Minister for Resources, the Hon. Madeleine King MP, Press Release, "Statement on the National Radioactive Waste Management Facility" (10 Aug. 2023).
301. Willis, B. (2023), "Division and Questions After Kimba Nuclear Waste Site Veto", InDaily, https://indaily.com.au/news/2023/07/19/division-and-questions-after-kimba-nuclear-waste-site-veto.
302. ANSTO (n.d.) "Managing waste", www.ansto.gov.au/education/nuclear-facts/managing-waste (accessed 24 Sept. 2024).
303. Tellus Holdings Limited (Tellus) (n.d.), "Sandy Ridge", https://tellusholdings.com/projects/sandy-ridge (accessed 24 Sept. 2024).
304. *Ibid*.

near Alice Springs.[305] This initiative is envisioned as a deep geological repository for the storage of both international and domestic chemical wastes and low-level radioactive material.[306] Recognising the importance of community engagement, Tellus has placed a strong emphasis on obtaining social licence, prioritising dialogue and consent from local communities ahead of the technical aspects of the project. In a significant development, in November 2023, Tellus announced that it had secured the approval of the Titjikala Indigenous community for the Chandler project. This consent marks a crucial milestone for the project, which is set to be Australia's first underground salt mine and deep geological waste repository.[307] Tellus's advancements in this area represent an important private-sector contribution to Australia's broader efforts in effective and responsible radioactive waste management.

b. Radioactive waste and AUKUS

Australia's engagement in the AUKUS partnership represents a new challenge in its radioactive waste management strategies. This collaboration, which involves acquiring Virginia class submarines and constructing SSN-AUKUS nuclear-powered submarines, necessitates the management of radioactive waste generated through their operations, maintenance and eventual decommissioning.[308] Expected waste types include low-level radioactive materials, such as discarded protective gear used in routine submarine maintenance and a smaller quantity of ILW.[309] Australia's responsibility extends to handling all operational waste associated with these submarines, scheduled for acquisition in the 2030s.[310] The storage of this waste, encompassing both LLW, ILW and spent nuclear fuel, from Australian flagged submarines and UK and US submarines docked for maintenance, is planned to be conducted securely within designated Defence sites across Australia.[311] A crucial aspect of this commitment is the eventual defueling, dismantling and recycling of the submarines at the end of their operational lifespan. This process will involve managing the spent nuclear fuel and radioactive components of the reactor, a significant undertaking given the current absence of HLW in Australia. In 2023, Defence Minister Richard Marles noted that the need for disposal of spent nuclear fuel and radioactive reactor components is anticipated around the 2050s.[312] Acknowledging this long-term requirement, the Australian government has committed to a comprehensive review process in 2023.[313] This review aims to identify potential sites within existing or future Defence sites that could be deemed suitable for storing and disposing of intermediate-level and high-level radioactive waste.

c. Conclusion

Reflecting on Australia's journey in radioactive waste law, it is clear that it has been profoundly influenced by both domestic events and international influences, set against a backdrop of consistent societal resistance and concerns over social acceptance. The narrative

305. Tellus (n.d.) "Chandler Facility Description", https://tellusholdings.com/projects/chandler-facility/chandler-facility-description (accessed 24 Sept. 2024).
306. *Ibid*.
307. Tellus (2023) "Native Title Owners Greenlight Chandler Repository in Northern Territory", as posted on LinkedIn, www.linkedin.com/posts/tellus-holdings-ltd_lowlevelradioactive-social license-cleanenergytransition-activity-7127164248052432896-U2me (accessed 24 Sept. 2024).
308. Defence (2023), *supra* note 74, p. 42.
309. *Ibid*.
310. *Ibid*.
311. *Ibid*.
312. The Hon. Richard Marles MP, Press Conference held on 14 March 2023, Parliament House, Canberra, transcript available at: www.minister.defence.gov.au/transcripts/2023-03-14/press-conference-parliament-house-canberra (accessed 24 Sept. 2024).
313. Australian Submarine Agency (n.d.), "Nuclear Stewardship and Waste", www.asa.gov.au/sites/default/files/documents/2024-10/Stewardship_Waste_Fact_Sheet.pdf (accessed 5 Nov. 2024).

began with experimental disposals at Little Forest and traversed through highly debated sites like Muckaty Station, culminating in the current state of ambiguity following the Napandee site's withdrawal. This progression epitomises the dynamic interplay of technical expertise, environmental consciousness, social considerations and political factors in shaping nuclear law. The impact of international incidents like the Chernobyl accident,[314] alongside treaties such as the Joint Convention,[315] has been pivotal in steering Australia towards practices that are robust, safe and in line with global standards. Yet, domestic political nuances, community resistance and the rights of Indigenous communities have been equally influential in determining policy directions and legislative outcomes.

As the federal government ponders the future of Australia's radioactive waste management, several considerations loom large. With ANSTO's storage capacity nearing its limit by 2038,[316] the question arises whether the government will pivot from its traditional approaches, such as compulsory or voluntary land acquisitions. Potential alternatives might include leveraging existing infrastructure at Tellus Holdings' operational and proposed sites, combining defence and civilian waste on defence lands, exploring commercial nuclear build models like Engineering, Procurement, Construction (EPC), Engineering, Procurement, Construction Management (EPCM), or Build-Own-Operate-Transfer (BOOT) arrangements with the private sector, or revisiting the voluntary acquisition model with new parameters like adhering to Free, Prior and Informed Consent (FPIC) principles with Indigenous communities. However, the feasibility of these options remains entangled in a web of challenges, encompassing state legislative restrictions, complex political landscapes and the imperative to respect Indigenous rights and perspectives.

The evolution of radioactive waste law in Australia underscores the intricate task of balancing diverse stakeholder interests, environmental safety and international commitments. The path forward for managing both civilian and defence-related radioactive waste will undoubtedly be shaped by the lessons from past experiences and the continuously evolving global nuclear context. This situation presents an opportunity for Australia to develop a more integrated, inclusive and sustainable approach to radioactive waste management that aligns with both national priorities and global best practices.

7. Nuclear liability

Nuclear liability is a fundamental element of nuclear law, encompassing the legal and financial responsibilities associated with third party liability resulting from nuclear accidents. This area of law is particularly pertinent in contexts where nuclear technology is employed, as it defines the accountability framework for potential nuclear incidents. In Australia, the approach to nuclear liability is shaped by its unique engagement with nuclear technology, characterised by a focus on mining, waste management and recent strategic developments like the AUKUS partnership rather than on nuclear power generation.

Internationally, nuclear liability is governed by several key treaties, including the Paris Convention,[317] the Vienna Convention,[318] and the Convention on Supplementary Compensation for Nuclear Damage (CSC).[319] These conventions establish a global framework for nuclear liability, outlining the principles for compensation and the

314. IAEA (1996), *supra* note 50.
315. Joint Convention, *supra* note 178.
316. Shepherd, T. (2023), "Most of Australia's nuclear waste comes from Lucas Heights – should it stay there?", *The Guardian*, www.theguardian.com/australia-news/2022/oct/17/most-of-australias-nuclear-waste-comes-from-lucas-heights-should-it-stay-there.
317. Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1960), 1519 UNTS 329 (Paris Convention).
318. Vienna Convention on Civil Liability for Nuclear Damage (1963), IAEA Doc. INFCIRC/500, 1063 UNTS 266, entered into force 12 Nov. 1977 (Vienna Convention).
319. Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 ILM 1473, entered into force 15 Apr. 2015 (CSC).

mechanisms for addressing cross-border implications of nuclear incidents. Australia was a primary advocate for non-nuclear power generating countries in the CSC negotiations and was among the first countries in the world to sign the CSC.[320] Australia has not ratified the CSC and is therefore not a party. However, as a signatory, Australia must refrain from acts that would defeat the object and purpose of the convention.[321] Importantly, the CSC only applies to nuclear instalments for peaceful purposes, highlighting a distinct aspect of nuclear liability that Australia must navigate in this new era of defence co-operation.[322]

Australia's approach to nuclear liability is markedly distinct, shaped by its unique nuclear landscape characterised by limited infrastructure and geographical isolation. Unlike many nuclear-powered nations with complex liability frameworks, Australia does not have specific domestic laws that address civil liability for nuclear damage. The country's nuclear legal framework primarily revolves around waste management within the mining sector and the oversight of its two key nuclear installations: the ANSTO OPAL research reactor and the Tellus Sandy Ridge waste repository. In the mining sector, particularly concerning the management of industrial waste such as tailings and waste rock, liability is governed by state and territory laws. These laws establish financial assurance models that predominantly address operational liability during active mining and residual liability following closure.[323] However, these models focus on protective mitigation measures and reducing the likelihood of accidents, and as a result, they do not fully account for contingent liabilities arising from potential nuclear waste accidents, often due to the high cost of meeting such assurances for mining operators. This framework reflects Australia's specific nuclear profile, where the broader aspects of nuclear liability, often seen in countries with extensive nuclear power generation or near nuclear neighbours, are less pronounced. As a result, Australia's nuclear liability regime is tailored to its own environmental, industrial and infrastructural contexts, focusing on the management and assurance of operations more than the broader implications of nuclear accidents.

The liability arrangements in place for the ANSTO OPAL reactor covers ionising radiation liability up to AUD 50 million by Comcover, the Australian government's self-managed insurance fund. This coverage includes responsibilities related to managing, storing, and conditioning radioactive materials, as well as their domestic and international transportation. Additionally, ANSTO has a Deed of Indemnity from the federal government for liabilities not covered by Comcover, extending to ANSTO Nuclear Medicine Pty Ltd and their employees and contractors indemnification from any claims involving ionising radiation damage. This indemnity is in effect until April 2026.[324]

On the other hand, Tellus Holdings Limited, a private entity, has a layered approach to liability. It includes over AUD 100 million in construction insurance and over AUD 422 million in operational insurance, comprising general operational coverage and unique environmental liability insurance for the facility, backed by international underwriters. Further financial safeguards are provided by assurance bonds and a material trust fund managed by an independent trustee, ensuring ongoing financial security

320. Department of Foreign Affairs and Trade, Press Release, "Australia signs new Convention on Compensation for Nuclear Damage" (3 Oct. 1997).
321. Vienna Convention on the Law of Treaties (1969), 1155 UNTS 331, entered into force 27 Jan. 1980, Article 18.
322. CSC, *supra* note 319, Article 2.
323. For example, see Financial Assurance Framework for mining in South Australia: Mining Act 1971 (SA), sec. 62 and 63; Department of Energy and Mining (Energy & Mining) (n.d.) "Financial Assurance", www.energymining.sa.gov.au/industry/minerals-and-mining/mining/operational-information/financial-assurance (accessed 24 Sept. 2024).
324. ANSTO (2023), "Annual Report 2022-2023", www.ansto.gov.au/media/6822, p. 59 (accessed 24 Sept. 2024).

throughout the facility's operations. This fund is regularly reviewed both by independent experts and by the Western Australian government for accountability and adequacy.[325]

The management of nuclear liability in the context of the AUKUS submarines introduces new uncertainties into Australia's nuclear legal landscape. Australia is expected to receive nuclear material in sealed power units, a design choice that lowers risk by negating the need for regular fuel stockpiles and reducing the production of spent fuel.[326] As for the specifics of nuclear liability associated with these submarines, the Australian government has not yet disclosed its intended approach. Given that these military nuclear installations will be operated by the government, on government-owned land, it is anticipated that the civil liability for third party claims against the government will be insured by Comcover and underwritten by the government, potentially under an uncapped liability model, aligning with practices observed in countries like Germany, Japan and Switzerland.

The implementation of Australia's procurement strategy under the AUKUS programme introduces notable complexities, especially in terms of nuclear liability. The Australian Standard for Defence Contracting (ASDEFCON) generally adheres to principles that allocate risk to the party most capable of managing it.[327] Furthermore, ASDEFCON typically discourages indemnities from the government in favour of contractors. In the context of nuclear liability, a key challenge arises from the principle of exclusive liability, pivotal in international nuclear law. This principle posits that the operator of a nuclear installation holds sole liability for third party damages, a concept not commonly incorporated in Australian defence contracts. This discrepancy raises significant questions about how Australia will navigate liability management within the AUKUS programme, particularly for those involved in the supply chain. As Australia embarks on this new defence venture, adapting its procurement policies and legal frameworks to align with the unique demands of nuclear liability will be crucial for ensuring coherent and effective management of risks across the programme's supply chain.

8. Conclusion

As explored in this analysis, Australia's journey through the complex terrain of nuclear law and policy stands as a testament to the nation's evolving relationship with nuclear technology. This progression, marked by intricate interplays between domestic political dynamics, international events and societal responses, underscores Australia's unique position in the global nuclear narrative.

From the nuanced beginnings in uranium mining to the strategic leap signified by the AUKUS partnership, Australia's nuclear story is one of cautious advancement, strategic alignment and, at times, contentious policymaking. The analysis highlights the critical role that political rhetoric, inter-party dynamics and federal-state relations have played in shaping the nation's nuclear laws. The dichotomy between Australia's vast uranium resources and its restrained approach to nuclear power generation and waste management speaks volumes about the complexities inherent in nuclear law development.

The AUKUS partnership, in particular, marks a significant pivot in Australia's nuclear policy, bringing new dimensions of strategic defence and international alignment into focus. This development not only underscores Australia's evolving role in the global nuclear landscape but also propels the nation into uncharted legal and policy territories. While primarily focused on defence, this development inadvertently brings civil nuclear issues to the fore. As Australia ventures into the operational complexities of nuclear-powered submarines, the interplay between military and civilian nuclear applications

325. Tellus (2020), "World class financial assurance and insurance framework", https://tellusholdings.com/sandy-ridge-facility-now-open-for-business-providing-key-enabling-infrastructure-for-covid-19-economic-recovery (accessed 24 Sept. 2024).
326. Defence (2023), *supra* note 74, p. 45.
327. Defence (n.d.), "Defence Liability Principles", www.defence.gov.au/sites/default/files/2020-06/defenceliabilityprinciples.pdf (accessed 24 Sept. 2024).

becomes increasingly intricate. It raises the question: can Australia have its yellowcake and eat it too? This adage aptly captures the emerging reality: Can Australia facilitate a defence nuclear industry while still navigating moratoriums on uranium mining in certain jurisdictions, as well as legislative prohibitions on waste repositories and nuclear power?

In conclusion, this analysis of Australia's nuclear law evolution in the context of global events and the AUKUS partnership reveals a narrative rich in lessons and insights. It underscores the importance of adaptive legal frameworks, the need for nuanced policy development and the imperative of balancing national interests with global commitments and public expectations. As Australia continues to navigate this intricate landscape, its journey offers invaluable perspectives on the role of law in shaping a nation's nuclear policy and its impact on the global stage.

A legal analysis for a future regulatory framework for fusion energy in Japan

*by Takakazu Kimura**

1. Introduction

This article analyses Japanese law and international law to better inform the future Japanese regulatory framework[1] for fusion energy. It begins with an overview of Japanese nuclear law[2] and examines the applicability of Japan's Atomic Energy Basic Law (Basic Act)[3] to fusion energy technologies, confirming that fusion is legally a "nuclear energy". However, due to a restriction arising from the Basic Act, the existing laws regulating nuclear fission power plants, i.e. the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Reactor Regulation Act),[4] cannot be used to regulate fusion. To determine what a future nuclear fusion framework could look like, the article considers the two relevant existing laws, namely the Reactor Regulation Act and the Act on the Regulation of Radioactive Isotopes (RI Regulation Act),[5] finding that the main difference lies in the licensing process. The Reactor Regulation Act requires an intensive step-by-step process, a gradual approach in which licensees must receive siting permission to install a reactor at a specific site, then approval of the reactor design and construction plant, then approval of its operational safety programme and finally permission to operate following a pre-service inspection. The RI Regulation Act, on the other hand, characterises itself with a less burdensome approach. Further, the current RI Regulation Act cannot be used to regulate fusion due to its limitation in the regulatory scope of law. By comparing the two acts and taking into account the lack of existing laws applicable to fusion, the article demonstrates a need for legislative action and proposes that a new act be pursued, rather than an amendment to one of the existing two acts, in order to give clarity and simplicity to the regulations. This article recommends that, given the difference in the safety risks between fusion and fission and the benefits of a graded approach, a new law be enacted, primarily based on the RI Regulation Act to take

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1. Throughout the article, the term "regulatory framework" is intended to include both legislative and non-legislative (i.e. administrative) frameworks, while the focus here is on a legislative-level analysis to inform a future fusion act in Japan. The term "fusion energy" refers to energy generated by nuclear fusion reaction, notably between deuterium and tritium (D-T). Because the next foreseen large-scale fusion project in Japan, the Japanese demonstration fusion power plant (DEMO), will be based on a D-T reaction, it is appropriate to focus on regulation of D-T fusion. Facilities that produce fusion energy, such as DEMOs and fusion power plants (FPPs) are called "fusion facilities".
2. The definition of "nuclear law" under this article follows that of the IAEA, i.e. "The body of special legal norms created to regulate the conduct of legal or natural persons engaged in activities related to fissionable materials, ionizing radiation and exposure to natural sources of radiation." Stoiber, C. et al. (2003), *Handbook on Nuclear Law*, IAEA, Vienna, p. 4.
3. Atomic Energy Basic Act, No. 186, 19 Dec. 1955, as amended (Basic Act).
4. Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors, No. 166, 10 June 1957, as amended (Reactor Regulation Act).
5. Act on the Regulation of Radioisotopes, etc, No. 167, 10 June 1957, as amended (RI Regulation Act).

advantage of the less burdensome licensing process. Some of the clauses under the Reactor Regulation Act should also be incorporated into this new law, such as accident measures and quality assurance (QA) requirements.

Section 3 analyses the potential impact of international law, notably the Convention on Nuclear Safety (CNS)[6] and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention).[7] According to Article 98.2 of the Japanese Constitution (Constitution),[8] the international obligations arising from signed and effective international conventions must be respected, and if these conventions apply to fusion, a future Japanese act must, likewise, incorporate them. Interpretations may differ as to whether the CNS applies and the contracting parties to the CNS should clarify a position on the application to fusion as soon as possible. As for the Joint Convention, it also requires clarification by the contracting parties but, assuming it does apply, the relevant question is to what extent. To this purpose, this article hypothesises the application of the four scenarios and presents the possible impacts. Although it would be beneficial to incorporate the basic principles of nuclear safety enshrined in the CNS and the Joint Convention into future fusion legislation, some of the articles under these instruments would negatively impact the licensing process because these conventions adopt a step-by-step approach. Also, special attention must be paid to the articles of these conventions that require the availability of financial resources through decommissioning.

2. Japanese nuclear law and the existing acts

2.1 Japanese law

Before discussing Japanese nuclear law, a brief introduction to Japanese law, generally, will be helpful. First, the Constitution, which was promulgated on 3 November 1946 and came into effect on 3 May 1947, is the basis of law in Japan. The Constitution defines itself as the "supreme law" of the nation, stipulating that any law, ordinance or other governmental act has no legal effect if contrary to the provisions of the Constitution.[9] Therefore, it is the starting point of any Japanese law, including the nuclear laws.

As in many democratic states, the Constitution separates Japan's state powers into three branches – legislative power, executive power and judicial power. When it comes to the legislative power, the Constitution provides that "the Diet shall be the sole law-making organ of the state",[10] and the Diet consists of two houses, namely "the House of Representatives" and "the House of Councillors".[11] A law made by the Diet is called either a "code" or an "act". The former is used for the laws that provide a general legal framework, which include the Civil Code,[12] Commerce Code,[13] Criminal Code,[14] Code of Civil Procedure[15] and Code of Criminal Procedure.[16] The rest of the laws, which counts for the majority, are referred to as "acts" and are enacted for specific topics, including the ones for nuclear.

6. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293, entered into force 24 Oct. 1996 (CNS).
7. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997), IAEA Doc. INFCIRC/546, 2153 UNTS 357, entered into force 18 June 2001 (Joint Convention).
8. The Constitution of Japan, 3 Nov. 1946 (Constitution), Article 98.2.
9. *Ibid*., Article 98.1.
10. *Ibid.,* Article 41.
11. *Ibid.,* Article 42.
12. Civil Code, No. 89, 27 Apr. 1896, as amended.
13. Commerce Code, No. 48, 9 Mar. 1899, as amended.
14. Penal Code, No. 45, 24 Apr. 1907, as amended.
15. Code of Civil Procedure, No. 109, 26 June 1996, as amended.
16. Code of Criminal Procedure, No. 131, 10 July 1948, as amended.

The Constitution vests in the Cabinet executive power under Article 65 and, per Article 66, the Cabinet consists of the prime minister and other ministers of state. The Constitution allows the Cabinet to perform administrative functions, which include, among other things, the authority to issue "Cabinet orders", which are used to give further details not defined under the laws made by the Diet. All three of the nuclear acts discussed below have been supplemented by Cabinet orders.

It should be noted that the Constitution stipulates that Cabinet orders can be issued only to "execute the provisions of the Constitution and *of the law*".[17] Therefore, the Cabinet orders shall not deviate from the delegation of the original law. Also, giving a delegation of a "general and carte blanche" nature is impermissible.[18] The same principle applies to other executive instruments issued by the administrative organs. According to the National Government Organization Act, which provides the standards for the organisation of the administrative organs in Japan, a minister can issue a "ministerial order" as an order from the ministry "in order to enforce a law or Cabinet order" or "on the basis of a special delegation under a law or Cabinet order".[19] As such, ministerial orders are bound within the delegation of the original law and the relevant Cabinet order. Certainly, this shows the hierarchical structure of the Japanese legal instruments in public law, where the Constitution is the supreme law and supersedes all other laws (codes and acts), which, in turn, take precedence over the Cabinet orders, and subsequently over the ministerial orders. The National Government Organization Act also defines other types of administrative instruments, such as "public notices", which can be issued by a minister, a commission or the director-general of an agency when it is deemed necessary to issue it publicly in respect of the affairs under the jurisdiction of the relevant administrative organ.[20] Under the Japanese nuclear law, the public notices are used to supplement the law, the Cabinet order or ministerial order.

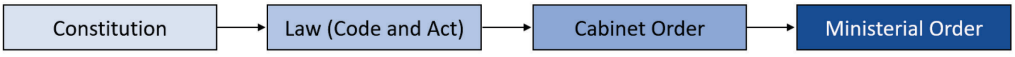


Figure 1: Japanese legal instruments and hierarchical structure

2.2 Japanese nuclear law

Japanese nuclear law finds its primary source in the Basic Act, which was passed by the Diet on 19 December 1955, around two years after the President of the United States (US), Dwight D. Eisenhower's "Atoms for Peace Speech" at the United Nations (UN) General Assembly in December 1953. As the name suggests, the act presents only the "basic" principles for regulating nuclear energy in the state of Japan, providing 21 articles over 9 chapters as summarised in Table 1.

The purpose of the act is "to secure energy resources in the future", "to achieve scientific and technological progress" and "to promote industry" in the nuclear energy field, showing the state's decision and determination to pursue nuclear energy and nuclear technology.[21] The state's basic stance and policy is that that the research and development and utilisation of nuclear energy shall be limited to "peaceful purposes" with an "aim at ensuring safety".[22] The Basic Act further presents three principles relating to Japanese research and development and utilisation of nuclear energy, i.e. "democratic administration", "independent development" and "making the results available to the public".[23]

17. Constitution, *supra* note 8, Article 73.6 (emphasis added).
18. Higuchi, Y. (1998), *Kenpō*, [Constitution], Sobunsha, Tokyo, p. 375.
19. National Government Organization Act, No. 120, 10 July 1948, as amended, Article 12.
20. *Ibid.*, Article 14.
21. Basic Act, *supra* note 3, Article 1.
22. *Ibid.*, Article 2.
23. *Ibid.*

Chapter	Articles
Chapter 1: General Provisions	Article 1 (purpose)
	Article 2 (basic policy)
	Article 3 (definitions)
Chapter 2: Atomic Energy Commission and Nuclear Safety Commission	Article 4 (establishment)
	Article 5 (duties)
	Article 6 (organisation, operation and authority)
Chapter 3: Organisation of Development of Nuclear Energy	Article 7 (Japan Atomic Energy Agency)
Chapter 4: Development and Acquisition of Minerals related to Nuclear Energy	Article 8 (special provisions on the mining act)
	Article 9 (purchase order and transfer order)
	Article 10 (control over nuclear source material)
	Article 11 (financial incentives)
Chapter 5: Control over Nuclear Fuel Materials	Article 12 (regulations concerning nuclear fuel materials)
	Article 13 (order of transfer of nuclear fuel materials)
Chapter 6: Control of Reactors	Article 14 (regulations over construction of reactors)
	Article 15 (transfer and receipt of reactors)
	Article 16 (supplementary clause of the former two articles)
Chapter 7: Measures for Patented Inventions etc	Article 17 (measures under the patent act)
	Article 18 (restriction on transfer)
	Article 19 (financial incentives)
Chapter 8: Prevention of Radiation Hazards	Article 20 (measures for the prevention of radiation hazards)
Chapter 9: Compensation	Article 21 (compensation)

Table 1: Index of Atomic Energy Basic Act in 1955

The Basic Act is called "the constitution of Japanese nuclear law",[24] because it is the basis of all other nuclear law in Japan. While it outlines the basic principles, it does not provide detailed provisions for each subject, anticipating separate enactments of specific laws. For example, Chapter 8 of the Basic Act has only one article, which states:

> In order to prevent radiation hazards and ensure public safety, the regulations on the manufacture, sale, use, measurement, etc. and any other safety and health measures relating to radioactive materials and radiation generating devices are provided separately by law.[25]

To correspond to the last three words, "separately by law", the Diet passed the RI Regulation Act, which references the Basic Act, confirming the connection in Article 1:

> The purpose of this Act is, *in accordance with the spirit of the Atomic Energy Basic Act (Act No. 186 of 1955)*, to provide regulations on the use, selling, leasing, waste management, and other handling of radioisotopes, the use of radiation generators….[26]

24. See Japan Radioisotope Association (JRIA) (2021), *Hōshaseidōigensotou no kisei ni kansuru hourei gaisetsu to yōten*, [Overview and Main Points of Act on the Regulation of Radioisotopes, etc and the Regulations], JRIA, Maruzen Publishing, Tokyo, p. 17.
25. Basic Act, *supra* note 3, Article 20.
26. RI Regulation Act, *supra* note 5, Article 1 (emphasis added).

The same structure is observed in other acts, notably the Reactor Regulation Act, which provides rules on the subjects mentioned under Chapters 4, 5 and 6 of the Basic Act. As seen in the RI Regulation Act, the Reactor Regulation Act also starts Article 1 as follows:

> This act, *in accordance with the spirit of the Atomic Energy Basic Act (Act No. 186 of 1955)*, is enacted for the purpose of providing the necessary regulation on refining activities, fabrication and enrichment activities….[27]

For reference, the following table provides a list of the major nuclear acts in Japan:

Title	Year	Description
The Basic Act	1955	The first nuclear law in Japan to define the state's basic policy, principle and rule for the nuclear energy
Act for Establishment of the Japan Atomic Energy Commission [28]	1955	Established the Japan Atomic Energy Commission under the Cabinet for the democratic administration of nuclear research and development and utilisation of nuclear energy
Act for the Establishment of the Nuclear Regulation Authority ("the NRA Establishment Act") [29]	2012	Established the Nuclear Regulation Authority (NRA) as the regulatory authority to ensure the safety in nuclear energy
The Reactor Regulation Act	1957	Provides the regulations on activities over the nuclear fuel cycle such as refining, fabrication and enrichment, installation and operation of reactor and so on
The RI Regulation Act	1957	Provides the regulation on radioisotopes and radiation generators
Act on Special Measures Concerning Nuclear Emergency Preparedness ("the Nuclear Emergency Act")[30]	1999	Provides measures against nuclear disaster to protect the lives, bodies and properties of citizens from the consequences of a nuclear disaster
Act on Compensation on Nuclear Damage ("the Compensation Act")[31]	1961	Provides a regime and protection for nuclear liability

Table 2: List of Major Nuclear Acts in Japan (non-exclusive)

2.3 The Basic Act and a future fusion regulatory framework

As the Basic Act is the central pillar of Japanese nuclear law, it will be impossible to ignore it when developing a future legal framework for fusion regulation. In this regard, Article 3 of the Act should be considered, as it defines several key terms:

Article 3(i)	the term "Nuclear Energy" means all types of energy emitted from the nucleus of an atom in the process of nuclear transmutation;
Article 3(ii)	the term "Nuclear Fuel Materials" means materials that emit high energy in the process of nuclear fission, such as uranium and thorium, which are specified by Cabinet order;
Article 3(iii)	the term "Nuclear Source Materials" means materials that are used as the raw materials of nuclear fuel materials, such as uranium ore and thorium ore, which are specified by Cabinet order;
Article 3(iv)	the term "Reactor" means a device that uses Nuclear Fuel Materials as fuel; provided, however, that those specified by Cabinet order are excluded;

27. Reactor Regulation Act, *supra* note 4, Article 1(1) (emphasis added).
28 Act for Establishment of the Japan Atomic Energy Commission, No. 188, 9 Feb. 1955, as amended.
29. Act for the Establishment of the Nuclear Regulation Authority, No. 47, 27 June 2012, as amended.
30. Act on Special Measures Concerning Nuclear Emergency Preparedness, No. 156, 17 Dec. 1999, as amended.
31. Act on Compensation for Nuclear Damage, No. 147, 17 June 1961, as amended.

Article 3(v) the term "Radiation" means electromagnetic waves or corpuscular beams capable of ionising air directly or indirectly and specified by Cabinet order.[32]

First, the term "nuclear energy" is important here because, as defined in the Act, "nuclear energy" would necessarily encompass fusion energy as well as fission energy. The fusion reaction from D-T emits an energy of 17.60 MeV,[33] and despite the differences between fusion and fission both reactions will go through a process of "nuclear transmutation" as the atomic nucleus will change due to the nuclear reaction.[34] Fusion energy, therefore, satisfies the definition of nuclear energy under the Basic Act. This needs to be noted and separated from the fact that the recent Japanese state's policy paper, which is not a legal instrument, expressly used the term "fusion energy", not "nuclear fusion energy", in order to "prevent misunderstanding arising from the confusion with nuclear fission."[35] The practice of removing "nuclear" when discussing fusion is rather common and is also practiced outside Japan, including by the International Atomic Energy Agency (IAEA), which frequently uses the term "fusion energy".[36] Nevertheless, it should be noted that, legally speaking, fusion energy is nuclear energy under the Japanese legal system.

Second, and conversely, the fuels of fusion energy, i.e. tritium and deuterium, do not meet the definition of "nuclear fuel materials" as defined in the Basic Act.[37] "Nuclear fuel materials" typically include materials such as uranium and thorium. Notably, the Cabinet order to supplement the Basic Act, which included other materials such as plutonium 239, did not include tritium or deuterium.[38] Also, the Basic Act clearly stipulates "nuclear fuel materials" are materials that "emit high energy in the process of *nuclear fission*".[39] Since "nuclear fuel materials" are limited to fissile materials, the term "nuclear source material", which is defined as raw material for "nuclear fuel" must likewise exclude raw materials for fusion.[40] In the same manner, a fusion reactor, even if it may be technically a reactor, cannot be a "reactor" under the Basic Act because it is not a device that uses "nuclear fuel materials".

Table 3 below summarises the author's interpretation of the applicability of the terms defined in the Basic Act to nuclear fission and fusion respectively. In a philosophical sense, it could be said that there is a vacuum in the applicability of the current legal framework that must be filled to address this new energy source. On one hand, fusion energy is a "nuclear energy" that results in radiation, on the other hand it does not involve "nuclear fuel materials", "nuclear source materials" or a "nuclear reactor", at least in a legal sense. This has two important, practical implications.

32. Basic Act, *supra* note 3, Article 3(i-v).
33. Ueda, Y. et al. (2004), "Intelligible Seminar on Fusion Reactors, 1: Introduction to Fusion Reactors", *Journal of Atomic Energy Society of Japan*, Vol. 46, No. 12, Atomic Energy Society of Japan, Tokyo, pp. 845-852.
34. The D-T fusion reaction is [2H + 3H → 4He + n]. While the fission has a variety of the reactions, a typical reaction is [U235 + n → Ba + Kr + 3n]. In both cases, the atomic nuclei have changed during the reaction, which means that they go through nuclear transmutation.
35. Government of Japan: The Integrated Innovation Strategy Promotion Council (2023), *Fusion Energy Innovation Strategy*, Cabinet Office, Government of Japan, Tokyo, English translation available at: https://www8.cao.go.jp/cstp/fusion/230426_strategy.pdf.
36. For example, the IAEA holds events to foster the exchange of scientific and technical results in nuclear fusion research and development, one of which is the IAEA Fusion Energy Conference (FEC). IAEA (2023), "29th IAEA Fusion Energy Conference (FEC 2023)", IAEA, www.iaea.org/events/fec2023 (accessed 13 June 2024).
37. Basic Act, *supra* note 3, Article 3(ii).
38. Cabinet Order on the Definition of Nuclear Fuel Materials, Nuclear Source Materials, Reactor and Radiation, No. 325, 21 Jan. 1957.
39. Basic Act, *supra* note 3, Article 3(ii), emphasis added.
40. Considering that tritium and deuterium fuel fusion reactors, the concept of "source material" as the raw material of the fuels might not be relevant for fusion. At least, it is difficult to make an equivalent comparison.

Article No.	Five legal terms defined under the Basic Act	Applicability to nuclear fission	Applicability to nuclear fusion
Article 3(i)	Nuclear Energy	√	√
Article 3(ii)	Nuclear Fuel Materials	√	✕
Article 3(iii)	Nuclear Source Materials	√	✕
Article 3(iv)	Reactor	√	✕
Article 3(v)	Radiation	√	√

Table 3: Legal terms defined under the Atomic Energy Basic Act

First, due to the above definitions, it is not possible to use the current Reactor Regulation Act to regulate fusion. The full title of the Reactor Regulation Act, "the Act on the Regulation of *Nuclear Source Material, Nuclear Fuel Material* and *Reactors*", includes the three terms, and their definitions in the Basic Act are incorporated by reference.[41] Therefore, unless the Diet passes an amendment to modify the definition of the terms, the Reactor Regulation Act cannot be used to regulate fusion facilities.

Redefining these three terms to apply to fusion would be an important step but represents only a small fraction of the massive amount of work needed to amend the Basic Act, the Reactor Regulation Act, the relevant Cabinet orders and other administrative documents to the degree necessary to create a framework for fusion energy regulation.

The second consequence of the Basic Act is that it will necessarily be used to clarify and support the jurisdiction of the Nuclear Regulation Authority (NRA) over fusion energy. In 2012, following the Fukushima Daiichi nuclear accident, the NRA was established as the sole regulator of nuclear energy by integrating several entities that had been previously in charge of the different nuclear regulatory activities.[42] The NRA Establishment Act, which is the source law of the NRA, stipulates that its mission is to ensure the safety of "nuclear energy",[43] which, per the Basic Act, would include fusion energy. The question of jurisdiction may seem self-evident to Japanese readers of this article, as the NRA is the sole nuclear regulatory body in Japan. However, it might not always be the case in other states. For example, the United Kingdom (UK) proposed that the regulatory body for fusion should be not the Office for Nuclear Regulation (ONR) but rather the Health and Safety Executive (HSE) and the Environmental Agency (EA).[44] The United Kingdom's direction was related to their choice of regulatory approach, determining that fusion reactors do not fall under the definition of "nuclear installations".[45]

41. Reactor Regulation Act, *supra* note 4, Articles 2.2, 2.3 and 2.4 (emphasis added).
    Article 2.2: The term "nuclear fuel material" as used in this Act means nuclear fuel material prescribed in Article 3, item (ii) of the Atomic Energy Basic Act. Article 2.3: The term "nuclear source material" means nuclear source material prescribed in Article 3, item (iii) of the Atomic Energy Basic Act. Article 2.4: The term "reactor" as used in this Act means a reactor prescribed in Article 3, item (iv) of the Atomic Energy Basic Act.
42. Morozuku, M. and Nishiwaki. Y. (2012), "The New Nuclear Regulation System of Japan", *Journal of Atomic Energy Society of Japan*, Vol. 54, No. 12, Atomic Energy Society of Japan, Tokyo, pp. 774-779.
43. "Article 3: The mission of the Nuclear Regulation Authority shall be to ensure safety in the use of nuclear energy…", Act for the Establishment of the Nuclear Regulation Authority, *supra* note 29, Article 3.
44. UK Department for Business, Energy & Industrial Strategy (2021), *Towards Fusion Energy, The UK Government's proposal for a regulatory framework for fusion energy*, HH Associates Ltd., Surrey, United Kingdom, p. 45.
45. *Ibid.*, p. 48.

2.4 Chapter 4 of the Reactor Regulation Act

2.4.1 Overview

Recognising that Japan may not use the current Reactor Regulation Act to regulate fusion facilities, it will be still worthwhile to review this Act. The Act has been used to regulate nuclear power plants for decades and has a set of established regulations to ensure a high level of safety. The Reactor Regulation Act starts with general provisions (Chapter 1), which include its purpose (Article 1) and definitions (Article 2).[46] Though the shortened English name of the Act is the "Reactor Regulation Act",[47] the scope is not limited to reactor regulation and it covers different regulatory areas of the nuclear fuel cycle and of nuclear technologies. Table 4 summarises the titles of each chapter, which present the regulatory subjects.

Chapter	Title of chapter	Article No.
Chapter 1	General Provisions	1, 2
Chapter 2	Regulation on Refining Activities	3 to 12
Chapter 3	Regulation on Fabrication and Enrichment Activities	13 to 22
Chapter 4	Regulation on the Installation and Operation of Reactors	23 to 43.3.35
Chapter 5	Regulation on Storage Activities	43.4 to 43.28
Chapter 6	Regulation on Reprocessing Activities	44 to 51.1
Chapter 7	Regulation on the Activities of Radioactive Waste Disposal and Storage	51.2 to 51.34
Chapter 8	Regulation on the Use of Nuclear Fuel Materials	52 to 57.7
Chapter 9	Responsibility of Nuclear Operators and Other Licensees	57.8
Chapter 10	Regulation on Nuclear Operators	58 to 61.2
Chapter 11	Supervision based on Nuclear Regulatory Inspections	61.2.2
Chapter 12	Regulation on the Use of International Controlled Materials	61.3 to 61.23.21
Chapter 13	Miscellaneous Provisions	62 to 76
Chapter 14	Penal Provisions	77 to 84
Chapter 15	Release of Foreign Vessels Subject to Security Deposit	85 to 89

Table 4: Index of Reactor Regulation Act

Chapter 4 of the Reactor Regulation Act provides for regulation of reactors. Though a fusion facility reactor is not a "reactor" as defined under current Japanese nuclear law, this chapter may nevertheless provide some relevant clauses for reference.

2.4.2 Chapter 4 of the Reactor Regulation Act

Chapter 4 of the Reactor Regulation Act contains two sections. Section 1 starts with Article 23 and continues through Article 43.3.4, providing regulations for "research and test reactors".[48] Section 2 is from Article 43.3.5 through Article 45.3.35, and provides regulations for "power reactors",[49] meaning commercial nuclear power plants. The articles under Section 2 for nuclear power plants are summarised in Table 5.

46. Reactor Regulation Act, *supra* note 4.
47. This is the case in the original Japanese texts too. The Reactor Regulation Act is a translation of "炉規法" (*Ro-Ki-Hō*). *Ro* means Reactor, *Ki* is Regulation and *Hō* represents Act.
48. A research and test reactor is defined as "a reactor other than power reactors". Reactor Regulation Act, *supra* note 4, Article 23.1.
49. "The term 'power reactor' as used in this Act means a reactor used for power generation, excluding reactors used for research and testing other than those specified by Cabinet order as being in the stage of research and development, and reactors installed on vessels." Reactor Regulation Act, *supra* note 4, Article 2.5.

Article No.	Article contents
43.3.5	Permission for the Reactor Installation
43.3.6	Criteria for Permission
43.3.7	Ineligibility for the Permission
43.3.8	Permission for and Notification of Changes
43.3.9	Approval of Design and Construction Method
43.3.10	Notification of Design and Construction Plan
43.3.11	Pre-Operational Inspection
43.3.12 to 13	(deleted)
43.3.14	Maintenance of Power Reactor Facilities
43.3.15	(deleted)
43.3.16	Periodic Licensee's Inspection
43.3.17	Operation Plan
43.3.18	Merger and Split
43.3.19	Inheritance
43.3.20	Rescission of the Permission
43.3.21	Records
43.3.22	Measures to Be Taken for Operational Safety and Physical Security of Specified Nuclear Fuel Materials
43.3.23	Suspension of the Use of Facilities
43.3.24	Safety Regulations
43.3.25	Acquiring Power Reactor
43.3.26	Chief Engineer of Power Reactor
43.3.27	Provisions for the Physical Security of Nuclear Materials
43.3.28	Nuclear Material Physical Security Manager
43.3.29	Evaluation for Improving the Safety of Power Reactor Facilities
43.3.30	Type Certificate for Design of Specified Equipment for Power Reactor Facilities
43.3.31	Designation of the Type of Specified Equipment for Power Reactor Facilities
43.3.32	Operation Period
43.3.33 to 34	Measures Associated with Decommissioning of Power Reactors
43.3.35	Measures Associated with Rescission of the Permission

Table 5: Index of chapter 4, section 2, of the Reactor Regulation Act

One of the main characteristics of the Reactor Regulation Act is the intensive licensing process, which utilises gradual steps the licensee must undertake before it may start operation of a nuclear power plant. As a first step, as part of the siting process, a licensee must obtain the NRA's permission to install a power reactor (the "permission for the reactor installation") by submitting an application that includes 11 items defined in the Act (see Table 8).[50] In considering whether to grant or reject an application for a permission for the reactor installation, the NRA follows five acceptance criteria stipulated in the Act.[51] Once the licensee successfully obtains the permission for the reactor installation, the next step is for them to apply for and obtain the NRA's approval on their construction plan ("design and construction plan") prior to the commencement of work.[52] The third step is to acquire the NRA's approval on an operational and safety programme, which must be obtained before the licensee can commence construction of the power reactor facilities.[53] In accordance with two criteria indicated in the Act, the NRA will review the file and decide

50. *Ibid.*, Article 43.3.5.
51. *Ibid.*, Article 43.3.6.
52. *Ibid.*, Article 43.3.9.
53. *Ibid.*, Article 43.3.24.1.

approval or rejection.[54] The Reactor Regulation Act gives the NRA relatively strong authority to order the licensee to change the licensee's internal safety regulations, if determined to be necessary.[55]

Finally, the Act defines an obligation on the licensee to perform a pre-service inspection.[56] The licensee must conduct the inspection to confirm two conditions: (1) that their construction works have been carried out in compliance with the approved design and construction plan and (2) that their facilities are compliant with the technical criteria specified by the rules of the NRA.[57] A licensee cannot use the power reactor unless the NRA provides a confirmation that both of the two conditions in the previous article are satisfied.[58] The above process, which is also called step-by-step licensing regulation, is summarised in Chart 2.

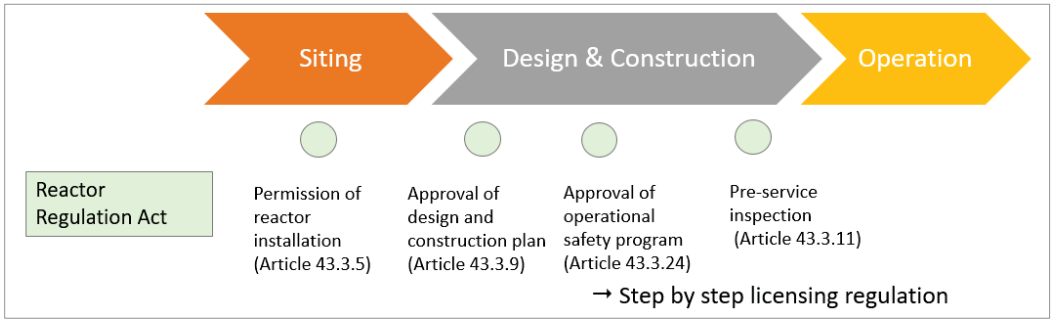


Figure 2: Licensing process for nuclear power plants under the Reactor Regulation Act

After the licensing has been obtained, the operator still has obligations, and the NRA will oversee the operator's activities as needed. First, the operator must maintain the power reactor facilities in compliance with the NRA's technical criteria.[59] Operators must also perform periodic inspections of the power reactor facilities and record and preserve the inspection results.[60] Further, the operator must create an operation plan for the power reactors and notify the NRA of the initial plan any of any revisions to the plan.[61] There are other obligations imposed on the operator with regards to physical protections.[62] For a detailed list of obligations on the licensee, see Table 7.

To enforce these regulations, the Reactor Regulation Acts sets criminal provisions that define types of offences and corresponding penalties.[63] The penalties are either a fine, imprisonment or both.[64]

54. *Ibid.*, Article 43.3.24.2.
55. *Ibid.*, Article 43.3.24.3.
56. *Ibid.*, Article 43.3.11.
57. *Ibid.*, Article 43.3.11.2.
58. *Ibid.*, Article 43.3.11.3.
59. *Ibid.*, Article 43.3.14.
60. *Ibid.*, Article 43.3.16.
61. *Ibid.*, Article 43.3.17.
62. *Ibid.*, Articles 43.3.22, 43.3.27, 43.3.29.
63. *Ibid.*, Chapter 7.
64. *Ibid.*

2.5 RI Regulation Act

2.5.1 Radiation

The RI Regulation Act was enacted in 1957 to prevent radiation hazards in accordance with Chapter 8 of the Basic Act.[65] Interestingly, the precise definition of "radiation", which is the very subject of the Act and which is used for the execution of the law and the associated regulations, can be found in neither the RI Regulation Act itself nor in the Basic Act, but only in a Cabinet order supplementing the Basic Act.[66] As summarised in the chart below, it presents the particularity of Japanese nuclear law where the Basic Acts plays a pivotal role in the nuclear law system by keeping other laws and relevant instruments established and connected around itself.

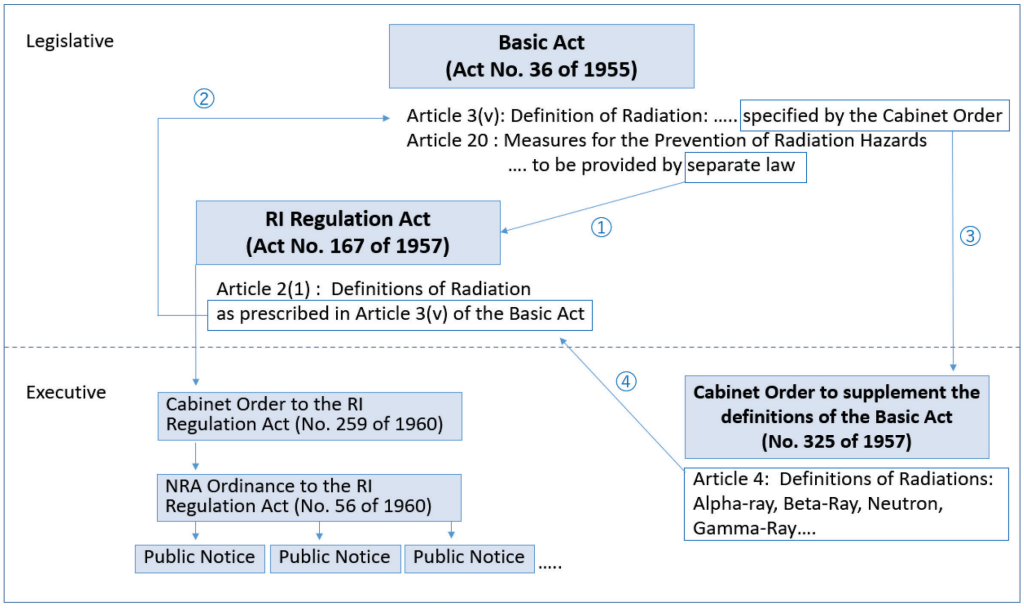


Figure 3: Definitions of "radiation"

2.5.2 Overview

The nine chapters of the RI Regulation Act, summarised in Table 6, assume three potential sources of radiation hazards, i.e. radioisotopes, radiation generators and any items contaminated by radioisotopes or radiation generators (called "radioactively contaminated objects").[67] Since the latter source is a by-product of contamination by the other two, it is essential to have a firm understanding of the first two sources.

65. Basic Act, *supra* note 3, Article 20.
66. "The radiation stipulated in Article 3, Item 5 of the Atomic Energy Basic Act means electromagnetic waves or particle beams as follows: 1. Alpha ray, deuteron beam, proton beam and other heavy charged particle beam, and Beta ray, 2. Neutron ray, 3. Gamma ray and characteristic X-ray (limited to characteristic X-ray generated by electron capture). 4. Electron ray or X-ray emitting energy equal to or larger than 1MeV."
Cabinet Order on the Definition of Nuclear Fuel Materials, Nuclear Source Materials, Reactor and Radiation, *supra* note 38, Article 4.
67. RI Regulation Act, *supra* note 5.

Chapter	Title of chapter	Article No.
Chapter 1	General Provisions	1-2
Chapter 2	Permission and Notification of Use, Notification of Selling and Leasing Radioisotopes, and License to Conduct Radioactive Waste Management	3-12.1
Chapter 3	Approved Devices with a Certification Label, etc.	12.2-12.7
Chapter 4	Obligation, etc. of Users Who Hold the Permission and Users Who Have Notified, Sellers Who Have Notified, Lessors Who Have Notified and Licensed Radioactive Waste Management Operators, etc.	12.8-33.3
Chapter 5	Radiation Protection Supervisors, etc.	34-38.3
Chapter 6	Responsibility of Users who Have the Permission and Users Who Have Notified	38.4
Chapter 7	Registered Certification Organizations, etc.	39-41.46
Chapter 8	Miscellaneous Provisions	42-50
Chapter 9	Penal Provisions	51-61
Chapter 10	Releasing Foreign Vessels, etc. through Providing Security Deposits, etc.	62-66

Table 6: Index of RI Regulation Act

Radioisotopes and radiation generators are defined as:

> "Radioisotope" as used in this Act means a radiation emitting isotope such as phosphorus-32, cobalt-60, etc., its compound, and material containing such an isotope (including those equipped in devices), which are prescribed in Cabinet order.
>
> "Radiation generator" as used in this Act means an equipment which generates radiation by accelerating charged particles such as cyclotrons, synchrotrons, etc., which is prescribed in Cabinet order.[68]

The Cabinet Order to the RI Regulation Act excludes nuclear fuel and nuclear fuel materials as subject to the RI Regulation Act, as they are regulated by the Reactor Regulation Act.[69] In the same way, medicines and medical equipment, even if they are radioactive, are excluded because they are regulated by the relevant medical acts. The Cabinet Order also stipulates that radioisotopes under the RI Regulation shall be "a radiation emitting isotope, its compound, or material containing such an isotope" whose quantity and concentration will exceed "the specified minimum quantity determined by the NRA".[70] Tritium, which is the fuel of fusion reactors, is therefore a radioisotope regulated under the RI Regulation Act.

For radiation generators, the Cabinet Order to the RI Regulation Act defines eight types of device as radiation generators.[71] Based on the public notice issued by the NRA,[72] previous or currently operating major Japanese fusion research test devices such as the JT60, JT-

68. *Ibid.*, Articles 2.2 and 2.5.
69. Cabinet Order on the Act on the Regulation of Radioisotopes, etc, No. 259, 30 Sep. 1960.
70. The actual definition of the minimum quantity is made by the relevant public notice. See Public Notice concerning the designation of the quantity etc, regarding radioisotopes emitting radiation, No. 5, 23 Oct. 2000 as amended as No. 6 on 8 Mar. 2020 (Quantity Notice).
71. "1. Cyclotron, 2. Synchrotron, 3. Synchrocyclotron, 4. Linear accelerator, 5. Betatron, 6. Van de Graaf type accelerator, 7. Cockcroft-Walton type accelerator, 8. Other equipment that generates radiation by accelerating charged particles and is designated by the Nuclear Regulation Authority as necessary for the prevention of radiation hazards."
Cabinet Order on the Act on the Regulation of Radioisotopes, etc, *supra* note 69, Article 2.
72. Public Notice concerning the designation of the equipment that generates radiation by accelerating charged particles, No. 4, 9 Apr. 1964 as amended on 17 Apr. 1989.

60SA[73] and the Large Helical Device (LDH) [74] have been treated under the eighth category of radiation generator, "other equipment that generates radiation by accelerating charged particles and is designated by the Nuclear Regulation Authority as necessary for the prevention of radiation hazards". According to the same notice, those devices, also called "plasma generators", were limited to generators "capable of achieving critical plasma conditions in reactions" and "exclusively used for deuterium and deuterium reactions" (D-D reaction). Indeed, JT60, JT-60SA and LHD produce D-D reactions.

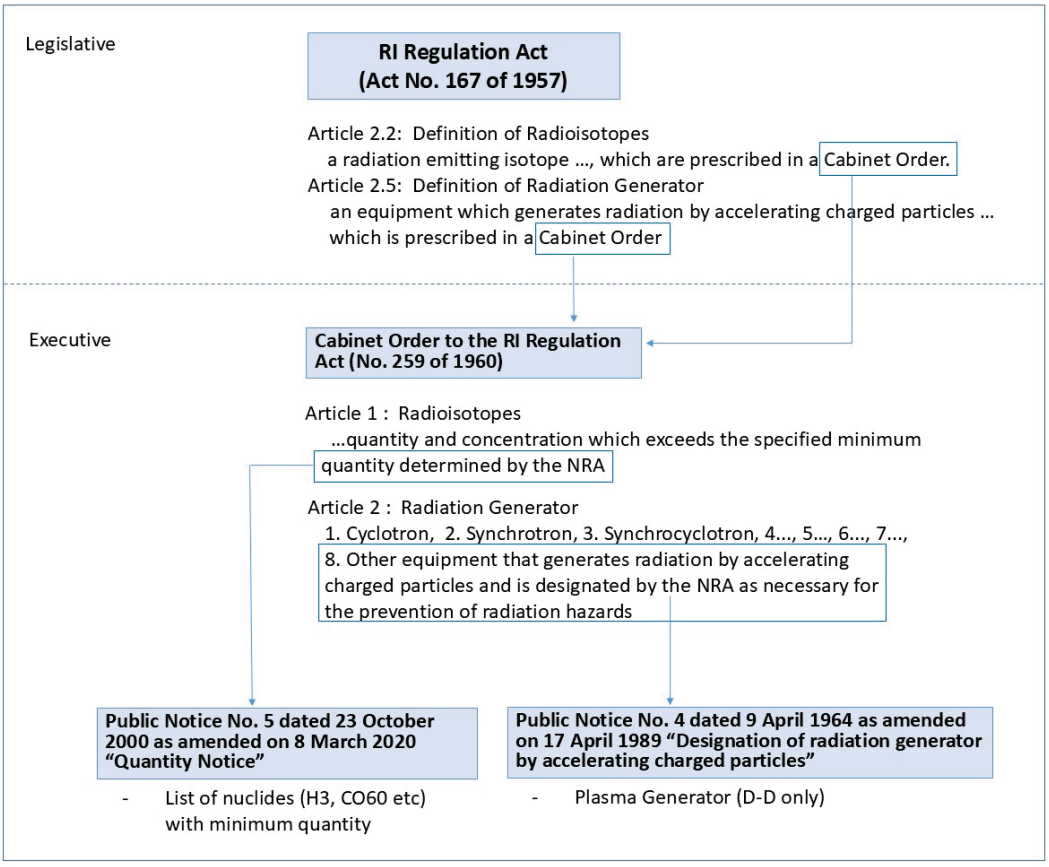


Figure 4: Definitions of "radioisotopes" and "radiation generators" under the RI Regulation Act

One of the main characteristics of the RI Regulation Act is a more relaxed licensing process than the one mandated by the Reactor Regulation Act. If an operator plans to build and use a new radiation generator, there will be only two hold point milestones.[75] First, a licensee must submit an application form including seven items defined by the Act (see

73. JT60 was a tokamak fusion research device operated by the Japan Atomic Energy Agency (JAEA). Japan and Europe built a new fusion research device named JT-60SA by updating the infrastructure of JT60. JT-60SA will be the largest tokamak test device in the world until ITER is completed. See JT-60SA (n.d.), "What is JT-60SA?", www.jt60sa.org/wp (accessed 13 June 2024).
74. LHD is a helical fusion research device operated by National Institute for Fusion Science in Japan.
75. The RI Regulation Act actually stipulates different types of users and imposes different rules. For those who use the radioisotopes under the specified threshold, they only need to notify the NRA of the use and they do not need to obtain the permission. This is also the case for those who use the approved device with a certification and those who sell or lease isotopes as business. RI Regulation Act, *supra* note 5, Articles 3.2 and 4.

Table 8) and obtain the NRA's "permission to use".[76] Subsequently, the NRA will review the file and decide to grant permission or reject the application in accordance with the four acceptance criteria stipulated in the act.[77] Second, the licensee needs to pass an inspection of the facility by the NRA or an organisation registered with the NRA.[78] The licensee cannot start using the radiation generator unless these two licensing steps are cleared by the NRA.

In addition to these two hold points, the Act places two obligations on the licensee. One is a notification of the radiation hazards prevention programme and the other is a notification of the physical security plan, which is needed if the facility holds specified radioisotopes.[79] These two obligations only require notification, not permission.[80] As the process is limited to two permissions and two notifications, licensing under the RI Regulation Act is much less burdensome than licensing under the Reactor Regulation Act.

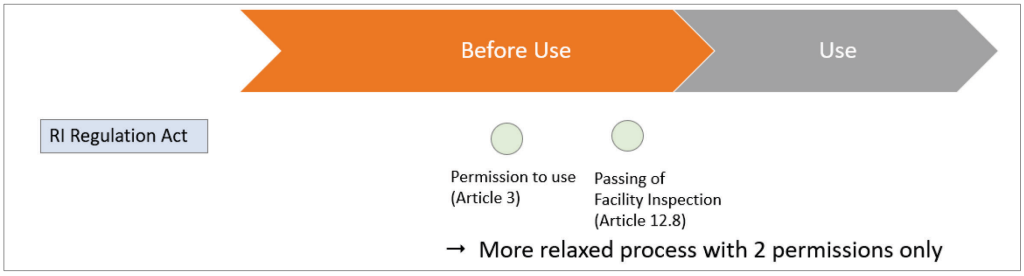


Figure 5: Licensing process of the RI Regulation Act

After these steps are completed, the operator still has other obligations, and the NRA will be required to perform oversight activities accordingly. These obligations include:[81]

- to maintain the facility conforming to the technical standards prescribed in the NRA Regulation;[82]
- to receive a periodic inspection on the facility by the NRA or a registered inspection organisation;[83]
- to receive a periodic confirmation by the NRA or a registered inspection organisation on the records and books of radiation contamination measurements;[84] and
- to perform education and training on the prevention of radiation hazard.[85]

76. *Ibid.*, Article 3.
77. *Ibid.*, Article 6.
78. *Ibid.*, Article 12.8.
79. *Ibid.*, Articles 21 and 25.4.
80. The Administrative Procedure Act clearly stipulates a difference between notification and request for permission. Notification does not require a response from the regulatory body and the obligation of a licensee will be deemed to be completed when the documents complying with the administrative requirements arrive at the regulator's office. See Administrative Procedure Act, Act No. 88, 12 Nov. 1993, Articles 2.3, 2.7 and 37.
81. RI Regulation Act, *supra* note 5. For a detailed list, refer to Table 7.
82. *Ibid.*, Article 13.1.
83. *Ibid.*, Article 12.9.
84. *Ibid.*, Article 12.10.
85. *Ibid.*, Article 22.

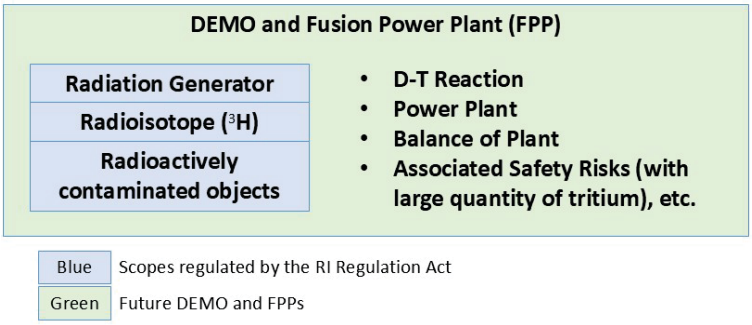
The RI Regulation Act also contains criminal provisions which define offences and corresponding penalties.[86] The penalties can be a fine, imprisonment or both.[87]

3. Why the RI Regulation Act cannot be used to regulate D-T fusion

While the current Reactor Regulation Act is not applicable to the regulation of fusion, the RI Regulation Act is likewise incompatible. First, as discussed in Section 2.3, the current law regulates fusion research devices for the D-D reaction only. Future fusion reactors such as the DEMO and the FPP will produce a D-T fusion reaction, which uses deuterium and tritium. As such, D-T fusion reactors cannot be considered radiation generators (i.e. plasma generators) under the RI Regulation Act.

There may be a second question worth considering, however: could the NRA issue another public notice to designate D-T fusion devices as another type of radiation generator? In other words, can the NRA modify the supplementary condition mentioned under Public Notice No. 4 by amending "exclusively used for deuterium and deuterium reactions" to be "exclusively used for either deuterium and deuterium reactions or tritium and deuterium reactions"?[88]

While an intriguing premise, ultimately the answer is no. The RI Regulation Act may provide for some useful regulations for a fusion regulatory framework, but it does not provide sufficient regulatory scope.[89] Despite a commonality between the current scope of the RI Regulation Act, and the future regulatory scope needed for fusion facilities, i.e. radioisotopes, radiation generators and contaminated objects, the DEMO and FPPs are different from and much more technically complex than D-D fusion plasma generators, necessitating different regulations. First, D-T reactions will produce a large amount of energy, which will be converted into electricity and connected to the grid. Second, fusion facilities will require large, complex facilities, systems, components and equipment, which are not necessary with D-D devices. Third, the safety risks, especially where the facility uses a large amount of tritium, will differ from D-D devices and are expected to be greater.



→ **RI Regulation Act provides "necessary" and "minimum" regulation but not "sufficient" regulation.**

Figure 6: DEMO/FPPs and the RI Regulation Act

86. *Ibid.*, Chapter 9.
87. *Ibid.*
88. Public Notice No. 4, *supra* note 72.
89. In addition, it is the author's interpretation, precisely speaking, that the current RI Regulation Act is written in a manner to regulate either radioisotopes (e.g. tritium) or a radiation generator (e.g. plasma generator) and does not provide provisions to regulate both at the same time. For example, Article 3.2.2 requires information on the "kinds and quantities of radioisotopes, and whether they are sealed or unsealed, or kind, number of units and performance of radiation generators". *Ibid.*, Article 3.2.2 (emphasis added).

3.1 The need for new legislation

The above analysis demonstrates a clear need for new legislative action to regulate the fusion facilities of the future. When it comes to a legislative process, there are principally two options. The first is to prepare and enact a totally new act for a regulatory framework for fusion (Option 1). The second option is to amend one of the existing acts by creating a specific chapter and/or specific provisions relevant to fusion (Option 2). Option 2 would then have two sub-options, one being to amend the Reactor Regulation Act (Option 2a) and the other to modify the RI Regulation Act (Option 2b).

In the author's opinion, Option 1 seems the best solution to provide clarity and simplicity to the regulation. The new act and all associated rules should be dedicated to fusion so that they can be easily understood and applied and to avoid regulatory confusion. In fact, when Japan was seeking to be the host state of the ITER project, the regulatory framework discussed by the government at the time was to establish a new legislation dedicated to the regulation of ITER.[90]

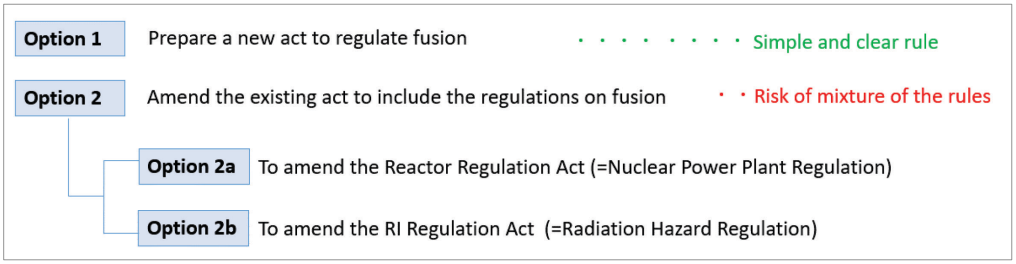


Figure 7: Legislative options to create a new regulatory framework for Japanese fusion energy

Even in the case of a new act, a comparison between Option 2a and Option 2b is still relevant, because the options offer distinct approaches to regulation.[91] While the purpose of the article is not to present any technical judgement, if Option 1 is followed it seems reasonable and appropriate to base the new legislation primarily on the RI Regulation Act, with aspects of the Reactor Regulation used to fill any regulatory gaps. This is because the licensing process as currently implemented may be unnecessarily burdensome given the difference of the safety risks between fission and fusion.[92] The IAEA, by referring to Principle 5 of the Fundamental Safety Principles,[93] explains that the radiation risks of fusion facilities and activities must be assessed by using the "graded approach".[94] In fact, the IAEA placed "steps for authorization" at the top of its list of "important issues to be considered" for an optimised regulatory framework for fusion facilities.[95] Under the current

90. Ministry of Education, Culture, Sports, Science and Technology (2002), "Minutes of Meeting of Panel to discuss Nuclear Safety Regulation etc, dated 24 December 2002", www.mext.go.jp/b_menu/shingi/chousa/gijyutu/004/gijiroku/1266389.htm (accessed 13 June 2024).
91. The governmental panel to discuss the state's fusion strategy established under the Cabinet office discussed the future regulatory framework during a meeting held on 6 December 2022 by briefly referring to the potential two approaches. See Cabinet Office (2022), "Minutes of the Meeting and the Presentation Documents for Panel for Fusion Energy Strategy", https://www8.cao.go.jp/cstp/fusion/3kai/giji.pdf (accessed 13 June 2024).
92. Ohira, S. (2005), "Intelligible Seminar on Fusion Reactors, 11: Safety of Fusion Reactor – Safety Characteristics and Requirements", *Journal of Atomic Energy Society of Japan*, Vol. 47, No. 12, Atomic Energy Society of Japan, Tokyo, pp. 839-845.
93. IAEA (2006), *Fundamental Safety Principles: Safety Fundamentals*, IAEA Safety Standards Series, Safety Fundamentals, No. SF-1, IAEA, Vienna, p.10.
94. IAEA (2023), *IAEA World Fusion Outlook 2023*, p. 28, available at: www-pub.iaea.org/MTCD/Publications/PDF/FusionOutlook2023_web.pdf.
95. *Ibid*.

Reactor Regulation Act, the licensee must halt progress at multiple points and wait for permission to proceed from the NRA. This scheme tends to cause a longer project period and create a financial burden on business developers. As long as adequate technical criteria are set, monitored and enforced, the less burdensome licensing process outlined in the RI Regulation Act seems more appropriate for fusion given the lower safety risks.

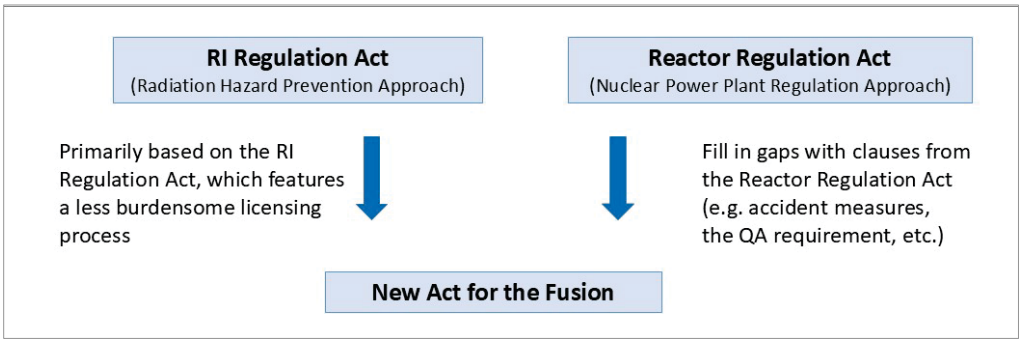


Figure 8: The concept to prepare a new legislation for fusion regulation

That said, not all elements necessary for a fusion regulatory framework are present in the current RI Regulation Act. For example, there is no provision under the RI Regulation Act imposing QA requirements on the operator. Also, the RI Regulation does not have a framework to require an operator to estimate and plan for response measures to potential accidents. It would be appropriate, therefore, to review and incorporate appropriate measures from other sources, potentially elements of the Reactor Regulation Act.

The real regulation will be in the details, especially at the administrative level. However, based on the rule of the delegation of law, regulations cannot be established unless the principles are defined first at the legislative level. As such, comparison of the RI Regulation Act and the Reactor Regulation Act should be further developed, and not limited to the two items identified above, to find the best equilibrium for fusion regulation.

	RI Regulation Act		Reactor Regulation Act		
Topic	Article	Regulatory Provision	Article	Regulatory Provision	The author's assessment
Periodical Inspection	12.9 12.10	Periodical inspection of the facility by NRA or it registered entity Periodical confirmation on records etc by NRA or its registered entity	43.3.16	Periodic Licensee's Inspection	Equivalent clauses observed
Keep the facility in conformity	13	Obligation to keep the facility in conformity to the technical standards	43.3.14	Maintenance of Power Reactor Facilities to comply with the technical criteria	Equivalent clause observed
Safety Measures	21 15 16 17 18 20 34	Preparation of radiation hazards prevention program Measures to prevent the radiation hazard when using radioisotopes or radiation generators Measures to prevent the radiation hazard when storing radioisotopes or radiation generators Measures to prevent the radiation hazard when transporting radioisotopes and contaminated objects inside the site Measures to prevent the radiation hazard when managing radioisotope waste and contaminated objects Measure radiation and contamination Appoint Radiation Protection Supervisors	43.3.24.1 43.3.24.4 43.3.26	Preparation of licensee's safety regulation (including provisions for safety training) A licensee of power reactor operations and their employees must observe the safety regulations Appoint Chief Engineer	Equivalent clauses observed (on assumption that radiation hazard prevention under RI Regulation Act is considered as equivalent to safety under Reactor Regulation Act)
Operation Plan		N/A	43.3.17	Notification of Operation Plan to NRA	Not matching. However, the Operation Plan may be too conservative for the Fusion Facilities. To be investigated Further
Education and Training	22 25.8 36.2	Make their radiation hazards prevention programs known thoroughly and perform education and training Make their security programs known thoroughly and perform education and training Periodic training for radiation protection supervisors	43.3.24.4	A licensee of power reactor operations and their employees must observe the safety regulations (which includes safety	Equivalent clauses observed
Security	25.3 38.2	Measures for the security for the specified radioisotopes Appoint Radioisotope Security Manager	43.3.22.2 43.3.28	Physical security measures Appoint a nuclear material physical security manager	Equivalent clauses observed
Records	25.1 25.9	Prepare a book and keep records concerning radiation hazards Prepare Books on the Security of Specified Radioisotopes	43.3.21	Record the required particulars and keep them	Equivalent clauses observed
Measures at the accident	31.2 33	Report to NRA in case of accident or other event or in case it likely to happen Obligation to take measures in case of emergency	43.3.22.1	Measures for operational safety including those in the event of a severe accident	Equivalent clause observed but an estimation of the measures is not a part of licensing. See Table 8 below.
Health of employee	23	Conduct health surveillance of personnel		N/A	Not matching. To be investigated further
Improvement	38.4	Improving duties, enhancing education and training and taking other measures for prevention of radiation hazards and for security of specified radioisotopes, taking into account the latest knowledge on the safety in the field of research, development and utilization of nuclear power.	43.3.29	Evaluation for Improving the Safety of Power Reactor Facilities	Not matching. To be investigated further
Operation Period		N/A	43.3.32	40 years of operation	Not matching. To be investigated further
Decommissioning	27 28	Notification of discontinuation of the use Measures, etc. Associated with Revocation of Permission or License, Discontinuation of Use, etc	43.3.33	Measures for decommissioning	Equivalent clauses observed

Table 7: Author's comparison of the regulatory items defined at the legislative level for the oversight scope between the RI Regulation Act and the Reactor Regulation Act.

Blue	Common or similar item between two Acts
Yellow	Items present at Reactor Regulation Act only

RI Regulation Act		Reactor Regulation Act		
Permission to use (Article 3.2)		Permission for Installation (Article 43.3.5)		The author's assessment
Items to be reported in Application Form		Items to be reported in Application Form		
1	the name or title, and address, and, if the applicant is a corporation, name of its representative	1	the name and address of the applicant and, in the case of a corporation, the name of its representative	
2	kinds and quantities of radioisotopes, and whether they are sealed or unsealed, or kind, number of units and performance of radiation generators	2	the purpose for which the power reactors are to be used	
3	purpose and means of use	3	the type, thermal output, and number of the power reactors	
4	place of use	4	the name and location of the factory or place of activity where the power reactors are to be installed	
5	location, structure, and equipment of the facility where radioisotope or radiation generators are used (referred to as "usage facilities")	5	the position, structure, and equipment of the power reactors and auxiliary facilities (referred to as "power reactor facilities")	
6	location, structure, equipment, and storage capacity of the facility used for storage of radioisotopes (referred to as "storage facilities")	6	the construction plan for the power reactor facilities	Based on step-by-step approach
7	location, structure, and equipment of the facility used for managing waste of radioisotopes and radioactively contaminated objects (referred to as "radioactive waste	7	the type and amount scheduled for annual use of nuclear fuel material to be used as fuel for the power reactors	
		8	the method of disposing spent fue	Not relevant to the fusion
		9	particulars concerning radiation management at the power reactor facilities	
		10	particulars concerning the development of necessary facilities and system to deal with significant damage to the core of the power reactor or other accidents	Accident measures - this should be added to a future fusion act
		11	particulars concerning the development of the system necessary for quality management related to activities for operational safety of power reactor facilities	QA requirement - this should be added to a future fusion act

Table 8: Author's comparison of the content of a licensing application file as defined at the legislative level of the RI Regulation Act and the Reactor Regulation Act.

4. International law and the impact on a future Fusion Act

4.1 Introduction

Section 4 of this article analyses international law and its potential impact on a future domestic act for fusion regulation. First, the conventions on nuclear safety, namely the CNS and the Joint Convention, are considered. Then, other nuclear conventions in the remaining areas of the "3S's", i.e. security and safeguards, are briefly addressed.

4.2 Constitutional commitment to respect international law

Article 98.2 of the Constitution provides that "the treaties concluded by Japan and established laws of nations shall be faithfully observed".[96] Under the Japanese legal system, international agreements, once they are signed by Japan and when they enter into force, are considered to immediately have the force of law.[97] However, in a practical sense, unless a relevant international law is self-executing, some form of legislative action may be required to make the agreement enforceable.[98] The IAEA *Handbook on Nuclear Law* also recommends assessing the state's compliance with international legal obligations, as a part of a legislative process for a new nuclear law.[99]

As of today, there is no specific international legal framework for the safety of fusion. Looking at nuclear law generally, Japan is a party to the four nuclear safety conventions: (1) the CNS, (2) the Joint Convention, (3) the Convention on Early Notification of a Nuclear

96. Constitution, *supra* note 8, Article 98.2.
97. Higuchi, Y. (1998), *supra* note 18, p. 98.
98. *Ibid.*
99. Stoiber, C. et al. (2003), *supra* note 2, p. 14.

Accident (Early Notification Convention),[100] and (4) the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention).[101] Since the CNS and the Joint Convention provide multiple specific obligations in the area of nuclear regulation, this article investigates whether the nuclear regulation provisions may be applied to fusion and how they may impact future Japanese legislation on fusion.

4.3 The CNS

The CNS was signed on 17 June 1994 and came into force on 24 October 1996.[102] As of 21 October 2024, it has 96 parties and 65 signatories.[103] Through 35 articles over 4 chapters, the CNS sets out obligations for the contracting parties to maintain a high level of safety in operating the nuclear power plants.[104]

The CNS presents the contracting parties' commitment to "the application of fundamental safety principles for nuclear installation rather than the detailed safety standards".[105] Accordingly, it stipulates the contracting parties' specific obligations under Chapter 2.[106] Together with the Joint Convention, the CNS is referred to as an "incentive convention" because one of the characteristics is soft enforcement through a peer review mechanism mentioned under Chapter 3. The contracting parties meet periodically and share their implementing safety measures with other members, by which process they are expected to learn from each other and collectively enhance the level of safety.[107]

4.4 The CNS's applicability to fusion

Will the CNS be applicable to fusion? No competent authority has directly addressed the question, and reasonable arguments can be made both for its applicability and against it. But it is certainly a question that should be discussed and an interpretation agreed upon by the contracting parties to the CNS as soon as possible to inform future fusion regulatory frameworks. Notably, the CNS enables just such a discussion concerning "interpretation or application of the convention".[108]

The argument that the CNS would apply to fusion would likely be based on Article 3 of the Convention, which states that it applies to the "safety of nuclear installations", with "nuclear installation" defined as "any land-based civil nuclear power plant".[109] Certainly, based on today's knowledge, the DEMO and the FPPs will be built and operated on land and

100. Convention on Early Notification of a Nuclear Accident (1986), IAEA Doc. INFCIRC/335, 1439 UNTS 276, entered into force 27 Oct. 1986 (Convention on Early Notification).
101. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986), IAEA Doc. INFCIRC/336, 1457 UNTS 134, entered into force 26 Feb. 1987.
102. IAEA (n.d.), "Convention on Nuclear Safety", www.iaea.org/topics/nuclear-safety-conventions/convention-nuclear-safety (accessed 13 June 2024).
103. *Ibid*.
104. CNS, *supra* note 6.
105. *Ibid*., Preamble.
106. *Ibid*., Articles 4-19.
107. Following the Fukushima Daiichi accident, the contracting parties of the CNS and the Joint Convention have increased the effectiveness of the peer review process. See Wolfram, T. et al. (2022), "International Legal Framework on Nuclear Safety: Developments, Challenges and Opportunities", in Nick, K.S. and S.G. Burns (eds.), *Principles and Practice of International Nuclear Law*, OECD Publishing, Paris, pp. 121-166.
108. CNS, *supra* note 6, Article 29.
109. *Ibid*., Article 2(i):

> "Nuclear installation" means for each Contracting Party any land-based civil nuclear power plant under its jurisdiction including such storage, handling, and treatment facilities for radioactive materials as are on the same site and are directly related to the operation of the nuclear power plant. Such a plant ceases to be a nuclear installation when all nuclear fuel elements have been removed permanently from the reactor core and have been stored safely in accordance with approved procedures, and a decommissioning programme has been agreed by the regulatory body.

used for the power generation, which is civil in purpose. They will generate radioactive waste (e.g. irradiated blankets) requiring facilities for their storage, handling and treatment. It is reasonable to compare them with the case of ITER.[110] Although the ITER facility is a nuclear installation under French law,[111] it does not meet the definition of a nuclear installation under the CNS, as while ITER is "land-based" and a "civil nuclear plant", it lacks the element of being a "power plant".[112] While one of the missions of ITER is to yield 500 MWt output, it will not convert the generated thermal power to electricity.

Term	ITER	DEMO/FPP
Land-based	√	√
Civil	√	√
Nuclear	√	√
Power Plant	✕	√
For radioactive materials	√	√

Table 9: CNS – "land-based civil nuclear power plant"

Conversely, if one was to argue that the CNS would not apply to fusion, the first argument may be the historical context and the intended purpose of the Convention. Fusion reactors that will satisfy "land-based civil nuclear power plants" were not present or conceived of when the CNS was signed in 1994.[113] It may be reasonably argued that the scope of the Convention must be limited to what it was originally intended to address – the safety of fission power plants.[114]

The Vienna Convention on the Law of Treaties[115] may also buttress this argument, as it provides the general rule that treaties are to be interpreted in good faith and in accordance

110. ITER is the largest scientific international project on earth to demonstrate the scientific and technological feasibility of fusion energy for peaceful purpose. Founded by the seven member states (People's Republic of China, the European Union, India, Japan, Korea, the Russian Federation and the United States), the International Fusion Energy Organization is currently constructing the world largest tokamak machine, and supporting facilities, in southern France. See Grammatico-Vidal, L. (2009), "The International Thermonuclear Experimental Reactor (ITER) International Organisation: Which Laws Apply to this International Nuclear Operator?", *Nuclear Law Bulletin*, No. 84, OECD Publishing, Paris, pp. 103-113.
111. "Installation Nucléaire de Base (INB)" according to the French Order of 7 February 2012. [*Arrêté du 7 février 2012 fixant les règles générales relatives aux installations nucléaires de base JORF du 8 février 2012*], p. 2231.
112. Olajos, K. (2023), "Legal Frameworks for Fusion Technologies", slideshow, p. 88 and an exchange of question and answer during the International School of Nuclear Law, NEA and University of Montpellier, Saint Paul Lez Durance, France, 25 Aug. 2023.
113. 1994 was more than ten years before the start of the ITER project in 2007. DEMO, which may satisfy the "land-based civil nuclear power plants", is planned as a project following ITER in order to obtain the experimental data from the ITER.
114. The IAEA's official brochure of the CNS also explains; "The Convention was drawn up in the aftermath of the Three Mile Island and Chernobyl accidents at a series of expert level meetings from 1992 to 1994…". Indeed, Three Mile Island and Chernobyl were nuclear fission accidents. See IAEA (2017), *Convention on Nuclear Safety (CNS): Introduction to the CNS and its Associated Rules and Procedures and Guidelines*, CNS Brochure, IAEA, Vienna.
115. Vienna Convention on the Law of Treaties (1969), 1155 UNTS 331, entered into force 27 Jan. 1980, Article 30.1 and 30.2.

> Article 31 General rule of interpretation – 1. 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 the light of its object and purpose. 2. The context for the purpose of the interpretation of a treaty shall comprise, in addition to the text, including its preamble and annexes….

with the ordinary meaning given to terms of the treaty in light of their object and purpose and that the meaning can be evidenced by the text of the convention, including its preamble and annexes. The Preamble of the CNS arguably provides the context to allow the interpretation of the treaty as one dedicated to fission power plants.[116] Looking at the three conventions indicated under the preamble, the Convention on the Physical Protection of Nuclear Material (CPPNM) is only applicable to nuclear fission[117] and, while not directly excluding fusion, the latter two conventions, i.e. the Early Notification Convention and the Assistance Convention, were the immediate response within a few months of the accident at Chernobyl, a fission power plant.[118] It is therefore reasonable to argue they were intended to address the safety and response to fission power plants, specifically.

Furthermore, reference to the term "nuclear fuel element" is relevant as, while the term is not defined under the CNS, nuclear fuel is "commonly understood as fissionable nuclear material".[119] For example, the Convention on Third Party Liability in the Field of Nuclear Energy (Paris Convention) limits nuclear fuel to only those fuels that are fissionable.[120]

4.5 Terminology in other international conventions

As both arguments are at least plausible, it is important that clarity be provided by the contracting parties as soon as possible as to whether the CNS applies to fusion, since fusion regulatory frameworks will need to be developed in the near future, and the applicability of the CNS will impact those frameworks.

Some states have already started to include a topic related to fusion as a part of their national reports under the CNS. France, for example, reported an implementation of the complementary safety assessment made on their domestic facilities and installations in accordance with the principles of the Vienna Declaration,[121] and specifically included ITER as one of those facilities.[122] The United States submitted their ninth report in 2022, in which

116. "Keeping in mind the Convention on the Physical Protection of Nuclear Material (1979), the Convention on Early Notification of a Nuclear Accident (1986), and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986)". CNS, *supra* note 6, Preamble vi).
117. Convention on the Physical Protection of Nuclear Material (1980), IAEA Doc. INFCIRC/274 Rev. 1, 1456 UNTS 125, entered into force 8 Feb. 1987 (CPPNM).
118. Burns explains several factors why the swift negotiation of the two conventions were possible despite a few months from the Chernobyl accident. See Burns, S. (2023), "The impact of the major nuclear power plant accidents on the international legal framework for nuclear power", in Nick, K.S. and S.G. Burns (eds.), *Principles and Practice of International Nuclear Law*, OECD Publishing, Paris, pp. 83-105.
119. "Currently, nuclear fuel for fission based plants is commonly understood as being fissionable nuclear material in the form of fabricated fuel elements." IAEA (2023), *supra* note 94, p. 24.
120. Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982, and by the Protocol of 12 February 2004, entered into force 1 Jan. 2022, consolidated text available at: NEA (2024), "Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982 and by the Protocol of 12 February 2004", NEA Doc. NEA/NLC/DOC(2017)5/FINAL (Revised Paris Convention).
121. IAEA (2015), "Vienna Declaration on Nuclear Safety: On principles for the implementation of the objective of the Convention on Nuclear Safety to prevent accidents and mitigate radiological consequences", IAEA Doc. INFCIRC/872, IAEA, Vienna.
122. France (2022), *National Report for France for the Combined 8th and 9th Review Meeting in 2023*, produced for the Combined 8th and 9th Review Meeting of the Contracting Parties to the CNS, available at: www.iaea.org/sites/default/files/23/11/france_cns_9th_national_report_2022.pdf.

they explained the preparatory works undertaken by the Nuclear Regulatory Commission to develop options for a regulatory framework for fusion energy systems.[123]

There is also the broader question: what is the meaning of "nuclear" under international law? For those developing fusion regulatory frameworks, the question of whether the term represents only nuclear fission or is inclusive of fusion may be an important one. Tables 11-13 summarise the relevant terminologies and definitions under different international instruments. There are three categories observed. In instruments where the term "nuclear" is used in combination with terms "fuel" or "material", it is inclusive of fission and exclusive of fusion. However, the term "nuclear" itself does not necessarily limit itself to fission under other international conventions, notably the Joint Convention and the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT).[124]

Instrument (subject)	Terminology	Article	Definitions
Paris Convention (nuclear liability)	Nuclear fuel	1(a)(iii)	Fissionable material in the form of uranium metal, alloy, or chemical compound (including natural uranium), plutonium metal, alloy, or chemical compound, and such other fissionable material as the Steering Committee shall from time to time determine
Vienna Convention (nuclear liability)	Nuclear fuel	1(f)	Any material which is capable of producing energy by a self-sustaining chain process of nuclear fission
ICSANT (nuclear security)	Nuclear material	1.2	Plutonium, except that with isotopic concentration exceeding 80% in plutonium-238; uranium-233; uranium enriched in the isotope 235 or 233; uranium containing the mixture of isotopes as occurring in nature other than in the form of ore or ore residue; or any material containing one or more of the foregoing;
CPPNM (nuclear security)	Nuclear material	1(a)	Plutonium, except that with isotopic concentration exceeding 80 per cent in plutonium-238; uranium-233; uranium enriched in the isotope 235 or 233; uranium containing the mixture of isotopes as occurring in nature other than in the form of ore or ore residue; any material containing one or more of the foregoing
A/CPPNM (nuclear security)	Nuclear facility	3(d)	Facility (including associated buildings and equipment) in which nuclear material is produced, processed, used, handled stored or disposed of, if damage to or interference with such facility could lead to the release of significant amounts of radiation or radioactive material

Table 10: Category 1 – "Nuclear" is limited to fission.

123. United States Nuclear Regulatory Commission (US NRC) (2022), *The United States of America Ninth National Report for the Convention on Nuclear Safety*, NUREG-1650, Rev. 8, Agencywide Document Access and Management System (Agencywide Documents Access and Management System [ADAMS]) Accession No. ML22245A090, available at: www.nrc.gov/docs/ML2224/ML22245A090.pdf. ADAMS is the NRC's official system for accessing publicly available documents. Documents referenced with an ADAMS number can be accessed via the NRC's ADAMS website, at: https://adams.nrc.gov/wba, using the "Advanced Search" option and searching for the "Accession Number".
124. International Convention for the Suppression of Acts of Nuclear Terrorism (2005), 2445 UNTS 137, entered into force 7 July 2007 (ICSANT).

Instrument (subject)	Terminology	Article	Definitions
Joint Convention (nuclear safety)	Nuclear facility	2(f)	A civilian facility and its associated land, buildings and equipment in which radioactive materials are produced, processed, used, handled, stored or disposed of on such a scale that consideration of safety is required
ICSANT (nuclear security)	Nuclear facility	1.3	(a) Any nuclear reactor, including reactors installed on vessels, vehicles, aircraft or space objects for use as an energy source in order to propel such vessels, vehicles, aircraft or space objects or for any other purpose; (b) Any plant or conveyance being used for the production, storage, processing or transport of radioactive material.

Table 11: Category 2 – "Nuclear" is not limited to fission.

Instrument (subject)	Terminology	Article	Definitions
ICSANT (nuclear security)	Radioactive material	1.1	Nuclear material and other radioactive substances which contain nuclides which undergo spontaneous disintegration (a process accompanied by emission of one or more types of ionising radiation, such as alpha-, beta-, neutron particles and gamma rays) and which may, owing to their radiological or fissile properties, cause death, serious bodily injury or substantial damage to property or to the environment

Table 12: Category 3 – "Nuclear" is not used and is inclusive of both fission and non-fission.

4.6 Potential impact of the CNS on fusion energy

The following section analyses the potential impact of the CNS on a future fusion energy act in Japan. First, if the CNS is determined by the contracting parties to be applicable, all the obligations under the CNS must be incorporated into the future act in accordance with Article 98.2 of the Constitution. Should Japan prepare a new act based on the Reactor Regulation Act there would not be much impact because the current Reactor Regulation Act should, by default, incorporate the CNS. The impact will be more vivid and may be controversial if Japan decides to prepare a new act based on the RI Regulation because, at the international level, the RI Regulation Act incorporates the recommendations of the International Commission on Radiological Protection (ICRP)[125] but not the CNS, as shown in the following chart:

125. JRIA (2021), *supra* note 24, p. 17.

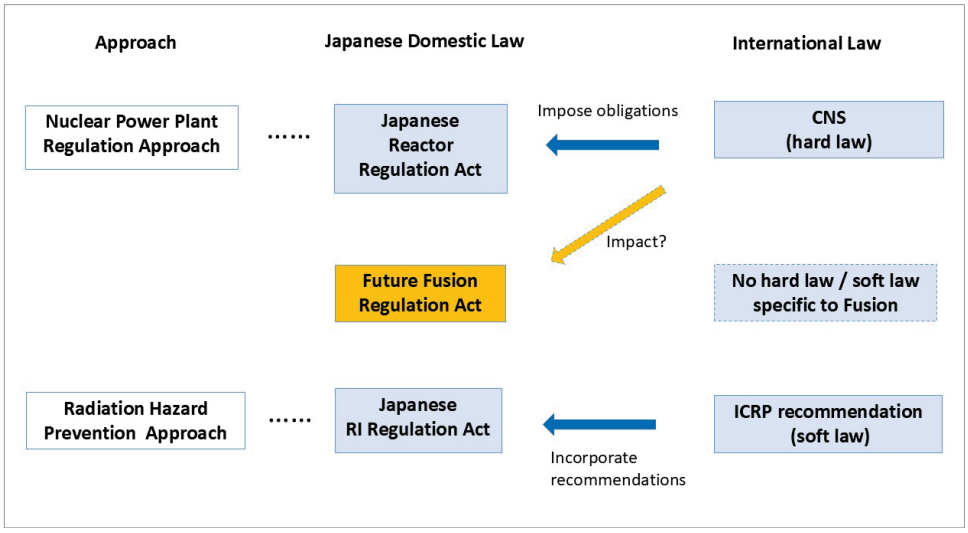


Chart 9: Relationship between domestic law and international law

Assuming Japan prepares a new act based on the RI Regulation Act, there are at least three consequences expected to be caused by the CNS. First, the light-touch licensing process implemented under the RI Regulation Act will be negatively impacted, because it is not compatible with the gradual licensing process required under Articles 17 (siting), 18 (design) and 19 (operations) of the CNS. Second, it will be necessary to incorporate the QA requirement and the prevention and mitigation of accident provisions of the CNS.[126] As discussed above, these requirements are currently not included in the RI Regulation Act, and their potentially positive impact should be considered. Third, it may be necessary to study the security of the financial resources of the DEMO and the FPPs through decommissioning. The CNS requires the contracting parties to ensure "adequate financial resources are available to support the safety of each nuclear installation *throughout its life*".[127] This requirement does not exist under the current RI Regulation Act, and since it has a policy impact with a financial consequence, it will need further assessment to determine whether it may be appropriate for fusion.

4.7 Joint Convention

The Joint Convention was adopted on 5 September 1997 and entered into force on 18 June 2001.[128] As of 21 October 2024, it has 90 parties and 42 signatories.[129] With 44 articles over seven chapters (summarised in Table 14), the Joint Convention deals with the safety of the spent fuel management and the safety of radioactive waste management.

4.8 Potential impact of the Joint Convention on fusion energy

Will the Joint Convention apply to fusion? Like the CNS, it is still a matter to be clarified by the contracting parties, but the Joint Convention seems more likely to apply when looking

126. CNS, *supra* note 6, Articles 13 and 18(i).
127. *Ibid.*, Article 13.1 (emphasis added).
128. IAEA (n.d.), "Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management", www.iaea.org/topics/nuclear-safety-conventions/joint-convention-safety-spent-fuel-management-and-safety-radioactive-waste (accessed 13 June 2024).
129. *Ibid.*

at the latter part of its preamble[130] and the definition of radioactive waste under Article 2,[131] which is not limited to fission. The IAEA explains that "the Joint Convention may be considered as being broad enough to cover fusion facilities and related radioactive waste management activities, both in terms of tritium and in terms of radioactive waste produced by the operation of the reactor".[132] As long as Japan decides to control the radioactive wastes from the DEMO and the FPPs accordingly, those wastes should be treated as applicable under the Joint Convention.[133]

Assuming the Joint Convention applies to fusion, the next relevant question is: to which extent does it apply? For this purpose, four scenarios are hypothesised, as shown in Figure 10:

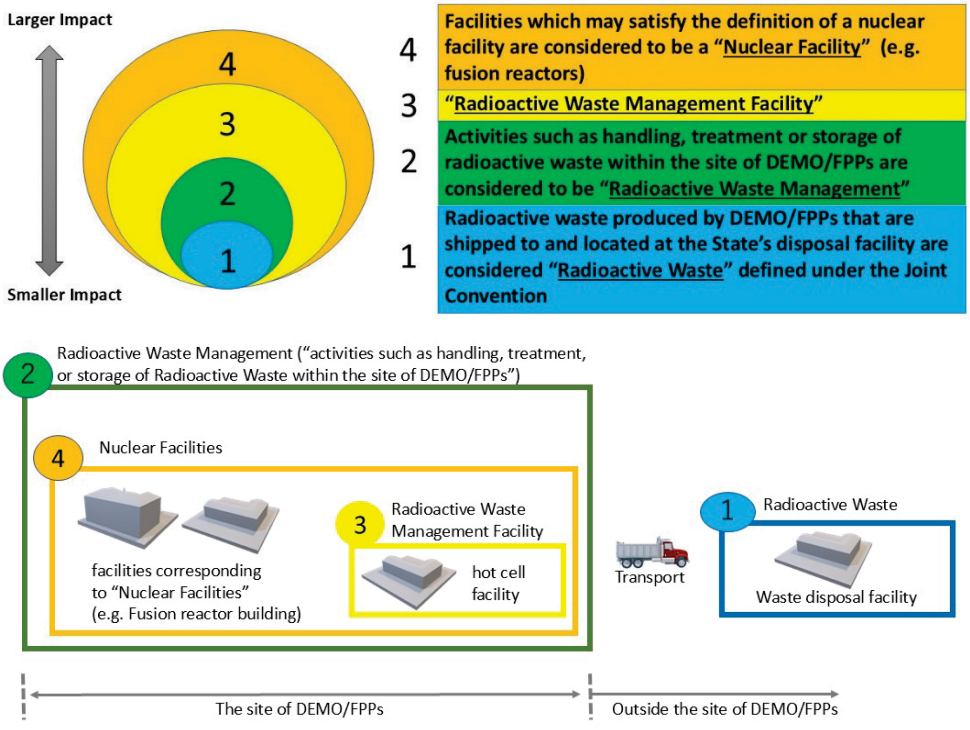


Figure 10: Four scenarios of the application of the Joint Convention to fusion

130. "Recognizing that the operation of nuclear reactors generates spent fuel and radioactive waste and that *other applications of nuclear technologies also generate radioactive waste*" Joint Convention, *supra* note 7, Preamble (i) (emphasis added).
131. *Ibid*, Article 2(h).
"[R]adioactive waste" means radioactive material in gaseous, liquid or solid form for which no further use is foreseen by the Contracting Party or by a natural or legal person whose decision is accepted by the Contracting Party, and which is controlled as radioactive waste by a regulatory body under the legislative and regulatory framework of the Contracting Party;
132. IAEA (2023), *supra* note 93, p. 24. The author interpreted "in terms of tritium" as an indication and possibility to apply Article 28 of the Joint Convention concerning the disused sealed source. This article focuses more on "radioactive wastes".
133. France for example in their 2020 national report, provided a section dedicated to ITER activities and presented the types of the radioactive wastes to be produced by ITER and the planning to manage them. France (2022), *France's Seventh National Report on Compliance with the Joint Convention*, available at: www.iaea.org/sites/default/files/france_national_report_7rm.pdf.

Scenario 1 is that Japan decides to apply the Joint Convention only to the radioactive waste produced by the DEMO and the FPPs that is already shipped out and physically located at a separate disposal facility. In such a circumstance, the impact of the Joint Convention on the fusion regulatory framework will be very limited, as the radioactive waste within the sites of the DEMO and the FPPs are not within the scope of the Joint Convention and the regulation of fusion facilities is not impacted. The disposal of radioactive waste is currently regulated under the RI Regulation Act, as well as under the Reactor Regulation Act.

Scenario 2 is that an activity such as handling, treatment or storage of radioactive waste within the DEMO and the FPPs is considered "radioactive waste management" as defined under the Joint Convention.[134] In this case, both Article 11 (General Safety Requirements) and Article 23 (Quality Assurance) will apply. These articles present the basic principles of nuclear safety, and it seems appropriate to incorporate them into a future act.[135]

Scenario 3 is that Japan decides to treat a hot cell facility inside the DEMO and the FPPs as a "radioactive waste management facility" as defined by the Joint Convention, considering that the "primary purpose" of the facility is radioactive waste management.[136] In such a case, Articles 12-16, 22, 24 and 25 of the Joint Convention should apply. While many articles should be incorporated into a future act as they present the basic principle of the nuclear safety, there are two points that need special attention and discussion. First, like the case of the CNS, application of Articles 13 (Siting of Proposed Facilities), 14 (Design and Construction) and 15 (Assessment of Safety Facilities) will present an obstacle if Japan intends to prepare a new act aiming for a less burdensome licensing approach. These articles require a step-by-step approach on hot cell construction. Second, if Article 22(ii) is applied, adequate financial resources will need to be available for the lifetime of the plant, including for decommissioning.

Lastly, Scenario 4 is that Japan designates several facilities inside the DEMO and the FPPs as the "nuclear facility" under the Joint Convention. As shown in in Table 12, the term does not limit itself to fission facilities. In such a case, Article 26 would apply, which induces the application of Articles 24 and 25 as well. Article 26 includes a provision for the financial security, so it raises the same question as above. Table 15 summarises the above analysis on the applicable articles depending on the scenario.

134. The definition of "radioactive waste management" is quite broad and not restrictive, and a handling alone should even constitute it. "'Radioactive Waste Management' means all activities, including decommissioning activities, that relate to the handling, pretreatment, treatment, conditioning, storage or disposal of radioactive waste, excluding off-site transportation. It may also involve discharges", Joint Convention, *supra* note 6, Article 2(i).
135. There is one point that can be noted for a further discussion. To observe the obligation indicated under Article 23 of the Joint Convention, the state may decide to take measures such as requiring an operator to establish and demonstrate an appropriate QA system as a part of the licensing and oversight conditions. However, for such a case, knowing that the QA system is eventually a matter of the entire quality system of the operator, it might not make an effective regulation to request the QA requirement only on the radioactive waste management. Practically, this requirement may need to be expanded to the requirement on the general quality requirement for the whole plant activities.
136. "'Radioactive waste management facility' means any facility or installation the primary purpose of which is radioactive waste management, including a nuclear facility in the process of being decommissioned only if it is designated by the Contracting Party as a radioactive waste management facility", Joint Convention, *supra* note 7, Article 2(j).

Scenario	Subject of the application	Article	Note
Scenario 1	"**Radioactive waste**" at the Disposal Facility outside DEMO/FPP	Article 17 – Institutional Measures after Closure	No impact on the regulation on DEMO/FPPs
Scenario 2	Handing of radioactive waste within the site of DEMO/FPPs ("**Radioactive Waste Management**")	Article 11 – General Safety Requirements Article 23 – Quality Assurance	
Scenario 3	Hot cell facilities within DEMO/FPPs ("**Radioactive Waste Management Facility**")	Article 12 – Existing Facilities and Past Practices Article 13 – Siting of Proposed Facilities Article 14 – Design and Construction of Facilities Article 15 – Assessment of Safety Facilities Article 16 – Operation of Facilities Article 22 – Human and Financial Resources Article 24 – Operational Radiation Protection Article 25 – Emergency Preparedness	13-15 may present obstacles if Japan intends to enact an act with a less burdensome licensing approach than in the RI Regulation Act. 22(ii) Financial security until decommissioning
Scenario 4	Any facilities judged as a nuclear facility under the Joint Convention ("**Nuclear Facility**")	Article 24 – Operational Radiation Protection Article 25 – Emergency Preparedness Article 26 – Decommissioning	26(i) Financial security until decommissioning

Table 13: List of the major applicable articles of the Joint Convention

4.9 Security and safeguards

While not a focus of this article, since "safety" has been discussed in the above sections, the remaining two of the "3S", i.e. security and safeguards, will be reviewed here briefly. First, regarding security, Japan is a party to the CPPNM, its amendment (A/CPPNM)[137] and ICSANT. The CPPNM and the A/CPPNM are not applicable to fusion.[138] The CPPNM, which came into force on 8 February 1978, sets the rules for the physical protection of nuclear materials during international nuclear transportation for peaceful purposes, by stipulating the associated criminalisation of certain acts and obliging international co-operation among the contracting parties. As shown in Table 11, nuclear materials, as defined by the CPPNM, are limited to fission material; therefore, it does not apply to the DEMO and the FPPs. Its amendment, the A/CPPNM, which came into force on 8 May 2016, expanded the scope of physical protection to domestic use, storage and transport of nuclear materials and included nuclear installations within the scope of physical protection, while adding new offences and enhancing international co-operation. Despite the expansion and enhancements, the A/CPPNM is not applicable to fusion because nuclear materials remained defined as those capable of fission. Further, nuclear facilities, newly added subjects under the amendment, are defined exclusively as facilities that deal with nuclear materials (see Table 11). Therefore, in principle, it will not be necessary to take into account international obligations arising from these conventions when Japan prepares legislation for fusion energy.

Conversely, ICSANT is applicable to fusion facilities. The Convention, which came into force on 7 July 2007, criminalises different types of acts involving radioactive material, radioactive devices and nuclear facilities. As seen in Table 13, Article 1.1 defines radioactive materials as including both nuclear materials and other radioactive substances. Tritium, a fuel for fusion energy, is a radioactive substance constituting radioactive material.[139]

137. Amendment to the Convention on the Physical Protection of Nuclear Material (2005), IAEA Doc. INFCIRC/274/Rev.1/Mod.1, entered into force 8 May 2016.
138. IAEA (2023), *supra* note 93, p. 25.
139. *Ibid*.

Therefore, the DEMO and the FPPs should be considered as "nuclear facilities" for the purposes of this Convention. It is therefore evident that ICSANT will be relevant to the DEMO and the FPPs. Notably, Japan has already incorporated the Convention into a domestic penal act.[140]

When it comes to the future preparation of a fusion regulatory framework, Article 8 of ICSANT will need to be considered, as it requires states to "make every effort to adopt appropriate measures to ensure the protection of radioactive materials, taking into account relevant recommendations and functions of the International Atomic Energy Agency".[141] The future fusion act should include an article to ensure that adequate security measures are enforced accordingly. At the same time, the IAEA is expected to provide relevant recommendations and guidelines which should clarify the level of security appropriate to future fusion facilities.

With regards to safeguards, Japan is a party to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).[142] To execute its obligation under Article 3.1 of the NPT, Japan has been accepting the IAEA safeguards in full, including the Comprehensive Safeguards Agreement (CSA)[143] and the Additional Protocol (AP),[144] and the IAEA started to implement the Integrated Safeguards in Japan in 2004. Fusion facilities are not a subject of the safeguards; however, a component, such as the fission chamber,[145] which includes a small quantity of uranium-235 could be subject to safeguards if it is designed to be used in the DEMO or the FPPs.

5. Conclusion

As there is currently no law that can regulate D-T fusion, there is a need for new legislative measures to establish a regulatory framework for fusion in Japan. Considering both the Reactor Regulation Act and the RI Regulation Act, it seems appropriate that future nuclear fusion legislation will be designed primarily based on the RI Regulation Act, which features a less burdensome licensing process, while incorporating some safety requirements of the Reactor Regulation Act. Although the basic principles of nuclear safety as required by the CNS and the Joint Convention should be reflected in any fusion legislation, strict adherence to these conventions may have a negative impact in terms of the licensing approach, because these conventions require a step-by-step licensing approach. Also, these conventions may require Japan to consider financial resource availability throughout the plant life, including decommissioning, and this needs further assessment. It is therefore important that the contracting parties to the conventions determine whether they apply to fusion installations.

140. Act on Punishment of Conduct Endangering Human Life by Generating Radiation, No. 38, 11 May 2007, as amended.
141. ICSANT, *supra* note 124, Article 8.
142. Treaty on the Non-Proliferation of Nuclear Weapons (1968), IAEA Doc. INFCIRC/140, 729 UNTS 169, entered into force 5 Mar. 1970.
143. Agreement between the Government of Japan and the International Atomic Energy Agency in implementation of Article III.1 and 4 of the Treaty on the Non-Proliferation of Nuclear Weapons, IAEA Doc. INFCIRC/255, entered into force 2 Dec. 1997.
144. Protocol Additional to the Agreement between the Government of Japan and the International Atomic Energy Agency in implementation of Article III.1 and 4 of the Treaty on the Non-Proliferation of Nuclear Weapons, IAEA Doc. INFCIRC/255/Add.1, entered into force 16 Dec. 1999.
145. Arnoux, R. (2012), "A Tiny Bit of Fission in the Giant Fusion Machine", ITER Newsline, www.iter.org/newsline/217/1130 (accessed 13 June 2024).

Reciprocity principle under the nuclear third party liability conventions

I. Introduction*

Reciprocity, as one of the general principles of international law,[1] can be defined as:

> …the status of a relationship between two or more States under which a certain conduct by one party is in one way or another juridically dependent upon that of the other party. Such conduct will in most instances, but not necessarily, amount to identical or equivalent treatment. Most attempts at definition add the element of a subjective interrelation of action and counteraction according to which the conduct of one party, whether consummated or expected, provides the motivation for that of the other.[2]

This principle "governs every international agreement, independently of its content, and consequently underlies the rules concerning the conclusion and entry into force of treaties, and their application, termination, amendment, and modification."[3]

This note addresses the reciprocity principle in the context of the international instruments relating to nuclear third party liability (i.e. the Paris Convention,[4] the Brussels Supplementary Convention,[5] the Vienna Convention,[6] the revised Vienna Convention,[7] the

* This note was prepared by the Division of Nuclear Law of the OECD Nuclear Energy Agency and endorsed by the OECD Nuclear Law Committee (NLC) on 8 November 2023.

1. Crawford, J. (2019), *Brownlie's Principles of Public International Law*, 9th ed., Oxford University Press, Oxford, p. 34.
2. Simma, B. (2008), "Reciprocity", in A. Peters and R. Wolfrum (eds.), *Max Planck Encyclopaedia of Public International Law (MPEPIL)*, Oxford University Press, Oxford, p. 651.
3. *Ibid*.
4. Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982 and by the Protocol of 12 February 2004, entered into force 1 Jan. 2022, consolidated text available at: NEA (2024), "Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982 and by the Protocol of 12 February 2004", NEA Doc. NEA/NLC/DOC(2017)5/FINAL (Paris Convention or PC).
5. Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960, as amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982 and by the Protocol of 12 February 2004, entered into force 1 Jan. 2022, consolidated text available at: NEA (2024), "Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960, as amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982 and by the Protocol of 12 February 2004", NEA Doc. NEA/NLC/DOC(2017)6/FINAL (Brussels Supplementary Convention or BSC).
6. Vienna Convention on Civil Liability for Nuclear Damage (1963), IAEA Doc. INFCIRC/500, 1063 UNTS 266 (Vienna Convention or VC).
7. Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage (1997), IAEA Doc. INFCIRC/566, 2241 UNTS 302 (the revised Vienna Convention or RVC). The "Vienna Conventions" will hereinafter refer to the Vienna Convention and the revised Vienna Convention jointly.

Convention on Supplementary Compensation[8] and the Joint Protocol[9]) and the national legislation governing nuclear liability in certain countries.

The principle of reciprocity may sometimes be expressly provided in the conventions and/or national legislation, and it may also be implied. It may relate to the scope of application of the convention or national law (determining who may be entitled to compensation) or to the amount available that may be allocated to victims of other States.

It is worth mentioning that the "original conventions" (i.e. the Paris Convention and the Brussels Supplementary Convention, both as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 only, and the Vienna Convention) do not contain any express provisions on reciprocity, leaving the decision of whether or not to apply such international principle, if relevant, to each competent court.

Participants at the Third International Workshop on the Indemnification of Damage in the Event of a Nuclear Accident held in 2017 in Bratislava[10] addressed the issue of reciprocity and the following factors were identified by some as having contributed to the establishment of the reciprocity principle in the "post-Chernobyl conventions" (i.e. the Paris Convention, the revised Vienna Convention and the CSC) or in national laws governing nuclear liability:

- the lack of harmonisation among the international nuclear liability conventions with regard to the amounts of compensation provided therein;
- the fact that a few countries (such as Germany, Japan and Switzerland) provide for unlimited liability or that some countries provide for higher nuclear liability amounts than others;
- the fact that a nuclear incident could have transboundary consequences, as demonstrated by the Chernobyl accident, which would therefore raise the issue of the adequate distribution of the amount of compensation available with regard to national and foreign victims when countries do not provide for reciprocal benefits;
- the fact that if a country is a party to the Joint Protocol, the scope of application of the nuclear liability convention it is a party to (either the Paris Convention or the Vienna Conventions) will be expanded and the concept of "equivalent treatment" provided under the Joint Protocol will apply, raising the issue of the adequate distribution of the amount of compensation available with regard to national and foreign victims when countries do not provide for equivalent reciprocal benefits;[11] and
- the extended geographical scope of the Paris Convention and the revised Vienna Convention, which cover States that are not parties to such conventions, raising the issue of the adequate distribution of the amount of compensation available with regard to national and foreign victims when countries do not provide for reciprocal benefits.[12]

All these factors influenced the approaches adopted by the drafters of the post-Chernobyl conventions and the national laws regarding reciprocity.

8. Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 ILM 1473 (CSC).
9. Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (1988), IAEA Doc. INFCIRC/402, 1672 UNTS 293 (Joint Protocol).
10. For more information see www.oecd-nea.org/law/workshops/bratislava2017. See also NEA (2023), *Third International Workshop on the Indemnification of Damage in the Event of a Nuclear Accident – Workshop Proceedings*, Bratislava, Slovak Republic, 18-20 October 2017, OECD Publishing, Paris.
11. Article IV of the Joint Protocol provides that either the Vienna Convention or the Paris Convention "shall be applied" with respect to the Parties to the Protocol that are Parties to the other Convention "in the same manner" as between Parties to that Convention.
12. See Article 2(a) of the Paris Convention and Article I.A of the revised Vienna Convention.

II. Reciprocity in scope

a. Paris-Brussels regime

Paris Convention

The Paris Convention expressly incorporates the principle of reciprocity related to the geographical scope of application of the Convention[13] in Article 2(a)(iv), which provides that the Convention shall apply to nuclear damage suffered in the territory of, or in any maritime zones established in accordance with international law of, or, except in the territory of a non-Contracting State not mentioned under (a)(ii)-(iv), on board a ship or aircraft registered by:

> any other non-Contracting State which, at the time of the nuclear incident, has in force nuclear liability legislation which affords *equivalent reciprocal benefits, and which is based on principles identical to those of this Convention*, including, inter alia, liability without fault of the operator liable, exclusive liability of the operator or a provision to the same effect, exclusive jurisdiction of the competent court, equal treatment of all victims of a nuclear incident, recognition and enforcement of judgements, free transfer of compensation, interests and costs.[14]

13. The geographical scope of application of the Paris Convention is provided in Article 2 of the Convention, which states that:
    a) This Convention shall apply to nuclear damage suffered in the territory of, or in any maritime zones established in accordance with international law of, or, except in the territory of a non-Contracting State not mentioned under (ii) to (iv) of this paragraph, on board a ship or aircraft registered by,
        i) a Contracting Party;
        ii) a non-Contracting State which, at the time of the nuclear incident, is a Contracting Party to the Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963 and any amendment thereto which is in force for that Party, and to the Joint Protocol relating to the Application of the Vienna Convention and the Paris Convention of 21 September 1988, provided however, that the Contracting Party to the Paris Convention in whose territory the installation of the operator liable is situated is a Contracting Party to that Joint Protocol;
        iii) a non-Contracting State which, at the time of the nuclear incident, has no nuclear installation in its territory or in any maritime zones established by it in accordance with international law; or
        iv) any other non-Contracting State which, at the time of the nuclear incident, has in force nuclear liability legislation which affords equivalent reciprocal benefits, and which is based on principles identical to those of this Convention, including, inter alia, liability without fault of the operator liable, exclusive liability of the operator or a provision to the same effect, exclusive jurisdiction of the competent court, equal treatment of all victims of a nuclear incident, recognition and enforcement of judgements, free transfer of compensation, interests and costs.
    b) Nothing in this Article shall prevent a Contracting Party in whose territory the nuclear installation of the operator liable is situated from providing for a broader scope of application of this Convention under its legislation.
14. Emphasis added. Paragraph 10 of the *Exposé des Motifs* of the Paris Convention further explains that:
    > Since such States pose a risk of nuclear damage in Paris Convention States, it is only logical that the benefits under the Paris Convention should accrue to victims in such States only if those States extend the benefits of their own legislation to victims in Paris Convention States. The additional requirement that such legislation be based upon principles identical to those contained in the Paris Convention is designed to ensure that victims in Paris Convention States who suffer damage as a result of a nuclear incident occurring in such a non-Contracting State will have the same basic rights with respect to claiming compensation against the liable operator in the non-

The reciprocity principle established under Article 2(a)(iv) of the Paris Convention is only applicable to those nuclear States[15] that are not parties to the Paris Convention and have not ratified the Joint Protocol, as long as they have nuclear liability legislation that will provide a contracting party to the Paris Convention (CPPC) with equivalent reciprocal benefits (i.e. a similar compensation regime) and which is based on principles identical to those of the Paris Convention.[16]

It may be the case, however, that the legislation of a State covered by Article 2(a)(iv) of the Convention "provides for reciprocal benefits which are globally equivalent to those provided under the [Paris] Convention without actually providing for [similar or higher nuclear] liability amounts".[17] In such a case, the CPPCs are allowed to apply, in addition to the reciprocity provided in Article2(a)(iv), a reciprocity in amount in accordance with Article 7(g) of the Paris Convention (see *infra* Part III).

Brussels Supplementary Convention

Article 2(a) of the Brussels Supplementary Convention states that:

> The system of this Convention shall apply to nuclear damage for which an operator of a nuclear installation, used for peaceful purposes, situated in the territory of a Contracting Party to this Convention (hereinafter referred to as a "Contracting Party"), is liable under the Paris Convention […] provided that the courts of a Contracting Party have jurisdiction pursuant to the Paris Convention.

This Convention establishes a system whereby additional compensation to that provided for under the Paris Convention is to be made available to victims who suffer nuclear damage within the geographical scope of application of the BSC provided in its Article 2(a) as a result of a nuclear incident for which a BSC nuclear operator is liable.[18] The geographical scope of application of the Brussels Supplementary Convention is therefore limited to the BSC States only and does not benefit all the CPPCs or any other State that is not party to the BSC.[19]

> Contracting State as will victims in the non-Contracting State when bringing their claims for compensation against the liable operator under the Paris Convention. The inclusion of this additional requirement thus transforms the principle of reciprocity into concrete terms. It may also act as an incentive for non-Contracting States to apply the Paris Convention principles at national level [see paragraph 67]. In keeping with the provisions on jurisdiction contained in Article 13, it is up to the competent court to determine whether or not a particular non-Contracting State meets the [reciprocity] requirements of this third case.

NEA (2024), *Exposé des Motifs of the Paris Convention as amended by the Protocols of 1964, 1982 and 2004*, adopted by the Contracting Parties to the Paris Convention on 18 Nov. 2016, NEA Doc. NEA/NLC/DOC(2020)1/REV1/FINAL (*PC Exposé des Motifs*).

15. Note by the Secretariat: For the purposes of this document, the term "nuclear State" will refer to States with nuclear installations. The term "nuclear non-Contracting State" will refer to States with nuclear installations that are not party to a specific nuclear liability convention, unless it is otherwise understood by the context of the concerned paragraph.
16. See Paris Convention, Article 2(a)(iv).
17. *PC Exposé des Motifs*, *supra* note 14, p. 34, para. 67.
18. According to Article 1 of the Brussels Supplementary Convention, "The system instituted by this Convention is supplementary to that of the Paris Convention, shall be subject to the provisions of the Paris Convention […]". The Brussels Supplementary Convention establishes a three tier system where the first tier corresponds to the amount to be made available by the liable operator under the Paris Convention (i.e. at least EUR 700 million); the second tier is to be made available by the BSC State in whose territory the liable operator's nuclear installation is located (i.e. up to EUR 1 200 million), if not already covered by the first tier; and the third tier (which consists of an additional EUR 300 million) to be provided by all the contracting parties to the BSC, in accordance with a specific formula set out in Article 12.
19. The *Exposé des Motifs* of the Brussels Supplementary Convention further specifies in paragraph 22 that:

As explained in paragraph 6 of the *BSC Exposé des Motifs*:

> Since public funds are being made available to compensate nuclear damage and given the nature and origin of those funds, they should only be allocated to victims in States which have agreed to participate in the supplementary funding system.

b. Vienna Conventions

The Vienna Convention does not make any explicit reference to reciprocity. The Convention is silent on the geographical scope of its application.[20]

> […] the Convention applies only to nuclear damage for which an operator of a nuclear installation used for peaceful purposes and located in the territory of a Contracting Party is liable under the Paris Convention. In general, each Contracting Party may exercise the powers vested in it by that Convention and may invoke any provisions made under that Convention in order to obtain the public funds to be provided for under Article 3(b)(ii) and (iii) of the Brussels Supplementary Convention. There are, however, certain exceptions to this rule. For example, while the Paris Convention clearly delineates its own geographic scope of application in Article 2(a), it also permits a Contracting Party in whose territory the liable operator's nuclear installation is located to extend the geographical scope of application of the Convention under its national legislation [Article 2(b)]. Where a Contracting Party does so, and where a nuclear incident occurs which results in nuclear damage occurring in that extended territorial field, no other Contracting Party to the Brussels Supplementary Convention is required to contribute second or third tier public funds to compensate that nuclear damage unless it has actually consented to that particular extension. The reason for this rule is straightforward. An extension of the geographical scope of application of the Paris Convention would normally entitle more victims to compensation, thus exhausting the funds available under that Convention earlier than otherwise, and thus allowing the Contracting Party in whose territory the liable operator's nuclear installation is located to call upon third tier funds under the Brussels Supplementary Convention at a correspondingly earlier date, than would otherwise be the case.

NEA (2024), *Exposé des Motifs of the Brussels Supplementary Convention as amended by the Protocols of 1964, 1982 and 2004*, adopted by the Contracting Parties to the Brussels Supplementary Convention on 23 Dec. 2010, NEA Doc. NEA/NLC/DOC(2017)4/REV1/FINAL *(BSC Exposé des Motifs*).

20. In this regard, the *Explanatory Texts of the 1997 Vienna Convention on Civil Liability for Nuclear Damage and the 1997 Convention on Supplementary Compensation for Nuclear Damage* further clarify that:

> In respect of the place of a nuclear incident, there can be no doubt that, under Article II, read in conjunction with the definitions of terms such as "operator" and "Installation State" in Article I, the 1963 Vienna Convention principally applies to nuclear incidents occurring in the territory of Contracting Parties; on the other hand, in the case of incidents occurring in the course of transport of nuclear material, it follows from the same definitions that the Vienna Convention does apply even to nuclear incidents occurring outside the territory of a Contracting Party, provided that the installation of the operator liable is located within such territory; moreover, if that installation is not situated within the territory of any State, the Convention applies if it is operated by a Contracting Party or under its authority. […]
>
> As for the place where damage is suffered, the absence of an express limitation of its territorial scope leaves it open to question whether or not the 1963 Vienna Convention allows for coverage of damage suffered outside the territory of the Contracting Parties and, in particular, in the territory of non-contracting States under the applicable substantive law, which will usually be the law of the Installation State. […]

The revised Vienna Convention provides in its Article I.A that the "Convention shall apply to nuclear damage wherever suffered." Articles I.A.2 and I.A.3 of the Convention allow the legislation of the Installation State to exclude from the application of the Convention damage suffered in a non-Contracting State which, at the time of the nuclear incident, "(a) has a nuclear installation in its territory, or in any maritime zones established by it in accordance with the international law of the sea; and (b) does not afford *equivalent reciprocal benefits*".[21]

> The major argument against covering damage suffered outside the territory of the Contracting Parties is that, with limited insurance funds to call on, adding more claimants would reduce the share available for victims in the Contracting Parties, *without reciprocal benefits*. On the other hand, damage outside the territory of Contracting Parties may well be suffered by their nationals or by, or on board, ships or aircraft flying their flags. Moreover, it may be questioned whether leaving victims in non-Contracting States without compensation is in line with public international law.

IAEA (2020), *The 1997 Vienna Convention on Civil Liability for Nuclear Damage and the 1997 Convention on Supplementary Compensation for Nuclear Damage — Explanatory Texts*, IAEA International Law Series No. 3 (Rev. 2), IAEA, Vienna, p. 29 (*Explanatory Texts of the Vienna Conventions*) (emphasis added, internal citations omitted). For more information on this topic, see Section 2.2.3 "Geographical scope" of the *Explanatory Texts of the Vienna Conventions*.

21. Emphasis added. Section 2.8, "The applicable law and the principle of non-discrimination", of the *Explanatory Texts of the Vienna Conventions* further specifies regarding the revised Vienna Convention that:

> […] if, under Article I A.2 and 3, the legislation of the Installation State excludes damage suffered in nuclear non-contracting States not affording reciprocal benefits, nationals of such States could still claim compensation for damage suffered on the high seas or in the territory, or maritime zones, of any Contracting Party; conversely, nationals of Contracting Parties could not claim compensation for damage suffered in the territory, or in the maritime zones, of any nuclear non-contracting State, except for damage suffered by, or on board, a ship or aircraft, which is covered under Article I A.4 [of the Convention].

IAEA (2020), *Explanatory Texts of the Vienna Conventions*, *supra* note 20, p. 52. Footnote 105 of the *Explanatory Texts of the Vienna Conventions* explains that:

> Within the Standing Committee, there initially were divergent views on the question of reciprocity and on the discretionary nature of the extension of the scope of the Convention to damage suffered in the territory of a non-contracting State. Although the proposal to extend the scope of the Convention received "wide support", alternative proposals would have left such extension to the discretion of the Installation State and/or would have permitted the Installation State to subject such extension to the requirement that the non-Contracting State "shall afford reciprocal benefits". But there was "general agreement" that the notion of "reciprocity" required further study and the suggestion was made from the beginning that it would not be appropriate to require reciprocity from a State without a nuclear industry (see document SCNL/1/INF.4, pp. 4-5). During the second session of the Standing Committee, it was decided to extend coverage to damage "wherever suffered", but to allow the legislation of the Installation State to exclude from the application of the Convention damage suffered in the territory, or maritime zones, of a non-contracting State. However, there was still some controversy as to the possibility of excluding damage suffered in non-nuclear States and on the question of "reciprocity" (see *Report of the Drafting Committee* in Annex I to document SCNL/2/INF.2, pp. 2–3). During the third session, the Drafting Committee decided to allow for the exclusion of damage suffered in the territory, or maritime areas, of a non-contracting State only if that State, at the time of the incident, had a nuclear installation in its territory, or maritime areas, and afforded no "reciprocal benefits" (see the *Report of the Drafting Committee* in Annex I to document SCNL/3/INF.2/Rev.1). The question was again discussed as a result of the decision to include in the Vienna Convention an element of supplementary compensation provided by the Installation State beyond the operator's liability limit, where this is established at less than 300 million SDRs (see Section 2.4.2 of these explanatory texts), but the "prevailing view" was that the benefits of such additional compensation should not be withheld from non-nuclear States that are not contracting Parties (see documents SCNL/9/INF.5, p. 9 and SCNL/13/INF.3, p. 9).

Ibid., p. 31.

The *Explanatory Texts of the Vienna Conventions* provide that: "The idea behind this provision is that a nuclear State should either join the Vienna Convention or afford reciprocal benefits if it wants the funds available under the Convention to cover damage suffered in its territory."[22]

As a consequence, and to the extent that the national legislation of the Installation State provides so, the revised Vienna Convention applies to nuclear damage suffered in nuclear non-Contracting States only if they afford equivalent reciprocal benefits. Like the Paris Convention, it may happen that the nuclear non-Contracting State's legislation provides for reciprocal benefits that are globally equivalent to those provided under the Convention without actually providing for similar liability amounts. In such a case, the contracting parties to the revised Vienna Convention are allowed to apply, in addition to the reciprocity in scope provided in Article I.A of the Convention, a reciprocity in amount in accordance with Article III.2 of the Convention (see *infra* Part III).

c. Joint Protocol

According to *The 1988 Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention – Explanatory Text*,[23] the Joint Protocol was designed to create a treaty link or a "bridge" between the contracting parties to either the Vienna Convention or the Paris Convention in order to extend "the benefit of the special regime of civil liability for nuclear damage set forth under each Convention and to eliminate conflicts arising from the simultaneous application of both Conventions to a nuclear incident."[24] Moreover,

> it was thought that it "*would stress the element of reciprocity*", since the Parties to one Convention would undertake to treat the Parties to the other Convention as if they were Parties to the former Convention and, at the same time and "as consideration therefor", the Parties to the other Convention would undertake to afford the same treatment to the Parties to the former Convention.[25]

Article II of the Joint Protocol does not specify its geographical scope of application and expressly provides that, for the purpose of the Joint Protocol, "[t]he operator of a nuclear installation situated in the territory of a party to [either the Paris Convention or the Vienna Convention] shall be liable in accordance with that Convention for nuclear damage suffered in the territory of a Party to [the other] Convention and [the Joint] Protocol."[26] As pointed out in Section 3.1 of the *Explanatory Text of the Joint Protocol*, "[t]his mutual extension

22. IAEA (2020), *Explanatory Texts of the Vienna Conventions*, *supra* note 20, p. 31. In addition, Section 2.2.3 "Geographical scope" of the *Explanatory Texts of the Vienna Conventions* further explains that:
    > The question may arise of the precise meaning of reciprocity in this context. It seems obvious that the exclusion of damage suffered in a nuclear non-contracting State could be based on the fact that the legislation of that State does not provide for compensation of damage suffered by victims in States party to the Vienna Convention. It is less obvious that the exclusion could be based on the fact that the legislation of that State does not ensure the same amount of compensation or, a fortiori, that it does not conform with all the principles of nuclear liability embodied in the Vienna Convention. The records of discussions within the Standing Committee do not throw much light on the precise meaning of "reciprocal benefits". However, a discussion on the scope of the exclusion was held within the Drafting Committee during the Seventh Session, and it was "agreed" that "a Contracting Party could decide as to which non-Contracting State or States the exclusion would be applicable". It would seem that, under the general principles of the law of treaties, such a decision could not be challenged by the affected non-Contracting State or States.

    Ibid, pp. 31-32 (internal citations omitted).
23. IAEA (2013), *The 1988 Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention – Explanatory Text*, IAEA International Law Series No. 5, IAEA, Vienna (*Explanatory Text of the Joint Protocol*).
24. Joint Protocol, *supra* note 9, Preamble.
25. IAEA (2013), *Explanatory Text of the Joint Protocol*, *supra* note 23, p. 11 (emphasis added).
26. Joint Protocol, *supra* note 9, Article II(a)-(b).

of the territorial scope of the operator's liability does not, however, otherwise affect that liability as determined by the applicable Convention: the operator remains liable under the Convention to which the State in which his installation is situated is a Party […]".[27]

Article IV of the Joint Protocol states that:

> 1. Articles I to XV of the Vienna Convention shall be applied, with respect to the Contracting Parties to this Protocol which are Parties to the Paris Convention, in the same manner as between Parties to the Vienna Convention.
>
> 2. Articles 1 to 14 of the Paris Convention shall be applied, with respect to the Contracting Parties to this Protocol which are Parties to the Vienna Convention, in the same manner as between Parties to the Paris Convention.

According to the *Explanatory Text of the Joint Protocol*, the basis of Article IV was a "general provision whereby the Parties to either the Paris Convention or the Vienna Convention were to be 'considered as if they were Parties' to the other Convention in respect of the application of the operative provisions thereof."[28] The language of Article IV "aims at establishing *equal treatment* as regards the operative Articles of either Convention without implying the status of a full Contracting Party."[29] However, the *Explanatory Text of the Joint Protocol* stresses that "there is *no perfect reciprocity* in the substantive obligations undertaken by the Parties to the two Conventions under Article IV of the Joint Protocol" due to the fact that there is no exact correspondence between the articles in either Convention.[30]

d. Convention on Supplementary Compensation

The *Explanatory Texts of the Vienna Conventions* provide that: "The Convention on Supplementary Compensation says nothing as to the place of a nuclear incident; in this respect also, its scope of application depends entirely on the scope of the applicable civil liability convention or, in the case of an "Annex operator", on the scope of the Annex."[31]

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27. IAEA (2013), *Explanatory Text of the Joint Protocol*, *supra* note 23, p. 16.
28. *Ibid.*, p. 17.
29. *Ibid.*, p. 20 (emphasis added). Section 3.2 of the *Explanatory Text of the Joint Protocol* further specifies that:
    > regarding the question as to which States should be treated as if they were Parties to the Conventions, […] a solution whereby all (present and future) Parties to either Convention would be treated as if they were Parties to the other, regardless of whether they were Parties to the Protocol, "could, at least partially, result in a unilateral treatment as Party". In this respect, it was further pointed out that, according to the principle of international law that a treaty does not create either obligations or rights for a third party without its consent, such a unilateral treatment would not be automatically binding on the non-Parties to the Protocol, which would have to give their consent or assent. Moreover, the absence of a condition of reciprocity might provide little incentive for ratification of the Protocol. Therefore, the alternative solution, whereby only the Parties to the Protocol would be treated as if they were Parties to the Convention in question, was eventually preferred as being "*truly reciprocal*". This solution was, therefore, reflected in Article I of the original 1974 Draft Joint Protocol and is still reflected in Article IV of the Joint Protocol.

    Ibid., pp. 17-18 (emphasis added, internal citations omitted).
30. *Ibid.*, pp. 19-20 (emphasis added). For more information, see Section 3.2 of the *Explanatory Text of the Joint Protocol*.
31. IAEA (2020), *Explanatory Texts of the Vienna Conventions*, *supra* note 20, p. 71. Section 3.5.3, "Geographical scope", of the *Explanatory Texts of the Vienna Conventions* further specifies regarding the Convention on Supplementary Compensation that:
    > Thus, there can be no doubt that the Convention applies if the incident causing damage occurs in an installation situated in the territory of a Contracting Party, irrespective of whether the operator is liable under the Vienna Convention, the Paris Convention or the Annex. However, doubts may arise if the incident occurs in the course of transport of nuclear material; depending on the scope of the applicable nuclear liability regime, the Convention may or may not apply.

    Ibid., p. 71.

As regards the place where the nuclear damage is suffered, the *Explanatory Texts of the Vienna Conventions* further clarifies that:

> the Convention on Supplementary Compensation creates an obligation on the part of all the Contracting Parties to make public funds available in order to compensate damage exceeding a given amount which the Installation State must make available at the national level. As far as the national compensation amount is concerned, Article III.2(a) of the Convention allows the law of the Installation State, subject to obligations of that State under other conventions on nuclear liability, to exclude damage suffered in a non-contracting State.[32]

There is an express reference to the principle of reciprocity provided in Article XII.2 of the CSC, which states that:

> Nothing in this Convention shall prevent any Contracting Party from making provisions outside the scope of the Vienna or the Paris Convention and of this Convention, provided that such provision shall not involve any further obligation on the part of the other Contracting Parties, and provided that damage in a Contracting Party having no nuclear installations within its territory shall not be excluded from such further compensation on any *grounds of lack of reciprocity*.[33]

The contracting parties to the CSC (whether they are parties to the Paris Convention or the Vienna Convention or are Annex States[34]) may therefore require in their national

32. *Ibid.*, p. 71. Section 3.5.3, "Geographical scope", of the *Explanatory Texts of the Vienna Conventions* further specifies that:
> Thus, the legislation of a State which is party only to the Convention on Supplementary Compensation may exclude damage suffered in all non-contracting States. On the other hand, the legislation of a State which is a Party to both the Convention on Supplementary Compensation and the Paris Convention may not exclude damage suffered in the territory of States which are party to the Paris Convention only; in addition, if that State is a Party to the 1988 Joint Protocol as well, it cannot exclude damage suffered in the territory of States which are party to both the Vienna Convention and the 1988 Joint Protocol. Mutatis mutandis, the same holds true for the legislation of a State which is a Party to both the Convention on Supplementary Compensation and the unamended 1963 Vienna Convention. On the other hand, the legislation of a State which is a Party to both the Convention on Supplementary Compensation and the 1997 Vienna Convention has to cover damage wherever suffered, but may exclude damage suffered in the territory, or maritime zones, of nuclear States which are party to neither the Vienna Convention nor to the Convention on Supplementary Compensation, unless these States afford reciprocal benefits; of course, if that State is also a Party to the 1988 Joint Protocol, it may not exclude damage suffered in the territory, or maritime zones, of States which are party to both the Paris Convention and the 1988 Joint Protocol. It seems clear, in any case, that damage suffered on the high seas, or within other maritime areas which cannot be considered as part of a non-contracting State's territory, will always be covered. As for the "geographical scope" of the additional funds to be provided by all the Contracting Parties, in cases where the damage exceeds the national compensation amount, Article V makes it clear that those additional funds cannot be used to cover damage suffered in the territory of non-contracting States. Moreover, as is explained later in greater detail, those funds are to be used, in part, to compensate damage suffered both inside and outside the territory of the Installation State and, in part, to compensate transboundary damage only.

Ibid., pp. 71-72.

33. Emphasis added.

34. An "Annex State" is a State that is a party to the CSC and is not a party to the Paris Convention or the Vienna Conventions, but which national law complies with the provisions of the Annex to the CSC. See CSC, Articles II.1(b) and XVIII.1.

legislation reciprocal benefits, as long as they do not exclude on the ground of lack of reciprocity those contracting parties "having no nuclear installations within its territory".[35]

It is important to note that the reciprocity is applied here explicitly with regard to CSC States (which is not the case under the Paris Convention or the revised Vienna Convention, where reciprocity expressly applies only to nuclear non-Contracting States).

III. Reciprocity in amount

a. Paris-Brussels regime

The consequences of Article 15(b) of the Paris Convention

Paris Convention

Article 15(b) of the Paris Convention provides the possibility to derogate from the provisions of the Convention under certain specific circumstances and more precisely:

> In so far as compensation for nuclear damage is in excess of the 700 million euro referred to in Article 7(a), any such measures in whatever form may be applied under conditions which may derogate from the provisions of this Convention.[36]

Thus, the CPPCs are entitled to derogate from the provisions of the Convention, such as the non-discrimination rule provided under Article 14(c) of the Paris Convention. As explained in paragraph 66 of the "Explanatory Report of the Final Act":

35. CSC, Article XII.2. In this regard, Section 3.5.3 "Geographical scope" of the *Explanatory Texts of the Vienna Conventions* clarifies that:
> […] the supplementary funds envisaged in the Convention are to be used to compensate: (a) all damage suffered "in the territory of a Contracting Party", including its territorial sea; (b) damage suffered by nationals of the Contracting Parties, or on board or by ships or aircraft registered in such Parties, "in or above maritime areas beyond the territorial sea of a Contracting Party", but "excluding damage suffered in or above the territorial sea of a State not Party" to the Convention; and (c) damage suffered "in or above the exclusive economic zone of a Contracting Party or on the continental shelf of a Contracting Party in connection with the exploitation or exploration of the natural resources of that exclusive economic zone or continental shelf".
>
> It may be necessary to point out that the Convention does not preclude any Party from establishing a further layer of compensation in addition to the national compensation amount to be provided by the Installation State and to the amount resulting from the funds to be provided by all the Contracting Parties together. This is made clear by Article XII.2. In that case, the Convention leaves that State free to determine how the additional funds are to be used in respect of the place where damage is suffered. However, Article XII.2 provides that coverage of damage suffered in a non-nuclear State which is party to the Convention cannot be excluded on the sole basis of lack of reciprocity.

IAEA (2020), *Explanatory Texts of the Vienna Conventions*, *supra* note 20, pp. 71-73 (internal citations omitted).

36. The *PC Exposé des Motifs* further specifies in its paragraph 105 that: "[…] to ensure that the same rules apply to the distribution of these additional funds regardless of their source, *deviation from the non-discrimination rule is permitted* regardless of whether public or private funds are used to compensate nuclear damage in excess of the liability amount established under Article 7." *PC Exposé des Motifs*, *supra* note 14 (emphasis added). Consequently, and based on Article 15(b) of the Paris Convention, the reciprocity in amount can also apply among the CPPCs, to the extent that the amounts of compensation established in their national legislation (i) are higher than the reference amount of EUR 700 million provided in Article 7(a) of the Paris Convention, and (ii) differ in the amount. For the application of this reciprocity concerning the contracting parties to the BSC, see *infra* Part III(a)1.ii.

> Article 15(b) of the [original] Paris Convention allows for deviation from the non-discrimination rule where public funds are used to compensate nuclear damage in excess of the liability amount provided for under Article 7 of the Convention. However, for States with unlimited liability regimes, funds made available to compensate nuclear damage are, effectively, operator funds and to the extent that such funds exceed the liability amount provided for under Article 7, those excess funds are subject to distribution in accordance with the non-discrimination provisions of Article 14, rather than in accordance with the provisions of Article 15(b). Such a result was viewed by States with unlimited liability regimes as unfair. To remedy this situation it was proposed that deviation from the non-discrimination rule be permitted where either public or private funds are used to compensate nuclear damage in excess of the liability amount provided for under Article 7.[37]

The Brussels Supplementary Convention

Even though the Brussels Supplementary Convention is "supplementary" to the Paris Convention and therefore subject to the provisions of the Paris Convention, the derogation provided under Article 15(b) of the Paris Convention does not apply in the framework of the Brussels Supplementary Convention. Article 3(f) of the Brussels Supplementary Convention provides that:

> The Contracting Parties, in carrying out this Convention, undertake not to make use of the right provided for in Article 15(b) of the Paris Convention to apply special conditions, other than those laid down in this Convention, in respect of compensation for nuclear damage provided out of the [three tiers of] funds referred to in paragraph (a) of [Article 3].[38]

A "Recommendation on the Application of the Reciprocity Principle to Nuclear Damage Compensation Funds" was adopted in 2004[39] that reflects a common understanding among

37. NEA (2004), "Explanatory Report by the Representatives of the Contracting Parties on the Revision of the Paris Convention and the Brussels Supplementary Convention", Annex IV to the Final Act of the Conference on the Revision of the Paris Convention and the Brussels Supplementary Convention, 12 Feb. 2004, available at: www.oecd-nea.org/law/final-act-conference-revision-pc-bc.pdf ("Explanatory Report of the Final Act").
38. The *BSC Exposé des Motifs* explains in paragraph 26 that:
    > Under Article 15(b) of the Paris Convention, the Contracting Parties to that Convention may derogate from its provisions with regard to the payment of compensation for nuclear damage in excess of EUR 700 million. Thus, they may discriminate on the basis of nationality, domicile, residence or any other factor in the payment of those excess funds. The Contracting Parties to the Brussels Supplementary Convention also undertake not to derogate from the provisions of the Paris Convention with regard to the payment of compensation for nuclear damage up to the amount of the first tier (not less than EUR 700 million), but they equally undertake not to apply any special conditions to the payment of compensation for nuclear damage furnished from public funds under the second and third tiers (between not less than EUR 700 million and EUR 1 500 million), other than special conditions laid down in the Brussels Supplementary Convention itself. Thus, the Brussels Supplementary Convention restricts, to some degree, the right of derogation permitted by Article 15(b) of the Paris Convention.

    BSC Exposé des Motifs, *supra* note 19.
39. NEA (2004), "Recommendation on the Application of the Reciprocity Principle to Nuclear Damage Compensation Funds", Annex III to the Final Act of the Conference on the Revision of the Paris Convention and the Brussels Supplementary Convention, 12 Feb. 2004, available at: www.oecd-nea.org/law/final-act-conference-revision-pc-bc.pdf ("Recommendation on Reciprocity"). It is important to note that originally the contracting parties to the Paris Convention had prepared a draft OECD recommendation, which was then replaced by the Diplomatic Conference recommendation. Therefore, paragraphs 65 to 68 of the Explanatory Report of the Final Act must be read taking into account this change (i.e. the reader should replace "OECD Council Recommendation" by "Diplomatic Conference Recommendation" and interpret paragraph 68 of the Explanatory Report of the Final Act accordingly).

the CPPCs[40] and the Contracting Parties to the BSC that a BSC State should not make use of the right provided for in Article 15(b) of the Paris Convention to apply special conditions to the allocation of the funds provided beyond the third tier of the BSC, in respect of a Paris Convention State, a Vienna Convention State which is also a Joint Protocol State and any other State which, at the time of the nuclear incident, has in force nuclear liability legislation which affords equivalent reciprocal benefits and which is based on principles identical to those of the Paris Convention, only if such States afford reciprocal benefits of an equivalent amount:

> [...] [I]f a Contracting Party to the Brussels Supplementary Convention has satisfied its obligations under that Convention up to the amount referred to in Article 3(a) thereof [EUR 1 500 million], if the amount of nuclear damage to be compensated exceeds the aforementioned amount and if funds remain available, whether provided by insurance or other financial security pursuant to Article 10 of the Paris Convention or by public funds pursuant to national legislation enacted prior to the nuclear incident which requires that specified amount of public funds will be provided to compensate nuclear damage, it should not make use of the right provided for in Article 15(b) of the Paris Convention in respect of:
>
> a) a State referred to in Article 2(a)(i), (ii) or (iv) of the Paris Convention which, at the time of the nuclear incident, has a nuclear installation in its territory or in any maritime zone established by it in accordance with international law and which affords *reciprocal benefits of an equivalent amount*;
>
> b) any other State which, at the time of the nuclear incident, has no nuclear installation in its territory or in any maritime zone established by it in accordance with international law.[41]

It is worth reminding that the Recommendation on Reciprocity only applies to the contracting parties to the BSC.

The consequences of Article 7(g) of the Paris Convention

The *PC Exposé des Motifs* provides that:

> [B]y virtue of Article 2(a)(iv) the Convention applies to nuclear damage suffered in a non-Contracting State which has nuclear liability legislation in force that affords equivalent reciprocal benefits to those provided under the Convention and that is based on principles identical to those of the Convention.[42]

As an additional condition to this reciprocity, Article 7(g) of the Paris Convention provides that:

> In cases where the Convention is applicable to a non-Contracting State in accordance with Article 2(a)(iv), any Contracting Party may establish in respect of nuclear damage amounts of liability lower than the minimum amounts established under this Article or under Article 21(c) to the extent that such State does not afford *reciprocal benefits of an equivalent amount*.[43]

40. It is explained in paragraph 68 of the Explanatory Report of the Final Act that the CPPCs wanted to reflect their agreement on the application of the reciprocity principle in a recommendation. Even though it would not be legally binding upon the CPPCs adopting it, it was considered as being "a strong policy commitment" on their part. *Ibid*. In addition, the *PC Exposé des Motifs* echoes the above in its paragraph 106: "Although not legally binding, the Recommendation [on Reciprocity] is considered a strong policy commitment on the part of those States." *PC Exposé des Motifs*, *supra* note 14.
41. Recommendation on Reciprocity, *supra* note 39 (emphasis added).
42. *PC Exposé des Motifs*, Paragraph 67, *supra* note 14.
43. Paris Convention, Article 7(g) (emphasis added). Paragraph 67 of the *PC Exposé des Motifs* clarifies that:

The CPPCs considered that the requirement of reciprocity under Article 7(g) of the Paris Convention is not inconsistent with the reciprocity requirement under Article 2(a)(iv): while the latter provision deals with reciprocity regarding all other elements of liability, Article 7(g) establishes a special regime with regard to the amount of compensation.[44]

Moreover, on 23 November 2004, the CPPCs jointly declared that if the following reservation[45] is made by any CPPC in accordance with Article 18 of the Paris Convention, such a reservation is accepted:

> [Name of State making the reservation], without prejudice to Article 2(a)(iii), reserves the right to establish in respect of nuclear damage suffered in the territory of, or in any maritime zones established in accordance with international law of, or on board a ship or aircraft registered by, a State other than [name of State making the reservation], amounts of liability lower than the minimum amount established under Article 7(a) to the extent that such other State *does not afford reciprocal benefits of an equivalent amount*.[46]

It is worth mentioning that non-Contracting States with no nuclear installations (according to Article 2(a)(iii) of the Paris Convention) are expressly excluded from the scope of application of the Joint Declaration. In fact, it covers a similar scope as under the Recommendation on Reciprocity: the reciprocity in amount will apply to other CPPCs,[47] Joint Protocol States or any other nuclear State, which, at the time of the nuclear incident,

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> It may be the case, however, that the non-Contracting State's legislation provides for reciprocal benefits which are globally equivalent to those provided under the Convention without actually providing for liability amounts identical to those fixed by the Convention. In these cases, the Contracting Parties are permitted to establish liability amounts that are lower than those established by the Convention and equal to those offered by that non-Contracting State.

PC Exposé des Motifs, *supra* note 14.

44. CPPC (2004), Summary Report, Meeting of the CPPCs, 12 Feb. 2004, Paris, France, NEA Doc. NEA/LEG/CPPC(2004)1/REV1, p. 1, para. 3 (CPPC Restricted).
45. The effects the reservation suggested in the Joint Declaration, *infra* note 46, would have on the Joint Protocol raised discussions about its legal validity, especially as to whether such reservation would defeat the object and purpose of the Joint Protocol. However, a legal opinion made by Professor Alain Pellet on this topic concluded that the reservation would be admissible. Pellet, A. (2011), "Legal Opinion Regarding the Effects of a Reservation Proposed by the Signatories to the 2004 Paris Protocol on the 1988 Joint Protocol Relating to the Application of the Vienna and Paris Conventions" (unpublished). For more information, see *infra* Part III(c).
46. CPPC (2004), Summary Report, Meeting of the CPPCs, 23 Nov. 2004, Paris, France, NEA Doc. NEA/LEG/CPPC(2004)2, p. 8, Annex 2, "Draft Proposal for a Joint Declaration by the Signatories to the Protocol of 12 February 2004 to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (the "Paris Convention") (CPPC Restricted) ("Joint Declaration") (emphasis added). (All Signatories of the 2004 Protocol to amend the Paris Convention indicated to the NEA Secretariat, in writing, that they expressly accept both the principle and the text of the Joint Declaration.) The States covered by this reservation and to which reciprocity in the amounts would apply are: (i) the contracting parties to the Paris Convention (Paris Convention, Article 2(a)(i)); (ii) the contracting parties to the Vienna Convention and to the Joint Protocol (Paris Convention, Article 2(a)(ii)); (iii) the non-contracting nuclear States (e.g. Vienna Conventions States not parties to the Joint Protocol, CSC contracting parties, etc.) that provide in their national legislation principles identical to those of the PC (Paris Convention, Article 2(a)(iv)); and (iv) the States that are covered by the scope of application of the PC according the national legislation of a contracting party in whose territory the nuclear installation of the operator liable is situated (Paris Convention, Article 2(b)).
47. Note by the Secretariat: The CPPCs considered that, in practice, the Joint Declaration will not apply to a CPPC because Article 7(a) of the Paris Convention provides for a minimum amount of nuclear liability of not less than EUR 700 million. CPPC (2010), Summary Report, Meeting of the CPPCs, 17 Nov. 2010, Paris, France, NEA Doc. NEA/LEG/CPPC(2010)2, section III, p. 5, para. 5 (CPPC Restricted).

has in force nuclear liability legislation that affords equivalent reciprocal benefits and which is based on principles identical to those provided in the Paris Convention. As of 1 January 2022 (i.e. the date of entry into force of the Paris Convention, as amended by the Protocol of 12 February 2004), 10 out of 16 CPPCs made a reservation to Article 7(a) of the Paris Convention, based on the Joint Declaration (see *infra* Part IV).[48]

b. Vienna Conventions

The Vienna Convention does not provide any explicit provisions regarding reciprocity in amount.

Unlike the Vienna Convention, however, Article XIII.2 of the revised Vienna Convention expressly states that:

> Notwithstanding paragraph 1 of this Article, insofar as compensation for nuclear damage is in excess of 150 million SDRs [special drawing rights], the legislation of the Installation State may derogate from the provisions of this Convention with respect to nuclear damage suffered in the territory, or in any maritime zone established in accordance with the international law of the sea, of another State which at the time of the incident, has a nuclear installation in such territory, to the extent that it does not afford *reciprocal benefits of an equivalent amount.*[49]

Thus, Article XIII.2 of the revised Vienna Convention allows the legislation of the Installation State to derogate from the provisions of the Convention, to the extent that it defines the operator's nuclear liability amount beyond SDR 150 million, if the State where nuclear damage is suffered "does not afford reciprocal benefits of an equivalent amount."[50]

48. Information on the latest status of reservations, declarations and notifications to the Paris Convention is available at: www.oecd-nea.org/jcms/pl_63387/paris-convention-status-of-reservations-declarations-and-notifications.
49. Emphasis added.
50. As further explained in Section 2.8 "The applicable law and the principle of non-discrimination" of the *Explanatory Texts of the Vienna Conventions*,

> This provision originated from the inclusion in the Vienna Convention of the option for the Installation State to limit the operator's liability to not less than 150 million SDRs while covering the damage in excess of that amount, and up to at least 300 million SDRs, out of public funds. […] [T]his option was presented as introducing an element of supplementary compensation into the Vienna Convention, but in fact only provides for an alternative basis for compensation without actually affecting the total amount available. Unfortunately, the new provision is drafted in a way that makes it applicable to compensation in excess of 150 million SDRs quite irrespective of the basis for such compensation; in other words, even if the Installation State has established the operator's liability at 300 million SDRs, it could still avail itself of the possibility envisaged in Article XIII.2.
>
> In addition, it must be recognized that the drafting of the new provision is not entirely satisfactory and could give rise to doubts as to its precise implications. Inasmuch as it refers to "another State", as opposed to a "non-Contracting State", Article XIII.2 is clearly intended to apply to a Contracting Party to the 1997 Vienna Convention. On the other hand, whereas the context of the new provision might be seen as implying that a derogation could only relate to the non-discrimination principle, a broader interpretation is also possible, since reference is made to the *possibility of derogating from "the provisions" of the Convention*. Under this broader interpretation, it could be argued, for example, that the legislation of the Installation State could establish lower amounts of compensation in respect of damage suffered in a State *not affording reciprocal benefits*; this interpretation may be seen as reinforced by the fact that the new provision is intended to apply to a nuclear State not affording "reciprocal benefits of an equivalent amount", language which clearly refers to the amounts of compensation.
>
> In other words, when it comes to damage suffered in a nuclear Contracting Party, lack of reciprocity, under the strict interpretation of Article XIII.2, would only allow for a derogation from the non-discrimination principle; for example, the Installation

It is worth emphasising that Article XIII.2 of the revised Vienna Convention is similar here to the Paris Convention approach regarding reciprocity in amount based on the Joint Declaration, as it refers not only to nuclear non-Contracting States but to any "another State", meaning that reciprocity may also apply to the revised Vienna Convention contracting parties.

However, and whereas the revised Vienna Convention allows deviation from the excess of SDR 150 million, which means half of the minimum amount provided under this Convention, the CPPCs could only derogate from the non-discrimination principle regarding the excess of EUR 700 million according to Article 15(b) of the Paris Convention, which corresponds to the minimum amount that all its contracting parties shall provide (see *supra* Part III(a)).

c. Joint Protocol

As pointed out in Part II of this Note, there is no exact equivalence between the articles in the Paris Convention and the Vienna Conventions. Moreover, these Conventions differ in the amounts of compensation to be paid in case of a nuclear incident[51] which may raise an issue of reciprocity in respect of the amount of the operator's liability in the frame of application of Article III of the Joint Protocol.[52]

State could exclude damage suffered by nationals of that State. Under the broader interpretation of that provision, the Installation State could establish lower amounts of compensation in respect of damage suffered in a Contracting Party which does not provide reciprocal benefits of an equivalent amount, for example because it has availed itself of the phasing-in provision in Article V.1(c).
The same holds true as far as damage suffered in a nuclear non-contracting State is concerned, but then only if the legislation of the Installation State chooses not to exclude that damage. In fact, since Article I A.2 and 3 allows the legislation of the Installation State to exclude such damage from "the application" of the Convention, it could be argued that Article XIII.2 would not even apply in such a case. On the other hand, as is pointed out in Section 2.2.3 of these explanatory texts, whereas there is no doubt that an exclusion under Article I A.2 and 3 could be based on the fact that the legislation of the third State concerned does not cover damage suffered in the States party to the Vienna Convention, it is not so obvious that such an exclusion could be based on the mere fact that the same amount of compensation is not made available. Therefore, if the Installation State opts for a strict interpretation of Article I A.2 and 3, it could still avail itself of the possibility envisaged in Article XIII.2.

IAEA (2020), *Explanatory Texts of the Vienna Conventions*, *supra* note 20, pp. 52-53 (emphasis added, internal citations omitted).

51. The minimum liability limit established under Article V of the 1963 Vienna Convention is USD 5 million (provided that the reference to the US dollar in the Convention shall be understood as "a unit of account equivalent to the value of the United States dollars in terms of gold on 29 April 1963, that is to say USD 35 per one troy ounce of fine gold"). Under Article V of the revised Vienna Convention, the minimum amount is raised to SDR 300 million (or SDR 150 million, provided that public funds are made available by the Installation State to compensate the damage in excess, up to SDR 300 million). Contracting parties may fix a liability amount of SDR 5 million where the nature of the nuclear installation or nuclear substances involved so justifies (generally this applies to low-risk nuclear installations and transport), but should the nuclear damage incurred exceed that lower amount, the installation state must ensure that public funds are available to make up the difference to SDR 300 million. Article 7 of the Paris Convention establishes a minimum of EUR 700 million. While reduced liability amounts for low risk installations and transport are permitted, the Paris Convention imposes minimum amounts of EUR 70 million for low risk installations and EUR 80 million for transport activities.

52. Article III of the Joint Protocol states that:

1. Either the Vienna Convention or the Paris Convention shall apply to a nuclear incident to the exclusion of the other.

A question as to whether, under the terms of the Joint Protocol, the contracting parties to one Convention may limit the amount of compensation available under their legislation to the lesser amount that may be available under the legislation of the contracting parties to the other Convention, may arise.[53] As explained in Section 3.2.3 of the *Explanatory Text of the Joint Protocol,* "[…] as a result of the approach taken in the Joint Protocol, 'The maximum amount of the operator's liability as fixed by his Installation State's legislation pursuant to the Convention to which the latter is a Party, covers nuclear damage suffered in [Vienna Convention] as well as in [Paris Convention] States without discrimination'."[54]

With regard to the effect of the right of derogation provided in Article XIII.2 of the revised Vienna Convention in respect to the contracting parties both to the Paris Convention and the Joint Protocol, the *Explanatory Text of the Joint Protocol* provides in its Section 3.2.3 that:

> Inasmuch as the new Article XIII.2 of the 1997 Vienna Convention refers to "another State", it is clearly intended to apply both to the other Contracting Parties to the Vienna Protocol and to non-Contracting States, to the extent that damage suffered in such States is covered. In any event, if a Contracting Party to the Vienna Protocol ratifies or accedes to the Joint Protocol, it would have to cover damage suffered in the Contracting Parties to both the Paris Convention and the Joint Protocol, but Article IV of the Joint Protocol would allow it to apply to the new Article XIII.2 to these latter States "in the same manner" as it applies between Contracting Parties to the Vienna Protocol.
>
> […] the Contracting Parties to the Vienna Protocol may resort to reciprocity in respect of compensation available in excess of 150 million SDRs, but, for those of them that are party to the Joint Protocol, it is highly unlikely that they may in fact do so vis-à-vis the Contracting Parties to the Paris Convention that are also party to the Joint Protocol, in view of the much higher amount of compensation that will be available under this latter Convention once it is amended by the 2004 Protocol.[55]

Regarding the Paris Convention, and as already mentioned, Article 2 expressly states that, as far as contracting parties to the Paris Convention that are also contracting parties to the Joint Protocol are concerned, damage suffered in contracting parties to the Vienna Convention that are in turn also contracting parties to the Joint Protocol will be covered under the Paris Convention. According to Section 3.2.3 of the *Explanatory Text of the Joint Protocol,* this provision is in line with Article II of the Joint Protocol. With regard to the right

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> 2. In the case of a nuclear incident occurring in a nuclear installation, the applicable Convention shall be that to which the State is a Party within whose territory that installation is situated.
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> 3. In the case of a nuclear incident outside a nuclear installation and involving nuclear material in the course of carriage, the applicable Convention shall be that to which the State is a Party within whose territory the nuclear installation is situated whose operator is liable pursuant to either Article II.1(b) and (c) of the Vienna Convention or Article 4(a) and (b) of the Paris Convention.

53. According to Section 3.2.3 of the *Explanatory Text of the Joint Protocol*:

> The drafters of the Joint Protocol were aware of this question from the very beginning, and the answer they gave in the earliest stages of the preparatory work was as follows:
>
> > "As far as the relationship between the Parties to the same Convention [is] concerned such restriction is not possible (Article 7(d) of the Paris Convention). Consequently, if there is treatment as Party in the general sense…the same would apply. Such limitations would also be contrary to the non-discrimination Articles of both Conventions (Article 14(a) of the Paris Convention and Article XIII of the Vienna Convention) and would put nationals of non-parties to both Conventions who suffer damage in the territory of the Parties or on the high seas in a more favourable position than nationals of the Parties".
>
> IAEA (2013), *Explanatory Text of the Joint Protocol*, *supra* note 23, p. 25 (internal citations omitted).

54. *Ibid.*, pp. 25-26.
55. IAEA (2013), *Explanatory Text of the Joint Protocol*, *supra* note 23, pp. 26-27.

of derogation provided in Article 15(b) of the Paris Convention, the *Explanatory Text of the Joint Protocol* further explains that:

> […] Inasmuch as [Article 15(b)] will apply as between Contracting Parties to the amended Paris Convention, the effect of Article IV of the Joint Protocol is that a Contracting Party to both the amended Paris Convention and the Joint Protocol will be allowed to apply that provision "in the same manner" to the Contracting Parties to both the Vienna Convention and the Joint Protocol.
>
> […] Contracting Parties to the amended Paris Convention that are also party to the Joint Protocol will only be allowed to resort reciprocity vis-à-vis the Contracting Parties to the Vienna Convention in respect of compensation available in excess of € 700 million.[56]

Moreover, it is worth reminding that the 2004 Joint Declaration allows a CPPC, among others, to establish with regard to the States parties to both the Vienna Convention and the Joint Protocol amounts of liability lower than the minimum amount established under Article 7(a) of the Paris Convention to the extent that such other State does not afford reciprocal benefits of an equivalent amount. As concluded by Professor Alain Pellet in the "Legal Opinion Regarding the Effects of a Reservation Proposed by the Signatories to the 2004 Paris Protocol on the 1988 Joint Protocol Relating to the Application of the Vienna and Paris Conventions",[57] the reservation based on the Joint Declaration would be admissible since "in itself such a reservation would have no effect on the application of the 1988 Joint Protocol".[58] Indeed, such a reservation would apply to both Contracting Parties to the Paris Convention and Parties both to the Vienna Convention and the Joint Protocol, without discrimination, since

> […] given the wording of Article IV of the Joint Protocol, the reserving State will have the benefit of such a reservation in its relations with the Contracting Parties to the Protocol which are not Parties to the Paris Convention.[59]
>
> […] In other words, since "the Parties to either Convention are to be treated as if they were Parties to the other"[], the inescapable consequence is that a State Party to the Paris Convention which has made a reservation in keeping with the Joint Declaration of 23 November 2004, will have the benefit of its reservation in its relations with the Parties to the Joint Protocol.[60]

Therefore, and based on the legal opinion of Professor Pellet, the reservation contained in the Joint Declaration would be effective against the Vienna Convention States parties to the Joint Protocol.

Finally, three CPPCs – Belgium, France and Switzerland – made an express reservation regarding reciprocity in amount when depositing their instrument of ratifications of the Joint Protocol (see *infra* Part IV).[61]

d. Convention on Supplementary Compensation

There are no additional conditions regarding reciprocity in the amount compared to the possibility of applying reciprocity according to Article XII.2 of the CSC (see *supra* Part II(d)).

56. *Ibid.*, p. 27.
57. See Pellet, A. (2011), *supra* note 45.
58. *Ibid.*, p. 22.
59. *Ibid.*
60. *Ibid.*, p. 21.
61. Information on the latest status of reservations, declarations and notifications to the Joint Protocol is available at: www.iaea.org/sites/default/files/22/06/jointprot_reserv.pdf.

IV. National laws[62]

a. Austria

According to Section 23 of the AtomHG,[63] Austrian law is applicable if radiation from a foreign territory causes nuclear damage in Austria. Under this precondition, the injured person has the right to require the application of Austrian law. However, if nuclear damage has occurred in a foreign territory and the Austrian law applies (if determined by the private international law of the State that has jurisdiction), the plaintiff will only be able to benefit from the Austrian law insofar as his or her national law would provide for compensation in similar circumstances.

b. Belgium

Belgium made a reservation to the Joint Protocol, pursuant to which reciprocity in amount applies with regard to Vienna Convention States that are also parties to the Joint Protocol (see *supra* Part III(c)).

c. Denmark

Denmark made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation that affords equivalent reciprocal benefits.

d. Finland

According to Section 5 of the Nuclear Liability Act (484/1972), a reciprocity principle applies to nuclear non-Contracting States[64] that are not parties to the Joint Protocol. National legislation of such States shall correspond to the principles provided in the Paris Convention and provide reciprocal benefits in amount.[65]

Finland also made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation which affords equivalent reciprocal benefits.

62. Note by the Secretariat: All English translations provided in Part IV for laws issued in a language other than English are unofficial.
63. *Bundesgesetz über die zivilrechtliche Haftung für Schäden durch Radioaktivität* [Federal Act on Civil Liability for Damage Caused by Radioactivity] (*Atomhaftungsgesetz* 1999 – AtomHG 1999), BGBl. I Nr. 170/1998. An unofficial consolidated English translation can be found on the NEA website at: www.oecd-nea.org/jcms/pl_23270/austria-1999-atomic-liability-act-last-amended-in-2003.
64. Note by the Secretariat: Reference is made here to States that are not parties to the Paris Convention.
65. Section 5 of the Nuclear Liability Act (484/1972) provides that:

> In addition to the provisions laid down in section 4, the operator of a nuclear installation situated in Finland shall, in accordance with this Act, also be liable for nuclear damage occurring in territory that is sovereign to or within the jurisdiction under international law of a non-Contracting State in the territory of which there is a nuclear installation at the time of occurrence of the nuclear incident when the legislation of the said State corresponds to the principles of the Paris Convention. The same shall apply to nuclear damage occurring on a ship or aircraft registered in such a State provided that at the time of occurrence of the damage the ship or aircraft was not located in the territory of a State other than one referred to in section 4, subsection 1 or in this subsection.
>
> Compensation payable from the insurance of the operator of a nuclear installation situated in Finland for the nuclear damage referred to in this section shall not exceed the compensation that would be payable under the legislation of the foreign State concerned for equivalent nuclear damage occurring in Finland.

e. France

According to Article L.597-4 of the French Environmental Code,[66] the amount of the nuclear operator's liability shall be reduced, as regards damage suffered in a State not party to the Paris Convention but to which the Paris Convention applies (i.e. a Joint Protocol State or a nuclear non-Contracting State which nuclear liability legislation affords equivalent reciprocal benefits), in case the law applicable in that State does not provide for reciprocal benefits in amount.

France made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation that affords equivalent reciprocal benefits. France also made a reservation to the Joint Protocol, pursuant to which reciprocity in amount applies with regard to Vienna Convention States that are also parties to the Joint Protocol (see *supra* Part III(c)).

f. Germany

In accordance with Article 2(b) of the Paris Convention[67], Germany provides in its legislation for a broader scope of application of the Convention. Accordingly, an operator of a nuclear installation is liable for nuclear damage in a non-Contracting State as specified in Article 2(a)(iv) of the Paris Convention even if the non-Contracting State, at the time of the nuclear incident, has in force nuclear liability legislation which is based on principles not identical to those of the Paris Convention.[68]

Germany made a reservation to the Paris Convention in order for Article 9 of the Paris Convention[69] not to be applicable under German law. Consequently, an operator of a nuclear installation is liable for damage caused by nuclear incidents that are a direct consequence of acts in an armed conflict, hostilities, civil war or insurrection. According to Section 25(3) of the Act on Peaceful Utilisation of Atomic Energy and Protection against Hazards (*Gesetz über die friedliche Verwendung der Kernenergie und den Schutz gegen ihre Gefahren – Atomgesetz*),[70] a geographic reciprocity applies in case a nuclear incident occurs

66. Article L.597-4 of the Environmental Code provides that:
> The maximum amount of the operator's liability is set at 700 million euros for nuclear damage caused by each nuclear incident. However, the above amount is reduced to 70 million euros for a given nuclear incident where only low-risk installations, the characteristics of which are defined by regulation are operated on a given site. Such amount is also reduced in cases where the Paris Convention applies to a non-Contracting State pursuant to Article 2(a), sub-paras. (ii) and (iv) thereof, in so far as that State does not afford an equivalent and corresponding amount.

67. Article 2(b) of the Paris Convention provides: "Nothing in this Article shall prevent a Contracting Party in whose territory the nuclear installation of the operator liable is situated from providing for a broader scope of application of this Convention under its legislation."

68. Section 25(4) of the *Atomgesetz* states that:
> Article 2 of the Paris Convention shall apply, provided that in the cases referred to in paragraph (a)(iv) of Article 2, an operator of a nuclear installations shall be liable even if the non-Contracting State has in force nuclear liability legislation which is based on principles which are not identical to those of the Paris Convention.

69. Article 9 of the Paris Convention provides that: "The operator shall not be liable for nuclear damage caused by a nuclear incident directly due to an act of armed conflict, hostilities, civil war, or insurrection."

70. Section 25(3) of the *Atomgesetz* states that:
> The provisions of Article 9 of the Paris Convention relating to the exclusion of liability for nuclear damage caused by a nuclear incident which is a direct consequence of acts in an armed conflict, hostilities, civil war or insurrection shall not apply. If the nuclear damage occurs in another country, the first sentence shall only apply insofar as such other country, at the time of the nuclear incident, has provided for a system of compensation in relation to the Federal Republic of Germany which is equivalent as to nature, terms and amount.

in Germany due to an armed conflict, hostilities, civil war or insurrection and causes nuclear damage beyond the German borders. If nuclear damage occurs in another State, an operator will be liable insofar as the other State, at the time of the nuclear incident, has provided for a system of compensation that is equivalent to the nature, terms and amount provided for under German law.[71]

Under German law, the liability of an operator of a nuclear installation is unlimited. Section 31(2) of the *Atomgesetz* states that if nuclear damage occurs in another State, the liability of an operator is unlimited insofar as, at the time of the nuclear incident, such other State has provided for a system of compensation that is equivalent as to the nature, terms and amount provided for under German law. Otherwise, the liability of the operator will be limited to the same amount, including any additional compensation on the basis of international conventions (e.g. the BSC), envisaged by the other State in relation to Germany at the time of the nuclear incident. In relation to States that have no nuclear installations on their territory, the liability of the operator is unlimited.[72]

Finally, Germany made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation that affords equivalent reciprocal benefits.

g. Netherlands

Section 18(4) of the 1979 Nuclear Incidents (Third Party Liability) Act (the Nuclear Liability Act) applies reciprocity with regard to the nuclear liability principles and the amount of liability to States mentioned in Article 2(a)(i) to (iv) of the Paris Convention. According to the Act, if the State guarantee has to be made available to compensate for damage, only damage in States parties to the Brussels Supplementary Convention that make similar amounts available above the amount of EUR 1 500 million can be compensated by the extra amount made available by the State guarantee. Moreover, according to Section 18(4), reciprocity also applies with regard to the nuclear liability principles and the amount of liability from CPPCs.[73]

71. According to Section 31(1), sentence 1 of the *Atomgesetz*, in the cases provided for in Section 25(3), the liability of an operator of a nuclear installation is limited to the maximum amount of the state indemnification obligation (EUR 2.5 billion) as specified in Section 34(1).
72. Section 31(2) of the *Atomgesetz* provides that:

> If the nuclear damage occurs on the territory of another State or in its maritime zones established in accordance with international law, para. 1 shall apply only insofar as, at the time of the nuclear incident, such other State has made provisions with the Federal Republic of Germany pursuant to para. 1, which are equivalent with regard to nature, terms and amount. Otherwise, if the nuclear damage occurs on the territory of another State or in its maritime zones established in accordance with international law, the liability of an operator of a nuclear installation for the compensation of nuclear damage caused by nuclear incidents, including any additional compensation on the basis of international conventions, shall be limited to the amount envisaged by the other State in relation to the Federal Republic of Germany at the time of the nuclear incident. Sentences 1 and 2 also apply to nuclear damage occurring on board a ship or aircraft registered by another State, insofar as the ship or aircraft is located on or over the high seas outside the territory of States or their maritime zones established in accordance with international law. Sentences 1 to 3 do not apply to States which, at the time of the nuclear incident, do not have any nuclear installation on their territory or in their maritime zones established in accordance with international law.

73. Section 18 of the Nuclear Liability Act provides that:

The Netherlands also made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation that affords equivalent reciprocal benefits.

h. Norway

Section 18(4) of the 1972 Act on Nuclear Energy Activities provides that the government may decide that no compensation shall be paid for nuclear damage occurring in States which are not a party to the Paris Convention, unless insofar as there is reciprocity by virtue of the legislation of such State or by virtue of an agreement.[74] In addition, Section 30

1. If on the territory of the Netherlands as a result of a nuclear accident damage is suffered for which compensation is required to be paid under the Brussels Convention or this Act, and the funds available for this from other sources are inadequate to compensate for that damage up to an amount of 3.2 billion Euros, the State shall make available the public funds required to pay compensation for that damage up to that amount. If it concerns an accident in which the operator's liability has been established pursuant to Article 5, third paragraph, at a lower amount than the amount applicable pursuant to Article 5, first paragraph, the State shall make available up to an amount of EUR 1.5 billion from public funds. If a lower amount has been determined for the relevant installation pursuant to Article 5, paragraph 2, the State shall make available up to an amount of EUR 1.5 billion from public funds.
2. The State shall have the right of recourse in respect of the sums paid out and the costs incurred in that connection against those persons who are liable under this Act.
3. Section 14 shall apply mutatis mutandis to the making available of public funds under (1).
4. Subsection 1 shall also be applicable to damage as referred to therein, suffered in states in which at the time of the nuclear incident in question a rule was in force, which by nature and area of application is equivalent to that of this Act, up to the amount which is available on a reciprocal basis in the state concerned.
5. By general administrative order, the amount referred to in Subsection 1 may be changed in connection with monetary depreciation and further rules may be laid down regarding the provision of public funds pursuant to Subsection 1.

74. Article 18 of the Act on Nuclear Energy Activities provides that:
1. The provisions of this Chapter apply to nuclear damage arising within a geographic area or aboard a vessel or aircraft where the Paris Convention applies in accordance with Article 2, subparagraph (a) of the convention.
2. If a nuclear incident occurs in Norway and the operator of a nuclear installation is thus responsible for the incident in accordance with the provisions of this Chapter, compensation may also be claimed for nuclear damage occurring in a non-Contracting State which is outside the scope of the Paris Convention in accordance with Article 2, subparagraph (a), or aboard a vessel or aircraft registered in such a country.
3. The King may decide (a) that the provisions of this Chapter shall apply in part or in full to nuclear damage occurring in Norway, in another Contracting State or at sea even if the incident occurred in a country that is a non-Contracting State. Such a decision may be made, conditional upon reciprocity between Norway and the Contracting State where the nuclear damage occurred or where the injured party is domiciled, (b) that a non-Contracting State shall be fully or partly equated with a Contracting State in accordance with the provisions of this Chapter.
4. The King may further decide that no compensation shall be payable under the provisions of this Chapter or under other provisions concerning compensation for nuclear damage that has occurred in a non-Contracting State except insofar as there is reciprocity by virtue of the legislation of such State or by virtue of an agreement. The King may make such a decision generally applicable or applicable in relation to specific States.
5. Notwithstanding the provisions of this Section, recourse may be brought against the operator concerned in accordance with the provisions of Section 28.

of the Act gives the government an option to limit the compensation to be paid to States mentioned in Article 2(a)(ii) or (iv) of the Paris Convention on a reciprocal basis.[75]

Norway made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation that affords equivalent reciprocal benefits.

i. Slovenia

Articles 3(1) and 4(3) of the Act on Liability for Nuclear Damage (No. 77/2010)[76] provide that the operator's liability for nuclear damage caused (i) in a non-Paris Convention State which, at the time of the nuclear incident, is a Contracting Party to the Vienna Convention and also to the Joint Protocol, or (ii) is a non-Paris Convention State which, at the time of the nuclear incident, affords equivalent reciprocal benefits and is based on principles identical to those of the Paris Convention, shall be reduced to the amount guaranteed by such State, if such amount is less than the one provided under the Slovenian Act on Liability for Nuclear Damage.

Slovenia also made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation that affords equivalent reciprocal benefits.

75. Section 30(5) of the 1972 Act on Nuclear Energy Activities provides that: "When compensation may be claimed for damage occurring in a State covered by Article 2, subparagraph (a) (ii) or (iv) of the Paris Convention, cf. Section 18, subsection 1, the King may prescribe a lower compensation amount than stated in this paragraph to the extent that this State does not make corresponding benefits available on a reciprocal basis."

76. Article 3(1) of the Act on Liability for Nuclear Damage provides that:

> This Act shall apply to nuclear damage suffered in the territory of:
>
> 1. the Republic of Slovenia;
> 2. any other Contracting Party to the Paris Convention;
> 3. a non-Contracting State to the Paris Convention but which, at the time of the nuclear incident, is a Contracting Party to the Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963 and any amendment thereto, which is in force for that Party, and to the Joint Protocol relating to the Application of the Vienna Convention and the Paris Convention of 21 September 1988 (Official Gazette of the Republic of Slovenia – International Treaties, No. 22/94);
> 4. a non-Contracting State to the Paris Convention which, at the time of the nuclear incident, has no nuclear installation in its territory or in any maritime zones established by it in accordance with the international law;
> 5. any other non-Contracting State to the Paris Convention which, at the time of the nuclear incident, has in force nuclear liability legislation which afford equivalent reciprocal benefits and which is based on principles identical to those of the Paris Convention, including, inter alia, liability without fault of the operator liable, exclusive liability of the operator or a provision to the same effect, exclusive jurisdiction of the competent court, equal treatment of all victims of a nuclear incident, recognition and enforcement of judgements, free transfer of compensation, interests and costs.

Article 4(3) of the Act states that:

> Notwithstanding paragraphs 1 and 2 of this Article, the operator's liability for nuclear damage which is caused in the States referred to in points 3 and 5 of the first paragraph of the preceding Article, shall be reduced to the amount guaranteed by this State, if the regulations of this State do not provide for the protection in the amounts laid down in this Act.

j. Spain

Article 2 of the Law 12/2011 of 27 May on Civil Liability for Nuclear Damage or Damage Caused by Radioactive Materials (Law 12/2011) lays down the reciprocity requirement in the same terms as in Article 2(a)(iv) of the PC (reciprocity in scope: equivalent reciprocal benefits and identical principles).[77] In addition, the condition of reciprocity in amount regarding the Vienna Convention States parties to the Joint Protocol and non-Paris Convention States with nuclear installations is explicitly required in Article 4 paragraph 4(c) of the Law 12/2011.[78] It should be noted that Vienna Convention States parties to the Joint Protocol are considered as any other non-Paris Convention States with nuclear installations since Spain has not ratified the Joint Protocol.

Spain also made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation that affords equivalent reciprocal benefits.

k. Sweden

Section 29 of the Act on Liability and Compensation for Radiological Damages (SFS 2010:950) establishes a reciprocity in amount applicable to all States, except for in countries with no nuclear installations or subject to the provisions of the 1974 Act relative

77. Article 2 "Spatial scope" of the Law 12/2011 provides that:
    1. Title I of the present law shall apply to nuclear damage defined under Article 3.1.h) incurred in the territory, territorial waters as established by international law, or (except in the case of States which are not Parties to the Paris Convention and do not meet the requirements laid down in subparagraphs (b), (c) and (d) of this article) on board a vessel or aircraft registered by:
        (a) a State which is a Contracting Party to the Paris Convention.
        (b) a State which is not a Contracting Party to the Paris Convention but which, at the time of the nuclear incident, is a Contracting Party to the Vienna Convention of 21 May 1963 on Civil Liability for Nuclear Damage and to any amendment to that Convention applying to the said Party, as well as to the Joint Protocol of 21 September 1988 relating to the Application of the Vienna Convention and the Paris Convention, always provided that the nuclear installation of the operator liable for the incident is located in a State which is a Contracting Party to the Paris Convention and to the Joint Protocol.
        (c) a State which is not a Contracting Party to the Paris Convention and, at the time of the nuclear incident, has no nuclear installation in its territory or in territorial waters which it has designated in accordance with international law.
        (d) any other State which is not a Contracting Party where, at the time of the nuclear incident, legislation on nuclear liability is in force which grants equivalent reciprocal benefits and is based on identical principles to those of the Paris Convention, including, inter alia, objective liability of the operator, absolute liability of the operator, or a provision with equivalent effect, exclusive jurisdiction of the competent court, equal treatment of all victims of a nuclear incident, recognition and execution of sentences, free transfer of compensation, interest and costs.
    2. Title II of the present law shall apply to nuclear damage caused during the storage, handling, processing, use in any form, or carriage of radioactive substances which are not nuclear substances throughout Spanish territory.
78. Article 4 "Liability of the operator" of the Law 12/2011 provides in its paragraph (c) that: "For damage caused in States referred to in subparagraphs 1(b) and 1(d) of Article 2 of the present law, the amount of EUR 700 million shall be reduced in so far as those States do not grant equivalent reciprocal benefits."

to the Environment Protection Convention between Denmark, Finland, Norway and Sweden of 19 February 1974.[79]

Sweden made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation that affords equivalent reciprocal benefits.

l. Switzerland

Article 27 of the Federal Nuclear Energy Liability Act[80] establishes a variety of reciprocity principles depending on the amounts of liability provided by the non-Paris Convention States that are parties to the Joint Protocol and allows for application of the reciprocity principles provided in Article 2(a)(iv) and 7(g) of the Paris Convention to non-contracting nuclear States.

Article 27 of the LRCN also provides for reciprocity in amount with regard to other CPPCs and differentiates among the amounts applicable with regard to the CPPCs that are also parties to the BSC, and those that are parties to the Paris Convention only.[81]

79. Section 29 of the Act on Liability and Compensation for Nuclear Damage provides that:
> For damages outside Sweden, the liability for compensation under this Act shall be limited so that the compensation does not exceed the amount that, according to the provisions of that country, applies in terms of compensation for damages in Sweden. The above subparagraph does not apply to damage in countries with no nuclear installations or if otherwise follows from the Act relative to the Environment Protection Convention between Denmark, Finland, Norway and Sweden (1974:268) of 19 February 1974.

80. *Loi fédérale sur la responsabilité civile en matière nucléaire* (LRCN – Federal Nuclear Energy Liability Act), 13 June 2008 (RS 732.44).

81. Article 27 of LRCN provides that:
> 1. The owner of a nuclear installation located in Switzerland is liable for nuclear damage abroad:
> (a) without limit of amount for contracting states which also provide for liability without limit of amount in their national legislation in relationship to Switzerland when these are either contracting states of the Paris Convention and if applicable, of the Brussels Supplementary Convention or the Vienna Convention and the Joint Protocol;
> (b) up to the amount mentioned in Article 3 paragraph (b) number (iii) of the Brussels Supplementary Convention or a higher amount which the national legislation of the state concerned stipulates at the time of the nuclear event in relationship to Switzerland for contracting states of the Paris Convention and the Brussels Supplementary Convention providing for a limitation of the liability amount of the owner;
> (c) up to the amount stipulated by the national legislation of the state concerned at the time of the nuclear event in relationship to Switzerland for contracting states providing for a limitation of the liability amount of the owner and where the contracting states are states of the Paris Convention but not of the Brussels Supplementary Convention or are contracting states of the Vienna Convention and the Joint Protocol.

Finally, Switzerland made a reservation to the Joint Protocol (see *supra* Part III(c)), pursuant to which reciprocity in amount applies with regard to VC States that are also parties to the Joint Protocol.

m. Türkiye

Article 13 of the Nuclear Regulation Law[82] provides for reciprocity in amount. For nuclear damage occurring in other countries, the amounts of liability provided in the Nuclear Regulation Law shall apply based on reciprocity and be limited to the amount of liability established for nuclear damage arising from the nuclear incident in such countries.

Türkiye made a reservation to Article 7(a) of the Paris Convention based on the Joint Declaration (see *supra* Part III(a)). Consequently, reciprocity in amount will apply to other CPPCs, Joint Protocol States or any other nuclear State that at the time of the nuclear incident has in force nuclear liability legislation that affords equivalent reciprocal benefits.

n. United Kingdom

The 1965 Nuclear Installations Act, as amended by the Nuclear Installations (Liability for Damage) Order 2016,[83] allows claims for damage from persons in "a qualifying territory" in accordance with Sections 12 and 13 of NIA 65. A qualifying territory includes a relevant reciprocating territory.[84] To be a reciprocating territory, the law of the country must confer

2. If the nuclear damage occurs in states other than those mentioned in paragraph 1, compensation in relationship to states which do not have nuclear installations within their territory or in their maritime zones stipulated according to international law is limited to the minimum amount mentioned in Article 7 paragraph (a) of the Paris Convention or, if applicable, to the amount provided for in this Act in application of Article 7 paragraph (b) to (e) of this convention. Regarding states which have nuclear installations within their territory or in their maritime zones stipulated according to international law, compensation is owed only subject to the prerequisites mentioned in Article 2 paragraph (a) letter (iv) and 7 paragraph (g) of the Paris Convention and up to the amount which the national legislation of the state concerned provides for at the time of the nuclear event in relationship to Switzerland, but not exceeding the minimum amount mentioned in Article 7 paragraph (a) of the Paris Convention or, if applicable, up to the amount provided for in this Act in application of Article 7 paragraph (b) to (e) of this convention.

82. Article 13 of Nuclear Regulation Law No. 7381 provides that:
    (1) The liability of the operator for each nuclear incident under this Section is limited to the amounts;
        a. 700 million Euros for nuclear reactors with a thermal power of more than ten megawatts and other nuclear facilities to be determined by the assessment to be made before the license to be given by the Authority to operate a nuclear facility,
        b. 70 million Euros for nuclear facilities not covered by subparagraph (a),
        c. 80 million Euros for the transport of nuclear materials,
        ç. 700 million Euros for the transit passage of nuclear materials within the borders of the Republic of Türkiye.
    (2) The liability amounts specified in the first paragraph are applied in relation to the damages occurred in other countries, within the framework of the reciprocity principle, limited to the amount of liability applied for the nuclear damages arising from the nuclear incident in that country.
83. Nuclear Installations Act, 1965, c. 57 (NIA 65).
84. Section 26(1A) reads as follows:
    A reference in this Act to a relevant reciprocating territory is a reference to—
        (a) a country that is not a party to a relevant international agreement but whose law—

benefits on a basis that corresponds to those conferred by the Paris Convention and must be based on identical principles. In light of NIA 65, Section 16(1ZB) and (3)-(3E), the amount of compensation payable in respect of claims from a reciprocating territory is capped at the limit on liability set by the law of the reciprocating territory.

V. Conclusion

Generally speaking, the reciprocity principle may be considered as a derogation from the normal application of the nuclear liability conventions because it is contrary to a basic principle of the conventions: the principle of non-discrimination. All nuclear liability conventions provide that said convention and the national law applicable thereunder shall be applied without any discrimination as to nationality, domicile or residence.[85] Thus, provided that nuclear damage is suffered within the geographical scope of application of the relevant conventions, claims can be brought by nationals of non-contracting States also. Conversely if damage is suffered outside that geographical scope, claims cannot be brought even by nationals of contracting parties.

However, a number of factors impacted the approach adopted by the post-Chernobyl conventions regarding reciprocity conditions introduced therein, such as:

- changes introduced in the post-Chernobyl conventions, like the extension of the geographical scopes of application, and divergences in the liability amounts and financial security limits;
- establishment of unlimited liability of nuclear operators in certain countries; and
- practical implications related to uncertainty as to how to interpret certain provisions of the Joint Protocol (e.g. "application … in the same manner").

(i) with a view to reciprocating benefits conferred as regards it by parties to that relevant international agreement, confers benefits as regards the parties to that relevant international agreement on a basis corresponding to the basis required of a party to that agreement, disregarding for these purposes that agreement's limits on the amount of liability, and
(ii) in that respect is based on principles identical to those of that relevant international agreement, or

(b) an overseas territory of a country falling within paragraph (a), if the law of the country or the territory provides for, or they together provide for, the benefits in question to be reciprocated on a basis that includes that territory.

Section 26(1B) reads as follows:

A reference in this Act to a qualifying territory is a reference to—
(a) a relevant territory,
(b) a country in the case of which there is no nuclear installation—
(i) within its territorial limits or its exclusive economic zone or on its continental shelf, or
(ii) within the territorial limits or the exclusive economic zone of, or on the continental shelf of, any overseas territory of the country,
(c) an overseas territory of a country falling within paragraph (b),
(d) an overseas territory of a country that is a party to a relevant international agreement where the territory—
(i) is not a territory to which that agreement applies, and
(ii) has no nuclear installation within its territorial limits or its exclusive economic zone or on its continental shelf, or
(e) a relevant reciprocating territory.

85. See Paris Convention, Article 14(a); Brussels Supplementary Convention, Article 8; Vienna Convention, Article XIII; revised Vienna Convention, Article XIII.1; and CSC, Article III.2.

The lack of harmonisation regarding the amounts of compensation provided in the national law (even among the contracting parties to the same convention) added an additional layer of complication prompting the countries to introduce different reciprocity principles in national legislation.

However, all nuclear liability conventions make a distinction between States with nuclear installations and States without nuclear installations while applying the principle of reciprocity. The latter are excluded from the scope of application of the reciprocity principle, with some minor exceptions (e.g. use of "excess funds" under Article 15(b) of the Paris Convention, mitigated to some extent by the provisions of the Recommendation on Reciprocity).

Certain post-Chernobyl conventions (i.e. the Paris Convention and the revised Vienna Convention) introduced the requirement of "equivalent reciprocal benefit" supplemented by a condition of "reciprocal benefits of an equivalent amount" and, for the Paris Convention only, by an additional requirement of having in force nuclear liability legislation which is based on principles identical to those provided in the Paris Convention. The intention was to provide an incentive to nuclear non-Contracting States to ensure that victims of a nuclear incident occurring in such States have the same compensation rights against the liable operator in the non-Contracting State, as will victims in the non-Contracting State when bringing their claims for compensation against the liable operator in the Contracting State.

Differences in the amounts of compensation provided for by the Paris Convention and the revised Vienna Convention, differences which are only magnified by the application of the Joint Protocol, may however lead to a situation where victims of a nuclear incident for which a foreign operator is liable may be entitled to a higher or lower amount of compensation than the one to which they would be entitled in their own country. Moreover, and taking into account that certain CPPCs opted for an unlimited liability of nuclear operators (e.g. Germany), a nuclear operator may remain liable for paying a compensation amount that goes beyond the liability limits provided under the Paris/Brussels regime. This situation led to the adoption of the non-binding Recommendation on Reciprocity in 2004, the main purpose of which is to allow a compromised solution to protect potential victims against discriminatory treatment by restricting the use of reciprocity conditions.

Given the significant differences among the minimum liability amounts provided for under the nuclear liability conventions, as well as among the amounts provided for in national legislation, the contracting parties to the Paris Convention adopted a Joint Declaration in 2004. The Joint Declaration works to minimise the impact of such differences by approving in advance the deposit of a reservation regarding the reduction of compensation to be paid to victims in certain States, unless and "to the extent such other State does afford reciprocal benefits of an equivalent amount." The reservation based on the Joint Declaration is enforceable against the Vienna Convention States parties to the Joint Protocol, and it was put into effect by the majority of the contracting parties to the Paris Convention.

In conclusion, introducing reciprocity rules resulted in the creation of an additional layer of legal complications to the process of compensating victims of a nuclear incident. To remedy this situation, alignment of the minimum liability limits and harmonisation of national nuclear liability legislation is encouraged.

CASE LAW

United States

Spent fuel storage litigation

Litigation activity continues in the federal courts concerning challenges to the licences issued by the NRC to Interim Storage Partners, LLC (ISP) and to Holtec International (Holtec) providing for the temporary storage of spent nuclear fuel.

Texas v. NRC

On 14 March 2024, the United States (US) Court of Appeals for the Fifth Circuit denied a petition for rehearing en banc of the court's 25 August 2023 decision to vacate a licence the NRC previously issued to ISP authorising the construction and operation of an interim storage facility.[1] That licence, issued by the NRC in September 2021, authorised ISP to receive and store up to 5 000 metric tons of spent nuclear fuel in above-ground canisters and casks for a licence term of up 40 years. The NRC issued this licence to ISP pursuant to its regulations in 10 *Code of Federal Regulations* (CFR) Part 72, which were first promulgated in 1980 for the licensing of both onsite and away-from-reactor private spent nuclear fuel storage facilities.[2]

The legality of the NRC's issuance of the licence was challenged in the Fifth Circuit by the State of Texas and two organisations representing property owners and oil and gas interests in the vicinity of the facility (collectively referred to as "Fasken"). In its 25 August 2023 decision (issued by a panel of three judges), the court agreed with the primary argument advanced by the State of Texas and held that the NRC lacked authority under the Atomic Energy Act to "issue licenses for private parties to store spent nuclear fuel away-from-the-reactor".[3]

Neither the concurring nor the dissenting opinion accompanying the denial of rehearing en banc discussed the court's prior holding pertaining to the NRC's authority to issue licences for the storage of spent nuclear fuel. Rather, both the concurrence and the dissent focused solely on whether the court had jurisdiction to hear the matter. The NRC is evaluating its options with regards to next steps for the case.

Holtec Interim Storage Facility

On 9 May 2023 (prior to the 25 August 2023 Texas v. NRC decision discussed above), the NRC issued an interim storage facility licence to Holtec, authorising the construction and operation of a facility in Lea County, New Mexico, for the receipt and storage of up to 8 680 metric tons of spent nuclear fuel for a licence term of 40 years. On 11 July 2023,

1. Texas v. NRC, No. 21-60743, 2024 WL 1108700 (5th Cir., 14 Mar. 2024), denying petition for reh'g en banc, Texas v. NRC, 78 F.4th 827 (5th Cir. 2023).
2. Licensing Requirements for the Storage of Spent Fuel in an Independent Fuel Spent Storage Installation, 45 Federal Register (Fed. Reg.) 74,693 (12 Nov. 1980).
3. Texas, 78 F.4th at 831. A full summary of the 25 Aug. 2023 decision may be found in NEA (2023), "Spent fuel storage litigation", *Nuclear Law Bulletin*, No. 111, OECD Publishing, Paris, pp. 65-66.

Fasken filed a petition for review in the Court of Appeals for the Fifth Circuit challenging the Holtec licence.[4] Fasken's challenge in the Fifth Circuit sought direct review of the NRC's May 2023 issuance of the licence to Holtec. Shortly after Fasken's petition for review was filed, the NRC filed a motion to dismiss the petition for lack of jurisdiction. The NRC also argued in its petition that, if not dismissed, the Fifth Circuit should transfer Fasken's petition to the US Court of Appeals for the District of Columbia (DC) Circuit, where Fasken had already filed a jurisdictionally proper petition for review concerning the Holtec facility.[5] On 25 August 2023, the Fifth Circuit denied the NRC's motion to transfer the petition for review, and on 13 September 2023, the Court ordered that the motion to dismiss be "carried with the case", meaning it would be considered in conjunction with a full briefing on the merits.

On 27 March 2024, a three-judge panel in the US Court of Appeals for the Fifth Circuit granted Fasken's petition for review and vacated the Holtec licence.[6] The panel held that the Texas v. NRC decision was controlling and dictated the outcome of Fasken's petition for review. The NRC is evaluating its options with regards to next steps for the case.

4. Fasken Land and Minerals, Limited v. NRC, 5th Cir. No. 23-60377.
5. A full summary of the US Court of Appeals for the DC Circuit matter may be found in NEA (2023), *supra* note 3. The DC Circuit heard arguments in that matter on 5 March 2024. See also Beyond Nuclear, Inc. v. NRC, DC Cir. No. 20-1187 (Consolidated with Nos. 21-1225, 21-1104, and 21-1147).
6. Fasken Land and Minerals, Limited v. NRC, No. 23-63077, *supra* note 4.

NATIONAL LEGISLATIVE AND REGULATORY ACTIVITIES

France

Nuclear installations

Law No. 2023-491 of 22 June 2023 on accelerating procedures relating to the construction of new nuclear installations near existing nuclear sites and on the operation of existing facilities.

The main objective of the law on accelerating procedures is to establish a simplified procedure for the construction of new nuclear reactors, including small modular reactors (SMR), located in the immediate vicinity of sites hosting basic nuclear installations (*installation nucléaire de base* – INB) (except for particle accelerators and deep geological repositories [DGRs] for radioactive waste) and for which an authorisation is requested within 20 years after the law is promulgated.

The law primarily affects procedures under the Urban Planning Code, where it waives the need for an urban planning authorisation request under certain conditions, and the Environmental Code, where the law establishes a specific procedure for granting an environmental licence. The law also contains other measures that aim to foster nuclear energy development. The law eliminates the earlier national objective to reduce the share of nuclear in electricity generation to 50% in 2035 and also eliminates the limit to total nuclear installed capacity, which had been set at 63.2 GWe. Finally, the law contains measures related to the operation of existing INBs. In that, first, the law simplifies the periodic safety review procedure for nuclear power reactors beyond 35 years of operation. Additionally, the law modifies the shutdown procedure of INBs that have stopped operation. Previously, an INB that had stopped operating for a continuous period of more than two years was deemed to be in permanent shutdown. Now, where an INB has been in continuous shutdown for a more than two years it may be ordered to enter permanent shutdown by a Decree of the State Council (*décret en Conseil d'État*) and only after an opinion by the French Nuclear Safety Authority (ASN) and after the operator has had the opportunity to provide comment. Finally, climate change must be considered when considering the grant of creation licences for INBs and during periodic safety reviews.

Decree No. 2023-1366 of 28 December 2023 implementing, in the continental metropolitan territory, Article L. 211-2-1 of the Energy Code and Article 12 of Law No. 2023-491 of 22 June 2023.

Article L. 411-2 of the Environment Code allows the competent administrative authority to waive prohibitions related to protected species, commonly referred to as a "protected species exemption", when three conditions are met:

- there is no alternative satisfactory solution that can be assessed through expertise by a third party on the request of the competent authority and with its agreement, at the expense of the petitioner;
- the exemption does not affect the ability of populations of the concerned species to remain in their natural distribution area in a favourable conservation state; and
- the project is motivated by an imperative reason of major public interest (RIIPM).

The Decree establishes that nuclear power and renewable energy projects in continental metropolitan France will be considered as motivated by an RIIPM and also establishes an RIIPM presumption for nuclear fuel interim disposal facilities.

Decree No. 2023-1104 of 28 November 2023 relating to the periodic safety review of nuclear power reactors and the shutdown of basic nuclear installations

The aim of this Decree is to improve access of the general public and foreign states to information related to a power reactor's periodic review after 35 years of operation and to allow the operator to disclose, at a later date, documents pertaining to the complete set of periodic reviews in cases where difficulties were encountered in performing a number of planned activities. The Decree also updates provisions relating to the final shutdown of an installation to factor in the amendments brought about by Law No. 2023-491 of 22 June 2023 on accelerating procedures related to the construction of new nuclear installations close to existing nuclear sites and on the operation of existing facilities.

Radioactive waste management

Constitutional Council, 27 October 2023, No. 2023-1066 QPC

Law No. 2016-1015 of 25 July 2016 specifying the creation modalities of a reversible DGR for high- and intermediate-level long-lived radioactive waste amended Article L. 542-10-1 of the Environmental Code that sets the legal regime applicable to the creation and operation of a DGR for radioactive waste. More specifically, the new law provides that disposal of radioactive waste in such facilities needs to be reversible, following specific modalities, for a minimum period of time.

The petitioners argued that the provisions were unconstitutional as they did not guarantee the reversibility of deep geological disposal of radioactive waste beyond a period of 100 years, thus hindering the capacity of future generations to renege on this decision even if irreversible damage to the environment could jeopardise their ability to satisfy their own needs.

In its decision, the Constitutional Council found that "the legislator, when adopting measures that may damage the environment severely and over a long period of time, should ensure that the choices made to answer the needs of present time do not jeopardise the ability of future generations and other peoples to satisfy their own needs, and safeguard their freedom of choice in this regard". However, the Constitutional Council found that the provisions of the law regulating the creation and operation of a DGR for radioactive waste was constitutional as the guarantees established by the law limit the infringement on the right to a healthy and balanced environment and limit the burden for future generations.

Radioactive materials (including physical protection)

Order of 13 April 2023 on activities subject to authorisation under Article R. 1333-4 of the Defence Code relating to nuclear substances belonging to categories I and II located in installations, that are to be exported or imported, or that are located in a vital importance site under the National Energy Sector Security Directive (civil nuclear subsector)

This Order applies to activities consisting in elaborating, possessing, transferring, utilising, importing or exporting nuclear substances subject to authorisation under Article R. 1333-4 of the Defence Code when they are performed inside a vital importance site under the National Energy Sector Security Directive (civil nuclear subsector). In this context, the Order sets the rules applicable in terms of protection and control of nuclear substances and activities against malicious acts and loss.

Nuclear safety and radiological protection (including nuclear emergency planning)

Decree No. 2023-489 of 21 June 2023 on the protection of workers against risks caused by ionising radiation

The Decree amends several rules related to the protection of workers against risks caused by ionising radiations in order to take into account changes brought by Law No. 2021-1018 of 2 August 2021 to reinforce health prevention at work. In particular, the decree adapts the modalities for training and for granting certificates of ability to handle industrial radiology appliances and reforms the certification of contractors working in areas presenting an important risk of exposure to ionising radiations. The Decree also clarifies the implementation methods of multiple rules, most notably rules relating to dose constraint, use of an operational dosimeter, periodic verification of means of transportation and measurement instruments.

Order of 23 June 2023 on modalities to sign up and access the Information and Surveillance of Ionising Radiations Exposure System "SISERI" and amending Order of 26 June 2019 on individual surveillance of workers' exposure to ionising radiations

This Order defines the methods to sign up to and access the Information and Surveillance of Ionising Radiations Exposure System "SISERI" managed by the Institute for Radiation Protection and Nuclear Safety (IRSN) in compliance with Article R. 4451-127 of the Labour Code.

Order of 16 November 2023 defining the calculation modalities for efficient doses and equivalent doses resulting from the exposure of persons to ionising radiations

This Order, adopted in consultation with the French Nuclear Safety Authority (ASN), sets the new calculation methods for effective doses and equivalent doses resulting from the exposure of people to ionising radiations.

Hungary

General legislation, regulations and instruments

Latest amendments to Act CXVI of 1996 on Atomic Energy

Act CXVI of 1996 on Atomic Energy (the Atomic Act) was recently amended to align the statutory provisions with the international system of requirements and to take into account the latest practices and experiences of the European nuclear authorities.

The definition of the independent inspection organisation authorised by law was added to the provisions of the Atomic Act. The latest amendment to the Atomic Act authorises the Hungarian Atomic Energy Authority (HAEA) to co-operate with the National Accreditation Authority to provide oversite of atomic energy. This co-operation authorisation covers accreditation procedures where an expert who has professional experience in the application of nuclear energy is needed. This change enables HAEA civil servants to participate in the evaluation phase of the National Accreditation Authority's accreditation procedure and in the work of the evaluation group in the nuclear field.

An additional amendment to the Atomic Act creates a category of occasional payments, deliverable to the Central Nuclear Financial Fund, from licensees of a nuclear facility during the phase before they have received an operating licence. Prior to entry into force of an operating licence, licensees possessing a valid construction licence will pay the costs of the preparatory tasks related to the management of radioactive waste and the management of spent fuel prior to the entry into force of the operating licence, by means of a case-by-case payment to the Central Nuclear Financial Fund. The amount to be paid is determined by law and reflected in the central budget of the given year.

According to the amendment to the Atomic Act, the HAEA is authorised to issue service ID cards to persons performing official duties. These ID cards function to prove the officials' eligibility to perform such duties. Pursuant to the amendment, the HAEA shall keep a register of service ID cards and the president of the HAEA shall establish all the detailed rules and data content relevant to the service ID cards in a separate HAEA decree.

The chapter on regulatory oversight of the Atomic Act (Chapter III) was amended to include sections on the procedure for the acknowledgement of notification and the procedure for the notification of deviations. The licensee is considered to be the only client in regard to both procedures. These procedures cannot be combined, either *ex officio* or by request, and the licensee cannot be called upon by the HAEA to remedy a deficiency.

According to the previous provisions of the 1/2022 HAEA Decree on the nuclear safety requirements of nuclear facilities and on related regulatory activities, which contains nuclear safety regulations, specific activities may be carried out by an inspection organisation independent of the licensee and authorised by law. These organisations must possess a MSZ EN ISO/IEC 17020 standard type "A" accreditation for independence, an accreditation that certifies their ability to carry out audit tasks independent of the licensee, as defined in accordance with the nuclear safety regulations. According to the latest amendment to the Atomic Act, accreditation alone is not sufficient to perform activities according to the nuclear safety regulations (inspections affecting nuclear safety); the HAEA must also register these accredited organisations. The HAEA carries out the administrative fee-based registration procedure in accordance with the provisions of Act CL of 2016 on the Code of General Administrative Procedure.

Latest amendments to the 2/2022 HAEA Decree

Section 2 of the 2/2022 HAEA Decree on the protection against ionising radiation and the corresponding licensing, reporting (notification) and inspection system was amended to clarify and supplement the provisions governing the release procedure of the HAEA decree and to eliminate regulatory deficiencies.

Slovak Republic

International co-operation

A Memorandum of Understanding was concluded between the Nuclear Regulatory Authority of the Slovak Republic and the Atomic Energy Regulatory Board of India for the Exchange of Technical Information and Cooperation in the Field of Regulation of the Safe Use of Nuclear Energy for Peaceful Purposes in Vienna, on 25 September 2023.

Slovenia

Nuclear safety and radiological protection (including nuclear emergency planning)

Resolution on Nuclear and Radiation Safety in the Republic of Slovenia for the period 2024-2033

At its session held on 28 November 2023, the National Assembly of the Republic of Slovenia adopted the Resolution on Nuclear and Radiation Safety in the Republic of Slovenia for the period 2024-2033 (the Resolution). The Resolution was published in the Official Gazette of the Republic of Slovenia, No. 122/23 on 5 December 2023 and serves as a high-level commitment by Slovenia, signifying an unwavering dedication to not only uphold but elevate nuclear safety and radiological protection standards over the next ten years. Positioned as an overarching programme document, it unequivocally prioritises nuclear safety above all other considerations in the field of peaceful use of nuclear energy. The Resolution considers the latest strategic documents pertaining to the future use of nuclear

energy in Slovenia and addresses some of the challenges, such as the need for human resources, research and development.

The Resolution was prepared as a continuation of and addition to the Resolution on Nuclear and Radiation Safety in the Republic of Slovenia for the period 2013-2023.

The Resolution first sets out ten fundamental principles and highlights the protection of people and the environment from the harmful effects of radiation, both now and in the future, as a fundamental safety objective. This is followed by a brief history of the development of radiation and nuclear activities in the territory of Slovenia, including the current situation in Slovenia and the strategic documents envisaging the further peaceful use of nuclear energy. The Resolution next describes Slovenia's efforts regarding international co-operation in nuclear safety and radiological protection, followed by a description of the current legislative and institutional framework defining the roles and competences of state authorities and other organisations, associations, expert councils and commissions in this field. A chapter is devoted to research, education and training of personnel and on ensuring the competence of all stakeholders in nuclear safety and radiological protection. The Resolution sets out objectives for each of the areas addressed and concrete actions to achieve them, including identifying who is responsible for the actions, the timetables for completion of the actions, and the sources of funding for the actions. Finally, the Resolution provides for the monitoring and reporting on the implementation of the Resolution in the Annual Report on Ionising Radiation Protection and Nuclear Safety.

Switzerland

Nuclear safety and radiological protection (including nuclear emergency planning)

Partial revision of the Radiological Protection Act (RPA)[1] *and the Iodine Tablets Ordinance*[2]

On behalf of the Federal Council, the Federal Office of Public Health (FOPH) has initiated a project for the partial revision of the Radiological Protection Act of 22 March 1991 (RPA) in 2021 to specify the polluter-pays principle (Article 4 RPA) regarding the financing of iodine tablet campaigns for the population. To achieve these aims, the FOPH also regulates who bears the costs for the remediation of radioactively contaminated sites (e.g. radium-contaminated sites), the disposal of radioactive waste and emission monitoring in the vicinity of facilities with a licence to release radioactivity into the environment during normal operation. With this ongoing partial revision, the radiation protection system and its principles remain unchanged.

In Switzerland, iodine tablets are distributed every 10 years to everyone who regularly resides within a radius of 50 km of a Swiss nuclear power plant. The municipalities in which such distribution takes place are listed in the annex to the Iodine Tablets Ordinance. However, with the shutdown of the Mühleberg nuclear power plant (KKM) in 2019, numerous municipalities in the region around the former KKM are no longer within a radius of 50 km of a Swiss nuclear power plant. Distribution of iodine tables is therefore no longer necessary in this area. The FOPH was therefore instructed to submit an application to amend the list of affected municipalities in the annex to the Iodine Tablets Ordinance with regard to the distribution of iodine tablets in the Fall of 2023. The amended ordinance came into force on 15 April 2023. After the ordinance came into force, around 5 million people within a 50 km radius of active Swiss nuclear power plants were supplied with iodine tablets in the Fall of 2023.

1. Radiological Protection Act of 22 March 1991 (*RPA; Classified Compilation* 814.50), available at: www.fedlex.admin.ch/filestore/fedlex.data.admin.ch/eli/cc/1994/1933_1933_1933/20230701/en/pdf-a/fedlex-data-admin-ch-eli-cc-1994-1933_1933_1933-20230701-en-pdf-a-1.pdf.
2. Ordinance of 22 January 2014 on distributing iodine tablets to the public, Systematic Record (RS) 814.52 (Ordinance on iodine tablets), available in French at: www.fedlex.admin.ch/filestore/fedlex.data.admin.ch/eli/cc/2014/69/20230415/fr/pdf-a/fedlex-data-admin-ch-eli-cc-2014-69-20230415-fr-pdf-a.pdf.

Failure analysis in nuclear installations and the Low Dose Ionising Radiation Report

Nuclear power plant operators must prove that the safety level of their installation is sufficient by way of failure analysis. The Environment, Spatial Planning and Energy Committee of the Council of States asked the Federal Council in 2018 to proceed to a comprehensive review of the failure analysis system, as well as of the failure categories detailed in the Ordinance on Radiological Protection[3] and in the Ordinance on Nuclear Energy.[4] In response, the Federal Energy Office established an expert group consisting of the Chairs of the Federal Commission for Radiological Protection and of the Nuclear Safety Commission, as well as the Head of the Radiological Protection Division of the Health Department of Luxembourg. The expert group mandated the French Institute for Radiation Protection and Nuclear Safety (IRSN), an independent organisation, to carry out this review. The IRSN report confirmed that the Swiss failure analysis system complies with applicable international recommendations on the matter and with the legal framework of states with comparable development level.[5] Switzerland is the only country that applies dose criteria in such a stringent fashion that their inobservance can lead to temporary closure of a nuclear power plant. The IRSN found that a revision to the legislation is not warranted. The expert group confirmed the IRSN report and its findings.[6] And the Federal Council approved the report on 8 December 2023.[7]

Liability and compensation

Revision of the Nuclear Energy Liability Ordinance[8]

A revision to the Nuclear Energy Liability Ordinance provides a possibility to lower the insurance cover for nuclear installations in the process of being decommissioned. In accordance with the legislation on third party liability in the field of nuclear energy, the operator of a nuclear installation has an unlimited liability for nuclear damage and must cover third party liability for nuclear damage up to EUR 1.2 billion (plus 10% of that amount for interest and costs awarded by a court). The insurance cover for low-risk installations, such as research reactors, is reduced to EUR 70 million (plus 10% of that amount for interest and costs awarded by a court).

Following the revision of the Nuclear Energy Liability Ordinance, which entered into force on 1 January 2024, the insurance cover for nuclear installations in the process of being decommissioned can be lowered to EUR 70 million (plus 10% of that amount for interest and costs awarded by a court) on the condition that all fuel elements have been removed from the installation. The Federal Office of Energy (OFEN) has the authority to decide that the insurance cover is lowered to EUR 70 million and sets the date of entry into force of the reduced amount.

3. Radiological Protection Ordinance of 26 April 2017 (RPO; RS 814.501).
4. Nuclear Energy Ordinance of 10 December 2004 (NEO; RS 732.11).
5. IRSN (2022), *Dose Limit Values for Nuclear Isntallations, Radioactive Radiation and Radiation Protection*, Report n°IRSN/DAEI/BU-DCI/2022-00044, IRSN, Nanterre, France, available at: www.newsd.admin.ch/newsd/message/attachments/87035.pdf.
6. Bochud, F., D. Gavillet and P. Majeurs (2023), *Postulate 18.4107: Dose limit values for nuclear installations, radioactive radiation and radiation protection – Accompanying Report,* Federal Counsel, Bern, available at: www.newsd.admin.ch/newsd/message/attachments/87032.pdf.
7. Federal Council report answering to Postulate 18.4107 of the Environment, Land Use Planning and Energy Commission of the Council of States of 13 November 2018 (2023), available in French at: www.newsd.admin.ch/newsd/message/attachments/85124.pdf.
8. Nuclear Energy Liability Ordinance of 25 March 2015 (NELO; RS 732.441).

Radioactive waste management

Ordinance on Nuclear Energy[9]

Licences to export radioactive waste for the purpose of encapsulation can be granted under certain conditions, including if the destination state has agreed to the importation of radioactive waste for this purpose in an international convention.[10] The Ordinance of 10 December 2004 on Nuclear Energy (OENu) was supplemented with a new provision giving authority to the Federal Department for Environment, Transport, Energy and Communication (DETEC) to sign international conventions with foreign states on the exportation (importation in such states) of low- or intermediate-level radioactive waste for the purpose of encapsulation (Article 55(3) of OENu). This is a delegation of authority previously held by the Federal Council.[11] The revision entered into force on 1 January 2024.

United Arab Emirates

Nuclear safety and radiological protection (including nuclear emergency planning)

Regulation for the Certification of Operating Personnel at Nuclear Facilities (FANR-REG-17 Version 1)

On 16 November 2023, the Federal Authority for Nuclear Regulation (FANR), the nuclear regulator of the United Arab Emirates (UAE), issued a revised Regulation on the Certification of Operating Personnel at Nuclear Facilities (FANR-REG-17, Version 1).[12] The regulation was published in the *Official Gazette* No. 764 issued on 30 November 2023 and entered into force on 30 May 2024.

This regulation establishes the requirements for the training, qualification and certification of operating personnel (i.e. senior reactor operators, reactor operators and local operators at a nuclear facility that is a nuclear reactor). The regulation has been revised to incorporate lessons learnt from the implementation of Version 0 of FANR-REG-17, reflect the relevant changes to industry standards and requirements and address input from various stakeholders. The regulation covers the entire process for the qualification of operating personnel, including:

- criteria related to education and experience for admission to the initial training and qualification programmes;
- required training programme resources;
- requirements for training and qualification programmes; and
- requirements for examinations, tests and the certification of reactor operators and senior reactor operators.

The regulation further specifies the conditions for maintaining the validity of the certificates, and for renewal or withdrawal of the certificates. Finally, the requirements for notification and records are detailed in the revised regulation.

9. Nuclear Energy Ordinance of 10 December 2004 on Nuclear Energy (NEO; RS 732.11).
10. 2003 Nuclear Energy Act (NEA), Article 34(3)(a) (RS 732.1).
11. NEA, Article 104(1)(a).
12. The Regulation on the Certification of Operating Personnel at Nuclear Facilities (FANR-REG-17, Version 1) is available at: www.fanr.gov.ae/en/Documents/FANR-REG17%20V.1%20EN%20-%20BOM%20Version%20Certified.PDF.

Nuclear installations

Licence for the Operation of Unit Four of the Barakah Nuclear Power Plant (Licence No. FANR/NF/2023/004)

On 16 November 2023, FANR granted a licence to Nawah Energy Company Private Joint Stock Company (Nawah) for the operation of Unit 4 of the Barakah Nuclear Power Plant (BNPP) located in the Al Dhafra region of the Emirate of Abu Dhabi in the UAE.[13]

The licence authorises Nawah to commission and operate Unit 4 of the BNPP for 60 years, as well as to conduct a number of regulated activities related to the operation of Unit 4. The issuing of the operating licence for Unit 4 follows licences to operate Units 1, 2 and 3 of the BNPP, granted to Nawah in February 2020, March 2021 and June 2022, respectively. Furthermore, these licences were amended on 16 November 2023 as a consequence of changes to some of the licence conditions in the operating licence for Unit 4.

The decision by the Board of Management of FANR to grant to Nawah the licence to operate Unit 4 of the BNPP was based on FANR's regulatory review and assessment of the operating licence application submitted in March 2017 and further updated in 2022 and 2023. The regulatory review and assessment carried out by FANR aimed to ensure that the application for the licence to operate Unit 4 of the BNPP demonstrates compliance with relevant regulatory requirements, satisfies the relevant principles, objectives and criteria for nuclear safety, radiation protection, nuclear security and safeguards, as well as provides a sufficient safety basis for granting the licence applied for. Such assessment is documented by FANR in the Safety, Security and Safeguards Evaluation Report on the Application for a Licence for the Operation of Unit 4 of the Barakah Nuclear Power Plant.

Licence for the Selection of a Site for the Construction of a Fuel Assembly Fabrication Facility (Licence No. FANR/NF/2023/003)

On 25 July 2023, FANR granted to Emirates Nuclear Energy Company Public Joint Stock Company (ENEC) a licence for the selection of a site for the construction of a fuel assembly fabrication facility.[14] The licence authorises the selection of a site for the construction of a fuel assembly fabrication facility in the UAE, which includes, *inter alia*, regional analysis and identification of potential sites, screening of potential sites and identification of candidate sites. The licence also covers the evaluation of candidate sites to characterise fully site-specific conditions pertinent to the safety and security of a nuclear facility, as well as activities reasonably associated with the foregoing.

In accordance with the licence conditions, the licensee shall provide FANR with a plan and timetable for specific activities to be undertaken under the general authority of this licence at least 30 days prior to commencing such activities. The licensee shall also provide to FANR, within one month of the end of each calendar year, a report on the regulated activity carried out under this licence during the previous year.

Licence for the Selection of a Site for the Construction of a Radioactive Waste Management Facility (Licence No. FANR/WF/2023/005)

On 13 April 2023, FANR granted to ENEC a licence for the selection of a site for the construction of a radioactive waste management facility.[15] The licence authorises the selection of a site for the construction of the radioactive waste management facility in the

13. Licence No. FANR/NF/2023/004 is available at: www.fanr.gov.ae/en/Documents/Unit%204_Operating%20Licence.pdf.
14. Licence No. FANR/NF/2023/003 is available online at: www.fanr.gov.ae/en/Documents/3.Licnece%20of%20Selection%20of%20Site%20for%20Construction%20for%20FAFF_signed.pdf.
15. Licence No. FANR/WF/2023/005 is available online at: www.fanr.gov.ae/en/Documents/4.Licence%20for%20the%20Selection%20of%20a%20Site%20for%20the%20Construction%20of%20a%20Radioactive%20Waste%20Management%20Facility.pdf.

United Arab Emirates, which includes, *inter alia*, regional analysis and identification of potential sites, screening of potential sites and identification of candidate sites. It also covers the evaluation of candidate sites to characterise fully site-specific conditions pertinent to the safety and security of a facility, as well as activities reasonably associated with the foregoing.

In accordance with the licence conditions, the licensee shall provide FANR with a plan and timetable for specific activities to be undertaken under the general authority of this licence at least 30 days prior to commencing such activities. The licensee shall also provide to FANR, within one month of the end of each calendar year, a report on the regulated activity carried out under this licence during the previous year.

United States

Environmental protection

Revisions to the National Environmental Policy Act

On 3 June 2023, President Biden signed into law the Fiscal Responsibility Act of 2023 (the Act).[16] Although the Act's primary purpose relates to federal government spending, the Act also includes provisions substantively amending the United States (US) National Environmental Policy Act of 1969 (NEPA).[17] Since its enactment in 1970, NEPA has required all federal agencies to assess the environmental effects of their proposed actions prior to making decisions. Specifically, NEPA requires federal agencies, prior to taking any "major Federal actions significantly affecting the quality of the human environment", to prepare a "detailed statement", referred to as an environmental impact statement (EIS). An EIS must describe, among other things, the environmental impacts of the proposed action; any adverse environmental effects that cannot be avoided if the action is taken; and alternatives to the proposed action. The US Nuclear Regulatory Commission (NRC) has implemented NEPA into its regulations at Part 51 of Title 10 of the US *Code of Federal Regulations* (CFR), "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions". These regulations identify which NRC regulatory actions require the preparation of an EIS and the process by which an EIS is prepared by the NRC staff, including procedures for public participation.

Some of the Act's notable amendments to NEPA include:

- defining "major federal action" (the threshold for triggering the applicability of NEPA), a term that previously was not defined in the legislation;[18]
- providing new guidelines for agencies to make threshold determinations of whether a NEPA review is required at all, including (among other determinations) whether preparation of a NEPA document would "clearly and fundamentally conflict with the requirements of another provision of law" or whether the proposed agency action is "nondiscretionary" such that the agency "does not have authority to take environmental factors into consideration in determining whether to take the proposed action";[19]
- codifying the requirement for an EIS to consider the "reasonably foreseeable" environmental effects of a proposed action, the "reasonably foreseeable" effects that cannot be avoided, and a "reasonable range" of alternative actions that are "technically and economically feasible";[20]

16. Public Law (Pub. L.) No. 118-5, 137 Stat. 10.
17. *Ibid.*, sec. 321, 137 Stat. 38-46. NEPA is codified at 42 *United States Code* (USC) 4321 *et seq.*
18. *Ibid.*, sec. 111(10), 137 Stat. 45.
19. *Ibid.*, sec. 106(a), 137 Stat. 39.
20. *Ibid.*, sec. 106(b), 137 Stat. 39.

- providing judicially enforceable time limits for the completion of an EIS (no later than two years after the agency determines that the EIS is required) or the completion of an environmental assessment[21] (one year after determining the assessment is required);[22]
- requiring that an environmental assessment not exceed 75 pages and that an EIS not exceed 150 pages (or 300 pages if a proposed agency action is "of extraordinary complexity");[23]
- codifying the practice of designating a "lead agency" with primary responsibility for the NEPA review where two or more federal agencies qualify as a "participating federal agency" with respect to the same major federal action;[24] and
- requiring that agencies develop procedures for the applicant or sponsor of a project to prepare the EIS or environmental assessment under the federal agency's supervision, with the agency retaining responsibility to independently evaluate its contents.[25]

The NRC is implementing these legislative changes and reviewing its procedures to determine what, if any, further changes to the agency's current NEPA practices may be warranted.

Licensing and regulatory infrastructure

Decommissioning financial assurance rule for sealed and unsealed radioactive materials

On 24 July 2023, the NRC staff sought Commission approval to publish a proposed rule concerning the NRC's regulations for decommissioning financial assurance for sealed and unsealed radioactive materials.[26] The purpose of decommissioning financial assurance regulations is to ensure that adequate funds are available for decommissioning of licensed nuclear facilities in a safe and timely manner. Existing NRC regulations require applicants for a licence to possess and use sealed and unsealed by-product material and special nuclear material in certain quantities to submit to the NRC a "decommissioning funding plan" (DFP) that contains, among other things, a detailed cost estimate for decommissioning and a description of the licensee's method for assuring the availability of decommissioning funds over the life of the facility.[27] To determine whether a DFP is required, NRC regulations direct applicants to Appendix B to 10 CFR Part 30, which is a table that lists radionuclides and quantity limits. An applicant must submit a DFP to the

21. An "environmental assessment" is a concise public document, shorter than an EIS, that an agency uses to determine whether a proposed federal action has the potential to cause significant environmental impacts. If the environmental assessment concludes that an action will not have significant environmental impacts, the agency issues a Finding of No Significant Impact and its NEPA review is complete. If the environmental assessment concludes that the environmental impacts of the proposed federal action will be significant, the agency then proceeds with an EIS.
22. Pub. L. No. 118-5, sec. 107(g), 137 Stat. 42.
23. These page limits do not include any citations or appendices.
24. Pub. L. No. 118-5, sec. 107(a), 137 Stat. 40.
25. *Ibid*., sec. 107(f), 137 Stat. 42.
26. Memorandum for the Commissioners from Daniel H. Dorman, EDO (24 July 2023), "Proposed Rule: Decommissioning Financial Assurance for Sealed and Unsealed Radioactive Materials (3150-AK52; NRC-2017-0031)", SECY-23-0062 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML23010A168). ADAMS is the NRC's official system for accessing publicly available documents. Documents referenced with an ADAMS number can be accessed via the NRC's ADAMS website, at: https://adams.nrc.gov/wba/, using the "Advanced Search" option and searching for the "Accession Number".
27. See 10 Code of Federal Regulations (CFR) 30.35 (by-product material); *ibid*., sec. 70.25 (special nuclear material).

NRC when the quantity of sealed or unsealed radionuclides exceeds the value in Appendix B by a magnitude specified in NRC regulations. For radionuclides that are not specifically listed in Appendix B, the table provides default possession values.

The NRC's draft proposed rule would add radionuclides not currently listed in Appendix B, including radionuclides associated with existing and emerging industrial and medical applications, such as germanium-68. The draft proposed rule would also revise the NRC's decommissioning funding requirements so that they are more risk-informed[28] and based on the cost of disposal and relative risk to public health and safety. The draft proposed rule would also remove all radionuclides with a half-life of 120 days or less from Appendix B to make clear that such radionuclides are not subject to decommissioning financial assurance requirements.

If approved by the Commission for publication, a proposed rule would be published in the *Federal Register* for public comment. The NRC staff also plans to hold a public meeting to promote full understanding of this proposed rule and facilitate public comments.

Nuclear safety and radiological protection (including nuclear emergency planning)

Approval of final rule for emergency preparedness for small modular reactors and other new technologies

The Commission has directed the NRC staff to issue a final rule (Final Rule) and associated regulatory guidance that provides an alternative, risk-informed, performance-based emergency preparedness regulatory framework for small modular reactors (SMRs) and other new technologies.[29] These technologies include non-light-water reactors, research and test reactors, and medical radioisotope facilities.

The Final Rule was published in the *Federal Register* in November 2023.[30] It builds on the NRC's existing emergency preparedness programme for large, light-water cooled nuclear power reactors. The Final Rule and related guidance address how state-of-the-art facility designs and safety research apply to future operation of SMRs and other new technologies.

The Final Rule's emergency preparedness framework adopts a technology-inclusive and consequence-oriented approach, in recognition of the fact that potential hazards from SMRs or other new technologies could differ substantially from those posed by large light-water reactors (for example, smaller reactor core sizes, lower probability of severe accidents, slower accident progression and smaller accident offsite consequences). The Final Rule includes a scalable method to determine the size of the offsite emergency planning zone around a facility. Applicants and licensees for SMRs and other new technologies can use the Final Rule in developing a performance-based emergency preparedness programme as an alternative to the current radiological emergency planning requirements. The Final Rule does not change the emergency planning regulatory framework for large light-water reactors (greater than 1 000 megawatts thermal), fuel cycle facilities, or currently operating research and test reactors.

28. As part of this update, the NRC is updating the basis for the values in Appendix B to 10 CFR Part 30, from International Commission on Radiological Protection (ICRP) Publications 2-26 and 30, that have served as the basis for 10 CFR Part 20.
29. Memorandum to Daniel H. Dorman, EDO, from Rochelle C. Bavol, Acting Secretary (14 Aug. 2023), "SRM-M230814 – Affirmation Session – SECY-22-0001: Rulemaking: Final Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies", (ADAMS Accession No. ML23226A184). See also Memorandum for the Commissioners from Daniel H. Dorman, EDO (3 Jan. 2022), "Final Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies (RIN 3150-AJ68; NRC-2015-0225)", SECY-22-00001 (ADAMS Accession No. ML21200A059).
30. Emergency Preparedness for Small Modular Reactors and Other New Technologies, 88 *Federal Register* 80050 (16 Nov. 2023).

INTERGOVERNMENTAL ORGANISATION ACTIVITY

Euratom Atomic Energy Community (Euratom)

Euratom Community activities

According to Article 33 of the Euratom Treaty, the European Commission is entrusted with making appropriate recommendations for harmonising the provisions applicable in the field of basic safety standards, including radiation protection, across the member states. To this end, it recently adopted two Recommendations, detailed below.

Commission Recommendation (Euratom) 2024/440 of 2 February 2024 on the use of dose coefficients for the estimation of the effective dose and equivalent dose for the purposes of Council Directive 2013/59/Euratom [1]

In February 2024, Commission Recommendation (Euratom) 2024/440 was adopted, with the aim of supporting the implementation of the Basic Safety Standards Directive's[2] requirements on individual monitoring of the radiation exposure of all radiation workers in the European Union (EU), be it in the nuclear, medical, research or industrial sector, as well as workers exposed to enhanced levels of natural radiation. It recommends the use of dose coefficients based on the latest international scientific developments for the estimation of the equivalent and effective dose received by workers from intakes of radionuclides and aims to help national authorities across the EU to assess, in a consistent manner, workers' internal radiation exposure.

More specifically, the Basic Safety Standards Directive requires that the exposure of occupationally exposed workers is assessed for each worker individually based on measurements. The calculation of radiation doses from such measurements relies on scientifically established values and relationships, called "dose coefficients", which are published by the International Commission on Radiological Protection (ICRP). ICRP recommendations form the basis of radiological protection policy, regulations and practice worldwide.

At the time of the entry into force in the EU of the Basic Safety Standards Directive in January 2014, the ICRP had already published dose coefficients for external exposure, the application of which the Directive expressly imposes on member states. However, as regards internal exposure, such dose coefficients were still to be developed and published by the ICRP. The Directive refers to these "missing" dose coefficients in one of its recitals, where it is stated that the Commission will invite the Group of Experts laid down in Article 31 of the Euratom Treaty[3] to monitor scientific developments, and that the Commission "will make recommendations on any updated values, relationships and coefficients, including those for exposure to radon, taking relevant opinions of the group of experts into account".

1. Available at: https://eur-lex.europa.eu/eli/reco/2024/440.
2. Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom, *Official Journal of the European Union* (OJ) L 13 (17 Jan. 2014) (Euratom Basic Safety Standards).
3. Namely a group of independent radiation protection and public health experts, which helps the Euratom Community develop legislation in the field of basic safety standards, which includes radiation protection.

In 2022, the ICRP completed a five-volume series of ICRP Publications on Occupational Intakes of Radionuclides[4] offering an updated set of dose coefficients for occupational exposure for some radionuclides, including radon. Following these ICRP publications, the Commission asked the Article 31 Group of Experts to issue an Opinion on the use of this set of ICRP dose coefficients. This Opinion was published in June 2023. The Article 31 Group of Experts' conclusion was that the above-mentioned series of ICRP publications, and all the dose coefficients therein, should be used in the estimation of the effective dose and equivalent dose for the purpose of the Basic Safety Standards Directive.

Commission Recommendation (Euratom) 2024/1112 of 18 April 2024 on clinical audits of medical radiological practices carried out pursuant to Council Directive 2013/59/Euratom[5]

In April 2024, the Commission adopted a Recommendation on clinical audits of medical radiological practices, aiming to help member states comply with the obligations set out at the EU level in the Basic Safety Standards Directive, which requires member states to carry out such clinical audits in accordance with national procedures.

The Commission has been systematically reviewing the status of implementation of clinical audits in the EU and found variable, and often lacking, clinical audit practices across member states. It also identified potential barriers and areas of future work for enhancing clinical audit implementation.

The Recommendation recognises clinical audits as an important tool to ensure quality and safety and provides specific measures and good practices regarding the set up and maintenance of a national audit system in radiology, radiotherapy, and nuclear medicine, thus contributing to delivering safe and high-quality diagnostic and therapeutic radiological procedures to European patients. It promotes harmonisation and correct implementation of clinical audits of medical radiological procedures across the EU, for the benefit of patients, healthcare practitioners and the public, and also helps national authorities establish the necessary framework and infrastructure, train auditors, and develop standards and criteria for good clinical practice.

This work is part of the Strategic Agenda for Medical Ionising Radiation Applications (SAMIRA) action plan,[6] the EU's first initiative to support a safe, high quality and reliable use of radiological and nuclear technology in healthcare. The SAMIRA action plan defines EU actions in three priority areas: securing the supply of medical radioisotopes, improving radiation safety and quality in medicine, and facilitating innovation and the technological development of medical ionising radiation applications. SAMIRA is supported by the Steering Group on Quality and Safety (SGQS) of medical applications of ionising radiation, an expert group which brings together representatives of EU health and radiation protection authorities. In 2023, the SGQS prepared a Position Paper, which served as a basis for this Commission Recommendation.

4. The first part of the series was published in 2015. ICRP (2015) Occupational Intakes of Radionuclides: Part 1, ICRP 130, Ann. ICRP 44(2). Part 5 was published in 2022. ICRP (2022), Occupational Intakes of Radionuclides: Part 5. ICRP Publication 151, Ann. ICRP 51 (1–2).
5. Commission Recommendation (Euratom) 2024/1112 of 18 April 2024 on clinical audits of medical radiological practices carried out pursuant to Council Directive 2013/59/Euratom, OJ L 2024/2112 (22 Apr. 2024).
6. European Commission (2021), "SAMIRA: Strategic Agenda for Medical Ionising Radiation", SWD (2021) 14, European Commission, Brussels, available at: https://energy.ec.europa.eu/topics/nuclear-energy/radiological-and-nuclear-technology-health/samira-action-plan_en.

International Atomic Energy Agency

Nuclear safety

Convention on Nuclear Safety (CNS)

The Second Meeting of the Working Group on Effectiveness and Efficiency of the CNS was held on 19-21 March 2024. At the meeting, the participating contracting parties (CPs) to the CNS supported all proposals in principle but identified a need for further refinement. All CPs who submitted proposals agreed to continue their work and other CPs made additional offers of collaboration.

The final report of the Chairperson, Carl-Magnus Larsson (Vice-President of the Joint Eighth and Ninth Review Meeting), on the deliberations of the working group will be submitted to the President of the Joint Eighth and Ninth Review Meeting prior to the Tenth Organizational Meeting, which will be held on 5 September 2024. The Chairperson's final report will then be presented at the Tenth Organizational Meeting.

Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention)

The Fifth Extraordinary Meeting of the Contracting Parties to the Joint Convention was held on 25-26 March 2024. The purpose of the Fifth Extraordinary Meeting was to discuss potential changes to the guidelines of the Joint Convention to achieve uniform identification of Good Practices. The CPs agreed by consensus to several proposals, for instance, how to address Good Practices and Areas of Good Performance in the National Report and how to enhance the identification of Good Practices in the Country Group Sessions. They also agreed to enhance training for other Officers in this regard and to develop an awarded Good Practices Database.

The Organizational Meeting for the Eighth Review Meeting of the Contracting Parties to the Joint Convention was held on 27-28 March 2024. At the meeting, the CPs, *inter alia,* elected the President and the two Vice-Presidents for the Eighth Review Meeting of the Contracting Parties to the Joint Convention. Mr Ramzi Jammal (Canada) was elected as President for the Eighth Review Meeting by consensus of the CPs. Mr Jean-Luc Lachaume (France) and Ms Erica Bickford (United States) were elected as Vice-Presidents to the Eighth Review Meeting. The CPs established eight Country Groups and assigned all CPs thereto by using a new method that was adopted at the Fourth Extraordinary Meeting in 2022. The CPS selected other Officers – namely a Chairperson, Vice-Chairperson, Rapporteur and Coordinator – for each Country Group. They also decided to hold a topical session on "Knowledge Management related to long term management of disused sealed sources, radioactive waste and spent fuel" at the Eighth Review Meeting. In addition, the CPs agreed to invite the signatory states, namely Lebanon and the Philippines, to observe select parts of the Eighth Review Meeting, i.e. the opening plenary session and the portion of the closing plenary session at which the Summary Report is adopted.

Promotional activities

The Workshop to Promote the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and the Convention on Nuclear Safety was held in Vienna from 23-25 October 2023.

Nuclear security

Outreach on the Convention on the Physical Protection of Nuclear Material (CPPNM) and its Amendment (ACPPNM)

The Agency continued to promote further adherence to and full implementation of the CPPNM and ACPPNM through national workshops and awareness missions. In addition,

the Agency convened the annual technical meeting of CPPNM and ACPPNM points of contact from 31 October to 1 November 2023. The meeting gave participants the opportunity to discuss experiences, lessons learnt and challenges in implementing the CPPNM and the ACPPNM. Immediately following the points of contact meeting, from 2 to 3 November 2023, the Agency held, for the first time, a technical meeting to promote the universalisation of the ACPPNM. This event allowed parties to the ACPPNM, parties to the original CPPNM only, and non-parties to exchange views and experiences with a view to supporting universal adherence to the CPPNM and ACPPNM.

The fourth International Conference on Nuclear Security was held at IAEA Headquarters from 20-24 May 2024. As part of the Ministerial Segment, ministers and other heads of delegation participated in an interactive session highlighting the importance of the relevant international legal instruments, including the CPPNM and ACPPNM. In addition, a number of technical sessions focussed on aspects of the legal framework for nuclear security, including a high-level panel on "Policy, Law and Regulations in an Evolving Nuclear Security Landscape".

Nuclear liability

The IAEA conducted a Regional Workshop on Civil Liability for Nuclear Damage for Latin America as an International Expert Group on Nuclear Liability (INLEX) outreach activity for the Latin America and the Caribbean Region in Rio de Janeiro, Brazil on 23-27 October 2023. Apart from IAEA staff and experts, the workshop was attended by 32 participants.

The 24th regular meeting of the International Expert Group on Nuclear Liability (INLEX or Group) took place at IAEA Headquarters from 28-30 May 2024. At the meeting, the Group discussed, *inter alia*, the geographical scope of the 2004 Paris Convention, the 1963 and 1997 Vienna Conventions and the Convention on Supplementary Compensation for Nuclear Damage (CSC). The Group also discussed the understanding of the term "for use" provided in the 2014 IAEA Board of Governors resolution (GOV/2014/63, derestricted 2017-06-09) on the exclusion of small quantities of nuclear material from the scope of the 1963 and 1997 Vienna Conventions and the CSC, and the related 2016 NEA Steering Committee decision. In addition, the Group discussed the compensation of radiation exposures under the international nuclear liability regimes, nuclear liability in situations of armed conflict, as well as the operator's right of recourse under the nuclear liability conventions and the current liability limits of the Contracting Parties to the 1963 Vienna Convention.

On 27 May 2024, a Workshop on Civil Liability for Nuclear Damage for diplomats from IAEA member states was held at IAEA Headquarters with the assistance of INLEX members. The purpose of the workshop was to provide the diplomats with an opportunity to gain further knowledge about the international legal framework on nuclear liability.

Legislative assistance

The Agency continued to provide legislative assistance to member states to support the establishment of an adequate and comprehensive national nuclear legal framework and to promote adherence to the relevant international legal instruments. The Agency provided such assistance through national workshops and awareness-raising activities. Specific bilateral legislative assistance was also provided to several member states through written comments and advice on the preparation of national nuclear legislation.

In addition, the Agency conducted a Training on International and National Nuclear Law for Representatives of the Teaching Faculties of Academic Institutions on 20-24 November 2023 at IAEA Headquarters in Vienna, Austria. The training was attended by 12 participants. This training was conducted as part of the process of implementing the IAEA's University Partnership Programme on Nuclear Law.

OECD Nuclear Energy Agency

Meeting of the NEA Nuclear Law Committee (NLC)

The NLC met in person and online on 3-4 April 2024 to review the activities of the NEA Division of Nuclear Law and the NLC working parties on nuclear liability and transport, nuclear liability and radioactive waste disposal facilities, and the legal aspects of nuclear safety. The meeting was attended by 57 participants representing 23 NEA member countries, the European Union (EU), the International Atomic Energy Agency (IAEA) and the insurance industry, as well as two non-member invitees: the People's Republic of China (China) and the United Arab Emirates (UAE).

The meeting featured reports on the latest national developments in nuclear law in China, Spain, Sweden, the United Arab Emirates, the United Kingdom and the United States, a report from the Japanese delegation on the status of lawsuits for compensation for nuclear damage related to the Fukushima Daiichi Nuclear Power Plant accident and a presentation by nuclear insurance experts on the impact of the ongoing conflict in Ukraine on nuclear liability for nuclear installations. The meeting also featured sessions on evolving the NLC and its working parties, as well as status reports on new initiatives, such as the Women in Nuclear Law Initiative, established under Women in Nuclear Global, and the Working Group on Re-establishing Nuclear Law Education Programmes, established under the NEA Global Forum on Nuclear Education, Science, Technology and Policy.

To conclude the event, a reception was held to honour the retirement of Mr Roland Dussart-Desart as Chair of the NLC, a position in which he has served since 2004. NLC delegations and the NEA Secretariat expressed their gratitude to Mr Dussart-Desart for his 20 years of dedicated service as Chair and more than 35 years of participation as a representative of Belgium.

Meeting of the NEA Working Party on Nuclear Liability and Transport (WPNLT)

The WPNLT met in person and online on 2 April 2024 to discuss and review its ongoing work on the practical challenges related to the nuclear liability regimes applicable to transport and transit of nuclear substances. The meeting was attended by 49 participants from 17 NEA member countries, the EU, the IAEA, representatives from the nuclear insurance industry and participants from non-member invitees: China and the UAE. Representatives of the International Nuclear Law Association, World Nuclear Association and World Nuclear Transport Institute also participated by reporting on their activities related to nuclear transport.

The meeting featured a topical session on the relationships between international commercial terms, different frameworks applicable to international carriage of dangerous goods and nuclear liability regimes. Also, an expert from the nuclear industry presented on increased liability amounts for the transport of nuclear substances and other relevant insurance challenges, and there was a fruitful discussion on the overlap of nuclear liability conventions in the case of international transport.

Meeting of the Contracting Parties to the Paris Convention (CPPCs)

The CPPCs met in person and online on 5 April 2024 with 13 participants from 8 CPPCs to discuss their respective national legislative and administrative processes and the status of financial securities following the entry into force of the 2004 Protocols to amend the Paris and Brussels Supplementary Conventions, with a focus on actions to be undertaken. Additionally, the CPPCs discussed several nuclear liability-related matters, including the application of the Paris Convention to nuclear incidents on the high seas and in international airspace and reciprocity conditions under Article 2(a)(iv) of the Paris Convention. Additionally, the Secretariat provided updates on the activities of the Working Group on the Conditions to Call upon the Supplementary Funds Pursuant to the Brussels Supplementary Convention, the Working Group on Fusion and the Possibility of its Inclusion within the

Scope of the Paris Convention, and the Expert Group on Nuclear Installations for the Decay Storage of Certain Types of Low-level Short Lived Radioactive Waste.

2024 International Nuclear Law Essentials (INLE)

The 11th edition of the INLE course was held in Paris, France on 4-8 March 2024 with a diverse group of 61 professionals from 19 countries, the largest number of participants to ever attend an INLE course. Renowned specialists in nuclear law from international organisations, governments, academia and private industry delivered the INLE's intensive programme, which consisted of a series of lectures, case studies and panel discussions. The classes, designed for participants of different backgrounds and career levels, touched on all aspects of nuclear law, including nuclear safety; management of spent fuel and radioactive waste; environmental protection; transport; nuclear security; non-proliferation; safeguards; nuclear liability; and international trade.

NEA publications of interest

Since the publication of *Nuclear Law Bulletin* No. 111, the NEA has issued a number of publications of interest.

On 8 February 2024, the *Workshop Proceedings of the Third International Workshop on the Indemnification of Damage in the Event of a Nuclear Accident* held in Bratislava, Slovak Republic, 18-20 October 2017, organised in co-operation with the Nuclear Regulatory Authority of the Slovak Republic, was published. The workshop offered a unique opportunity to explore the practical application of international nuclear liability instruments and the potential consequences with regard to non-convention states in the case of a nuclear incident. Discussions focused on the legal aspects of compensating victims who suffered nuclear damage due to a nuclear incident that occurred at a land-based nuclear power plant and caused transboundary damage.

The Second Edition of *The NEA Small Modular Reactor Dashboard* (NEA SMR Dashboard) was published on 28 February 2024, expanding upon the first edition and bringing the total number of assessed SMRs to 56. The second edition of the *NEA SMR Dashboard* provides a comprehensive assessment of the progress made by SMR designers and companies worldwide. Looking beyond technical feasibility, the *NEA SMR Dashboard* assesses progress towards first-of-a-kind commercial deployment across six dimensions: licensing, siting, financing, supply chain, engagement and fuel. The *NEA SMR Dashboard* reveals substantial progress towards SMR deployment and commercialisation in NEA and non-NEA member countries, with a subset of designs in more advanced stages of commercialisation and deployment.

The NEA has also published multiple reports of particular interest to nuclear regulators. *Practices for Enhancing Leadership for Safety in Regulatory Bodies*, published on 12 March 2024, presents practical guidance to enhance leadership for safety in nuclear regulatory bodies. It identifies the effective characteristics, competencies and behaviours of leaders in regulatory bodies that have a healthy safety culture and lays out programmes and processes that can continuously improve that safety culture. *The Mutual Impact of Nuclear Regulatory Bodies and License Holders from a Safety Culture Perspective*, also published on 12 March 2024, examines the factors and mechanisms by which nuclear regulatory bodies and site license holders influence the safety culture of the other. It presents a model, accountability-oriented, enabling regulation, for a regulatory body's approach to foster a licensee's accountability for safety. This approach builds on the concept of performance (or outcome) based regulation, but also includes a focus on risk (or hazard), processes, and licensee self-assessment. Finally, *Characteristics of a Trusted Nuclear Regulator*, published on 17 April 2024, serves as a practical guide to explain the organisational characteristics, attributes and ways of thinking that can help a nuclear regulator build and maintain trust with interested stakeholders and the public. It offers examples of actions and activities that can be taken to demonstrate those characteristics in practice.

NEWS BRIEFS

2024 International School of Nuclear Law (ISNL)

The next session of the ISNL will take place in Montpellier, France, from 26 August to 6 September 2024. Held by the Nuclear Energy Agency (NEA) in co-operation with the University of Montpellier, the two-week ISNL course is designed to provide participants with a practical and comprehensive understanding of the various interrelated legal issues relating to the safe and peaceful use of nuclear energy. Renowned specialists in nuclear law from international organisations, governments, academia and private industry will deliver the ISNL's intensive programme, which consists of a series of lectures, case studies, group workshops and panel discussions. Participants who attend the programme, successfully complete a multiple-choice test and submit a dissertation can apply for a University Diploma in International Nuclear Law from the University of Montpellier.

25th Nuclear Inter Jura Congress

Organised jointly by the International Nuclear Law Association (INLA) and the Lower Silesian Institute for Energy Studies (DISE Energy), the 25th Nuclear Inter Jura Congress will be held on 3-7 November 2024 in Poland. The biannual conference promotes the study of legal issues associated with the peaceful use of nuclear power by bringing together representatives of government, nuclear specialists, legal practitioners, academics and others involved in nuclear law to exchange information and explore new solutions to contemporary challenges. This year's conference focuses on the examination of advanced nuclear technologies, legal challenges and regulatory effectiveness, boosting local content and supplier development and path forward for the Polish nuclear power programme.

RECENT PUBLICATIONS

Legal Challenges Related to Nuclear Safety (2024), by the NEA

The peaceful uses of nuclear power can often give rise to legal challenges, with each country's framework for addressing these challenges affected by the particularities of its national legal system. Because each country's national legal structure is distinct, it is important for lawyers, as well as lawmakers and policymakers, to have a comparative understanding of the different frameworks for legal challenges. While there are numerous reports and articles on international comparative law, *Legal Challenges Related to Nuclear Safety* (the Legal Challenges Report) is the first report of its kind to comprehensively address existing various legal frameworks as they apply specifically to nuclear safety.

The aim of the report is to provide insights into the various frameworks for legal challenges related to nuclear safety and, without making any general recommendations, identify commonalities and differences that contribute to different countries' approaches. By collecting information from 24 NEA member and non-member countries, this report provides an overall review of the different approaches taken by countries to legal challenges related to nuclear safety, as well as nearly 40 case summaries by 11 different countries and an extensive chart of nuclear law cases from 1987 through 2023.

Based on a survey prepared by the NEA Secretariat in consultation with the Working Party on the Legal Aspects of Nuclear Safety (WPLANS), the report seeks to identify for each country:

- the types of procedures available for legal challenges related to nuclear safety;
- the stages of the legal process;
- the identification of the parties to proceedings and the method by which they become parties; and
- the types of decision/actions related to nuclear safety that can be challenged.

The responses to the survey were compiled by the NEA Secretariat and organised into two chapters. Chapter 1 presents the different approaches taken by the responding countries, with country-specific vignettes to highlight informative examples of certain aspects. A comprehensive analysis of the information provided by the responding countries offers the following insights:

- Every reporting country allows for legal challenges related to nuclear safety, with most countries having seen such challenges manifest.
- While some countries have specific procedures to challenge nuclear safety, laid out in specific legislation or regulations, most do not and are guided by procedures of general application, such as rules of administrative procedure.
- The vast majority of responding countries provide an opportunity to challenge a number of licensing actions and at least certain aspects related to long-term operation.
- A majority of responding countries have a requirement that the public be informed of their rights to challenge specific decisions or actions.
- The vast majority of responding countries allow individuals to raise a challenge to nuclear safety, while groups of individuals who are not part of a formal group or

organisation can bring challenges in a slight majority of responding countries, with some requiring a showing of "commonality" in action, harm or argument. Some non-governmental organisations (NGOs) are entitled to raise a challenge in a vast majority of responding countries, but the countries differ in how they define an NGO and what types of NGOs are permitted to bring certain types of challenges.

- The vast majority of responding countries impose a statute of limitations, or prescription period, requiring that a challenge be raised within specific time limits. In countries that impose such limits, the periods ranged from 15 days to 10 years, with an average period of 30-60 days.
- There are significant differences among the responding countries as to how proceedings are conducted, with different types of challenges subject to different procedural rules.
- The most commonly indicated legal remedy is to remand the decision to the original decision-maker for reconsideration, with many countries allowing for overturn of the original decision.
- Damages can be awarded in a slight majority of responding countries and criminal penalties may be imposed in just under half of responding countries.
- A majority of countries allow for the suspension or revocation of a licence/authorisation/permit and a slight majority of countries allow for a decision to result in amendment to a licence/authorisation/permit.
- Some responding countries allow courts to amend or repeal a law/rule/regulation/decree, while a few also permit a court to issue a new law/rule/regulation/decree.
- The vast majority of responding countries award legal fees to the prevailing party.
- The length of legal proceedings varied greatly between responding countries and depending on the subject matter, with just under half of countries reporting an average of one to three years.

Chapter 2 provides a compendium of 39 representative cases from 11 countries, with the cases organised into defined categories:

- new reactor licensing;
- long-term operation;
- reactor restart following a non-routine shutdown;
- other licensing and regulatory actions;
- decommissioning activities;
- storage and disposal of radioactive waste; and
- legislative claims.

The Report also contains annexes with a chart of cases and a list of all relevant laws and decrees related to the subject matter of the report for each reporting country. With the information gathered, this report can ultimately serve as a resource for future exchanges concerning legal challenges related to nuclear safety, with a view to further developing and strengthening the collective understanding of existing legal frameworks.

The report can be downloaded at: www.oecd-nea.org/jcms/pl_91598/legal-challenges-related-to-nuclear-safety.

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The following articles are featured in this issue: "Atoms for Peace in a time of international conflict: Assessing the legal situation of nuclear power plants under belligerent occupation" by Emiliano Buis, "Nuclear rhetoric and response: A historical analysis of Australia's nuclear law evolution considering global events and the AUKUS partnership" by Kirsty Braybon, "A legal analysis for a future regulatory framework for fusion energy in Japan" by Takakazu Kimura. The issue also features a note: "Reciprocity principle under the nuclear third party liability conventions".

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