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International Nuclear Security Law: The Use of 'Soft Law'

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[Summary]

International nuclear security law includes treaties such as the Convention on the physical protection of nuclear material and its amendment (A/CPPNM), as well as a series of soft law instruments, such as the International Atomic Energy Agency's (IAEA) Nuclear Security Series (NSS). These treaties and law instruments function as guidelines providing policy direction and ensuring that the various nuclear facilities are properly protected.

Traditionally, soft law has been typified by its flexibility and normativity. However, within the field of nuclear security law, nuclear security is mainly assessed using instruments that are properly implemented by relevant regulatory authorities or operators (in the case of soft law instruments), and regulatory bodies are given the authority to order operators to comply with mandatory instruction on the level of municipal law. This delegation of authority is necessitated by the potentially serious consequences of nuclear and radioactive material, as well as the associated facilities and activities. When the provisions of such instruments are transposed into municipal law, they somewhat function as hard laws despite having originated in international soft law. This is because nuclear security is a sensitive topic intimately related to national security.

In conclusion, this unique combination of legally binding instruments and non-legally binding ones, which are often converted into legally binding document as per municipal law in the case of Japan, enables robust control over nuclear security while also providing sufficient flexibility to ensure that a variety of nuclear facilities can fully adapt to the conditions required to protect these facilities.

[Keywords] Nuclear security, Nuclear safety, soft law, Amendment to the Convention on the physical protection of nuclear material, IAEA.

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1. Introduction

International nuclear security law includes hard laws such as the Convention on the Physical Protection of Nuclear Material (CPPNM), the amendment to this convention (A/CPPNM), and the International Convention on the Suppression of Acts of Nuclear Terrorism (INCSANT). There are also soft law instruments, such as the International Atomic Energy Agency's (IAEA) Nuclear Security Series (NSS), which advise on issues related to nuclear security. The situations of nuclear facilities in member states of the IAEA vary greatly. Moreover, member states have diverse municipal legal systems. Therefore, to cover all nuclear facilities, Article 2, Paragraph 2 of the A/CPPNM stipulates that '[t]he responsibility for the establishment, implementation, and maintenance of the physical protection within the State Party rests entirely with the States'.

An international nuclear security regime must be formulated in a way that enables it to adapt to a wide variety of nuclear facility environments. Therefore, compared to legally binding and rigid documents, such as the A/CPPNM and the ICSANT, flexible soft law instruments are more suitable for the application of respective norms in accordance with the different situations of member states. Many nuclear security issues are covered by international agreements; however, more technical but important details are often covered by non-legally binding instruments, such as soft law instruments, all of which provide adequate flexibility to adjust in various environments of member states. Nuclear security law is implemented at the national and international levels through the combination of hard and soft laws, which are often converted into a law of legally binding character at the municipal level, to address the variety of nuclear facilities within the member states of the IAEA.

This article first examines legally binding documents related to nuclear security. Next, it clarifies how nuclear security laws differ from other types of soft laws; it also examines transportation-related standards, such as the regulatory instruments of the International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO), at the operational level. Subsequently, the article examines other types of international soft law instruments related to nuclear security. Finally, the article considers extraordinary circumstances related to nuclear security, particularly those caused by Russian aggression in Ukraine, where nuclear security is a pressing topic. The objective of this paper is to provide an overview of the application of international hard and soft laws to the topic of nuclear security and examine their implementation and interactions at the municipal level.

Regulations concerning the safe transport of radioactive materials and their

implementation'¹ include both legally and non-legally binding documents. The IAEA has issued documents on nuclear security in discussions with the Board of Governors of the IAEA. A book titled *International Arms Control Law and the Prevention of Nuclear Terrorism*² was published by Jonathan Herbach, who is currently a legal officer in the IAEA. This book is important not only for practitioners but also for academics in this field. In addition, the IAEA published several guidance documents useful for the study of NSS documents,³ and such soft law and 'agreed standard' documents allow for smooth transposition into national legal systems at the state level. For example, as Herbach mentions, the focus on specific acts—that is, 'criminal or intentional unauthorised acts'—concerns domestic law, particularly regarding the contravention of authorisation.⁴

2. Defining Nuclear Security and Soft Law

Nuclear security instruments are constituted of both legally binding as well as typical soft law documents, which include agreed standards and ethical documents that cover nuclear security culture⁵ and other contents. Before examining specific instruments related to nuclear security, this section defines the basic yet essential concepts of nuclear security and soft law.

The NSS glossary defines nuclear security as '[t]he prevention of, detection of, and response to, criminal or intentional unauthorised acts involving or directed at nuclear material, other radioactive material, associated facilities, or associated activities'.⁶

The term nuclear security originally derives from nuclear safety, which is defined as '[t]he achievement of proper operating conditions, prevention of accidents, and mitigation of accident

¹ 'Legally binding and non-binding international instruments and regulations concerning the safe transport of radioactive materials and their implementation', IAEA 2017, 1–58. This document is in the public domain of the internet; however, it was originally produced for the discussion of the Board of Governors as a revised version of GOV/1998/17. Many documents, such as the IAEA's NSS have been published. However, these documents are not discussed in this work, as they cover only related instruments published before 1998. However, the IAEA's NSS is a useful reference for major instruments, such as the international legal framework for nuclear security (IAEA International No. 4, IAEA, 2011). The updated database is maintained by the IAEA secretariat.

² J. Herbach, 'International Arms Control Law and the Prevention of Nuclear Terrorism', Cheltenham Edward Elgar Publishing, 1–246.

³ N (1). NSS documents are useful resources that are easily adapted to each country because they are not legally binding documents and are modified in accordance with the surrounding situation in each country and at each type of facility.

⁴ N(2). J. Herbach, 'International Arms Control Law and the Prevention of Nuclear Terrorism', 4.

⁵ IAEA Doc. NSS No. 7 Implementing Guide, 'Nuclear Security Culture', 2008, 1–37.

Although this document was published as part of the nuclear security series, it provides guidance on nuclear security culture and contains ethical suggestions on the implementation of nuclear security. It should be noted that 'nuclear security' is referred to as the 'fundamental principal E' in Paragraph 3 of Article 2A of the A/CPPNM; originally, however, it was a soft law-type concept.

⁶ IAEA Nuclear Safety and Security Glossary: Terminology Used in Nuclear Safety, Nuclear Security, Radiation Protection and Emergency Preparedness and Response (2022 [Interim] Edition), IAEA, 2022, 139.

Nuclear safety is often associated with nuclear security, and they are interlinked in facilities and even during transportation. Therefore, a recently published revised glossary covers both nuclear security and nuclear safety.

consequences, resulting in protection of workers, the public, and the environment from undue radiation risks'.⁷ At the treaty level, the scope of nuclear safety generally includes the physical protection of nuclear facilities and the material used for peaceful and domestic purposes, as well as storage and both inland and international transport. The international nuclear security law also criminalises offences related to illicit trafficking and sabotage of nuclear materials or facilities. In addition, it provides for strengthened international cooperation on an expanded scope of issues, such as assistance and information sharing in the event of sabotage.⁸ Thus, the definition of nuclear security and safety varies across jurisdictions; however, the central concepts of both terms mostly conform to the definition provided by the NSS glossary. Furthermore, this glossary indicates the difference of these terms, '[t]here is not an exact distinction between general term safety and security. In general, security is concerned with intentional actions by people that could cause or threaten harm to other people; Safety is concerned with the broader issue of harmful concrescences to people and (and to the environment) arising from exposure to radiation, whatever cause'.⁹ The definition of 'soft law' is more complicated. Shaw explains that the term 'soft law' indicates that the instrument and provisions in question are not themselves 'law' but that their importance within the general framework of international legal development is such that they must be given particular attention.¹⁰ From a law-making perspective, there are multiple types of soft laws and doctrines that can be identified. Simply put, the term is a convenient description for a variety of non-legally binding instruments used in contemporary international relations.¹¹ Scholars have presented a variety of arguments and understandings of soft law. Many of these arguments first appeared in the 1980s in France and other countries. Subsequently, international scholars have attempted to further elucidate this complicated legal term. One well-known study was presented by Professor Prosper Veil,¹² and

⁷ Ibid, 140.

Interestingly, nuclear safety is also composed of legally binding documents, such as conventions, and non-legally binding documents, such as codes of conduct and guidelines. See also 'Codes of Conduct' at https://www.iaea.org/topics/codes-of-conduct (as of 19 April 2023).

⁸ 'Convention on the Physical Protection of Nuclear Material (CPPNM) and its Amendment', at https://www.iaea.org/publications/documents/conventions/convention-physical-protection-nuclear-material-and-its-a mendment (as of 15 January 2020).

⁹ n(6), *IAEA Nuclear Safety and Security Glossary: Terminology Used in Nuclear Safety, Nuclear Security, Radiation Protection and Emergency Preparedness and Response* (2022 [Interim] Edition). pp.139-140. See also Athanase Poppov, Euratom competence in the area of nuclear security and nuclear safety: An impossible parallel, Nuclear Law Bulletin, No.101, Vol.2018/2, 63.

¹⁰ Malcom N. Shaw, 'International law', ninth ed. (CUP 2021). 99.

¹¹ Alan Boyle and Christine Chinkin, *The Making of International Law (Foundations of Public International Law)*, (OUP 2007), 211–229. This book provides many examples of soft law, such as the Rio Declaration on Development (1992), the Universal Declaration of Human Rights (1948), the Declaration on the Principle of Friendly Relations among States (1970), and more.

¹² Prosper Veil, 'Towards Relative Normativity in International Law?', 1985, 77, EJIL, 413-442.

later, the issue was discussed by Professor Ida in Japan.¹³

There is no universally accepted definition of soft law. Moreover, the definition of soft law differs across various academic disciplines (e.g. legal studies and sociology), where scholars debate whether the concept is appropriate for discussing the governance of relationships between states. The realist perspective holds that although soft law is not a law *stricto sensu*, its normativity may, in principle, bind the concerned parties. Second, according to the traditional rule stipulated in Article 38–1 of the statute of the International Court of Justice (ICJ),¹⁴ soft law is not *lex lata* and does not have the legally binding character of other rules. Third, according to Judge Baxter, some treaty provisions are soft in the sense that they impose no real obligations on the parties.¹⁵ Although these provisions are formally binding, their vagueness, indeterminacy and generality may deprive them of the characteristics of 'hard law' in any meaningful sense.¹⁶ These are the main ideas of soft law doctrines. However, there are various definitions of soft law that can be applied to the topic of nuclear security.

For example, Chinkin defines soft laws as 'non-treaty agreements between states or between states and entities that lacks the capacity to conclude the treaties'.¹⁷ Moreover, V. Lowe writes that soft laws are 'norms that are not themselves legally binding but form part of the broader normative context within which expectations of what is reasonable or proper State behaviour are formed'.¹⁸ Additionally, Aust states, 'Soft law is generally used to describe international instruments which their makers recognise are not treaties, even if they employ mandatory language such as "shall", but have as their purpose the promulgation of norms (albeit not legally binding) of general or universal application'.¹⁹ Kodera asserts that soft laws have two features. The first feature is that they lack the form of a source of international law—that is, they lack the authority of the rules that govern international relations as treaties or customary law. The second feature is that they do not impose

¹³ Ryuichi Ida, 'What is soft law? Critic of its usefulness as a conceptual analysis in the international public law', 1985, 117 *Kyoto Law Review* 5&6, 1-2.

¹⁴ The Statute of International Court of Justice in Article 38–1 reads, '1. The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply: (1) international conventions, whether general or particular, establishing rules expressly recognized by the contesting states; (2) international custom as evidence of a general practice accepted as law; (3) the general principles of law recognized by civilized nations; (4) subject to the provisions of Article 59, judicial decisions, and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law'. Even this approach may contain soft laws such as 'the general principles of law' and 'the teachings of the most highly qualified publicists of the various nations' boundary area items.

¹⁵ Baxter, 'International law in "Her infinite variety", *International & Comparative Law Quarterly*, 29 (1980), 549–566.

¹⁶ Alan Boyle and Chritine Chinkin, 'The Making of International Law (Foundations of Public International Law)', (n11), 220.

¹⁷ Alan Boyle and Christine Chinkin, 'The Making of International Law (Foundations of Public International Law)', n (11), 213.

¹⁸ Vaughan Lowe, International Law (OUP 2007), 95–96.

¹⁹ Anthony Aust, Modern Treaty Law and Practice (second version) (CUP 2007), 52–53.

clear obligations or enforce certain mandatory actions. This is despite the fact that a soft law's constitutive documents may refer to a certain mandatory action as a norm of international customary law or treaty law.²⁰ The *Dictionary of International Law*, which is edited by J. Salmon, states that 'the designated rule's normative value would be limited because the instruments contained are little obligatory or the provisions concerned are not legally binding, although the instruments have the obligation of positive law or the instrument seems to be legally binding'.²¹

D. Shelton appears to provide a rational explanation of the current state of soft law, writing that

'There is no well-established definition of soft law. A lack of a common definition has made discussion on soft law difficult and even more complicated because of different understandings from different perspectives. In fact, at that time, commentators engaged in serious discussion on the usefulness of soft law at a terminological or conceptual level. However, as the discussion progressed, most authors tended to use the term 'soft law' with the same meaning'.²²

For the purposes of this article, soft law is defined as 'any international instrument other than a treaty that contains principles, norms or other statements of expected behaviours²³'. Although soft law is not legally binding, it has certain implications. Based on this understanding, two types of soft law are proposed: 'primary soft law' (as per D. Shelton's explanation), which is a legally non-binding instrument declaring general principles and guidelines on certain topics, and 'secondary soft law', which is a legally non-binding, complementary measure that implements a hard law regime.

Scholars have examined the impact and usefulness of legally and non-legally binding documents (i.e., soft law). Therefore, it is now necessary to ask why soft law is often used. There is a common understanding regarding the usefulness of soft law. In *The Making of International Law*, Boyle and Chinkin explain that it may be easier for the States to agree when the form of the instruments is

²⁰ Akira Kodera, 'The contemporary international and soft laws', *International Society and Soft Law*, 2008, 10. This book is a series of five research manuscripts published in Japan on soft law research from a variety of perspectives; the cited article is in the fifth and final volume.

²¹ Dictionnaire de droit international public, J. Salmon (ed.), Bruylant 2001, 1039.

Annoter Example is 'par laquelle ils entendent désigner des règles dont la value normative serait limitée soit parce que la valeur normative serait limitée soif parce que les instruments qui les contiennent ne seraient pas juridiquement obligatoire, soit parce que les dispositions en cause, bien que figurant dans un instrument contraignant, ne créeraient d'obligation de droit positif, ou ne pas des obligations peu contraignantes'.

²² Dinah Shelton, 'Normative hierarchy in international law', *American Journal of International Law*, Vol. 100, 2006, 319. See also Tatsuya Abe, 'New perspectives on Soft law: Toward more effective regime governance' in Shotaro Hamamoto, Hironobu Sakai, and Akiho Shibata (eds) *L'être Situé, Effectiveness and Purposes of International Law: Essays in Honor of Professor Ryuichi Ida* (Martinus Nijhoff 2015), 214–237.

²³ ibid. Dinah Shelton, 'Normative hierarchy in international law', *American Journal of International Law*, Vol. 100, 2006, 319.

non-legally binding. They also state that it may be easier for some states to adhere to non-legally binding instruments because such instruments enable them to possibly avoid ratification and domestic treaty verification processes. Next, Boyle and Chinkin assert that soft law instruments are more flexible. Finally, they state that a soft law instrument may provide more immediate evidence of international support and consensus compared to a treaty with an impact that is heavily qualified by reservations and the need to wait for ratification and implementation.

Soft law can be summarised as the 'making of international law', which is widely supported and has almost reached a consensus and common understanding in the governing of relations among states. It should be noted that although soft law—which is a *de facto* agreed standard—is often employed in legal instruments related to nuclear security, it is still abided and respected by these instruments and considered mandatory when the operator of a nuclear facility is obliged to apply nuclear security measures, especially during the absence of pertinent international laws or regulations that can be applied even with the necessary domestic modifications to mandatory regulations. This means that the municipal-level implementation of the law can be applied based on the 'order or request' from the regulatory authority, which also offers the possibility of quick and effective on-site guidance before application of regulatory authority to order the operators. Thus, soft law is of particular importance where good faith needs to be protected. It also proves helpful in developing, interpreting, and clarifying international and municipal laws.²⁴

3. International Nuclear Security Law

International nuclear security law consists of three categories: multilateral conventions, bilateral agreements that contain nuclear security clauses and regional international laws that are related to nuclear security.

A. Multilateral Conventions

The most representative international treaties related to nuclear security include the Convention on the Physical Protection of Nuclear Material (1979)²⁵ and the Amendment to the 1979 Convention on the Physical Protection of Nuclear Materials (2005).²⁶ Furthermore, the

²⁴ Daniel Thürer, 'Soft law', *Max plank Encyclopaedia of Public International Law*, (Oxford public international law, 2017), para.37. at https://docenti.unimc.it/paolo.palchetti/teaching/2017/17311/files/soft-law-1 (as of 17 October 2023)

²⁵ The Convention on the Physical Protection of Nuclear Material, 1456 UNTS 246 (adopted on 26 October 1979 and entered into force on 8 February 1987).

²⁶ The 2005 Amendment to the 1979 Convention on the Physical Protection of Nuclear Materials (adopted on 8 July 2005 as INFCIRC/274/Rev.1/Mod.1 and entered into force on 8 May 2016).

ICSANT²⁷ is also often cited as a nuclear security-related legal instrument; however, this treaty is actually focused on antiterrorism and is not, strictly speaking, a nuclear security treaty. However, its provisions can deter nuclear security threats. Therefore, the convention can also be categorised as a legal instrument for international nuclear security.

Other conventions closely related to the security of nuclear material include the Convention on Early Notification of a nuclear accident,²⁸ the Convention on Assistance in the Case of an nuclear accident or Radiological Emergency,²⁹ and the International Convention for the Suppression of Terrorist Bombings. These conventions ³⁰ are often categorised as nuclear security-related conventions, as they are mentioned in *The IAEA International Law Series No. 4 on The International Legal Framework for Nuclear Security.*³¹

B. Nuclear Security Clauses in Bilateral Agreements: Examples from Japan

Most bilateral agreements on nuclear cooperation contain nuclear security clauses. One relevant example is the cooperation agreement between the governments of the United States and Japan concerning peaceful uses of nuclear energy.³² Articles 7 and 11 of this agreement stipulate the following:

Article 7

Adequate measures of physical protection shall be maintained with respect to nuclear material transferred according to this agreement and special fissionable material used in or produced using material, nuclear material, or equipment transferred, at levels, as a minimum, comparable to those set out in Annex B of this agreement.

²⁷ The international Convention for the Suppression of Acts of Nuclear Terrorism, 2245 UNTS 89 (adopted as UN Doc A/RES/59/290 (2005) on 13 April 2005 and entered into force on 7 July 2007).

²⁸ Convention on Early Notification of a Nuclear Accident (1986), 1439 UNTS 275 (signed 26 September 1986 and entered into force 27 October 1986).

²⁹ Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, 1457UNTS133 (adopted 26 September 1986 and entered into force 26 February 1987).

³⁰ 1997 International Convention for the Suppression of Terrorist Bombings, 2149 UNTS 256 (adopted 15 December 1997 as UN Doc. A/RES/52/164 and entered into force 23 May 2001).

³¹ IAEA Doc., *The IAEA International Law Series No. 4 on The International Legal Framework for Nuclear Security.*

³² Cooperation Agreement between the governments of the United States of America and the Government of Japan concerning peaceful uses of nuclear energy (4699UNTS148). TIAS 4133, 4172, and 5553 (signed in Washington, D.C. on 16 June 1958 and entered into force on 17 August 1988).

This agreement was modified by the Exchange of Note (E/N) dated 18 October 1988, particularly with respect to the Implementing Agreement between the Government of Japan and the Government of the United States of America pursuant to Article 11 of their agreement for the cooperation concerning Peaceful uses of Nuclear Energy Agreement, particularly Annex 5 of this agreement, titled 'Guidelines for the International Transportation of Recovered Plutonium'.

Article 11

To facilitate activities subject to Articles 3, 4, and 5 of this agreement, the parties shall make, consistent with the objective of preventing nuclear proliferation and with their respective national security interests, and perform in good faith separate arrangements that will satisfy the requirements for mutual agreement set forth in those Articles on a long-term, predictable, and reliable basis and in a manner that will further facilitate peaceful uses of nuclear energy in their respective countries. [Underlining added by author for emphasis]

Precisely speaking, there is another legally binding instrument that also serves to supplement the agreement in detail: the Implementing Agreement between the Government of Japan and the Government of United States of America pursuant to Article 11 of their agreement on the cooperation concerning peaceful uses of nuclear energy,³³ and its agreed minutes are also concluded.³⁴ In Annex 5 of the modified agreement, 'A. Air shipment' has been inserted, and 'B. Sea shipment' has been drastically modified to enhance the effectiveness of nuclear security during international transportation situations where nuclear material is vulnerable to terrorist attacks.

In this way, the agreement addresses the security of nuclear material during transportation.

Regarding practical procedures, the chapeau paragraph of Article 2 of Annex 5 stipulates that [p]rior to each shipment, a transportation plan will be prepared to document the specific arrangement to be implemented for a particular shipment'. Paragraph G of this article also mentions a 'detailed contingency plan'. Furthermore, Paragraph H stipulates that '[c]onfirmation will be obtained from each response authority that necessary specific plans have been prepared through consultation as appropriate with other responsible authorities and close contact with the sender, recipient, and carrier to ensure effective implementation of the security measures described above'.³⁵ Most other nuclear cooperation agreements also contain nuclear security clauses.

Another example is the Japan–France nuclear cooperation agreement.³⁶ The amended Article

³³ Implementing Agreement between the Government of Japan and the Government of the United States of America pursuant to Article 11 of their agreement for the cooperation concerning Peaceful uses of Nuclear Energy. ³⁴ Agreed minutes.

This document is not an annex of the bilateral nuclear agreement; however, it clearly refers to its legal status using the language 'the undersigned hereby record the following understanding'. That is, it constitutes an integral part of the Japan–US nuclear cooperation agreement.

³⁵ In both 'A. Air shipment' and 'B. Sea shipment' of Annex 5, the term 'plan' is used, and it does not indicate its legal character as legally binding. However, from a practical viewpoint, if there is any discrepancy, it may cause serious consequences. Thus, this kind of document functions as a *de facto* legally binding document regardless of its form (The underlining in this paragraph was added by the author for emphasis).

³⁶ Protocol modifiant L'accord de coopération entre le gouvernement du Japon et le gouvernement de la République Française pour l'utilisation de Energie Nucléaire à des fins pacifiques (signed 26 February 1972 and entered into force 22 September 1972).

3 of the agreement stipulates that '[f]or all the nuclear material transferred in conformity with this agreement and all the nuclear material recovered or produced by-product material, the adequate measures of physical protection shall be maintained, at minimum, at levels of protection prescribed in the Annex A of this agreement'.³⁷ Article 5 of the agreement between the governments of Japan and the United Kingdom stipulates that '[a]dequate measures of physical protection shall be maintained with respect to nuclear material transferred according to this agreement nuclear material recovered or produced as a by-product, as a minimum, at levels set out in Annex B of this agreement'.³⁸ As these examples demonstrate, nuclear cooperation agreements tend to contain nuclear security clauses.

C. Regional Agreements on Nuclear Security

Similar to international law, EU law is also an interstate legal regime that applies to the member states of the EU. Although other regional legal systems exist, the European supranational framework is somewhat fragmented and inconsistent regarding the topic of nuclear safety and security.³⁹ In principle, the Euratom Treaty deals exclusively with issues concerning radiation protection for workers and the general public and establishes the scope of the powers of the European community in this field.⁴⁰ While the IAEA generally lacks enforcement powers and as regards nuclear security in particular, Euratom does possess extensive enforcement powers in the field of physical protection, a component of nuclear security. The IAEA may only make non-binding recommendations in its security reports, while the European Commission may impose direct sanctions on nuclear operators. Such sanctions under Chapter 7 of Euratom Treaty are normally imposed when operators have been violating the nuclear safeguards framework; however, since safeguards implicitly cover physical protection, sanctions under Article 83 of Euratom Treaty may also be imposed when the provisions of CPPNM that apply to Euratom have been breached⁴¹.

³⁷ Ibid.

³⁸ Agreement between the Government of Japan and the United Kingdom of Great Britain and Northern Ireland for cooperation on the peaceful uses of nuclear energy, 4700UNTS185: UKTS 1958/6, 1966/57 (signed on 16 June 1958 and entered into force on 12 October 1998). Despite the passage of Brexit, this nuclear security clause in the agreement with the UK remains valid, and Article 11 on physical protection is also included in the Agreement between the Government of Japan and the European Atomic Energy Community for cooperation on the use of nuclear energy, which was signed on 27 February 2006 and entered into force on 20 December 2008.

³⁹ Marco Balboni, 'Nuclear Safety and Security in Europe', in *International Law and Chemical, Biological, Radio-nuclear (CBRN) Events*, 2022, 262. According to Balboni's analysis, this is largely due to the way powers and competences have been conferred to actors on the supranational level, previously to the Euratom community and then to the European Union. Consequently, acts adopted in the field did not to result in a robust and solid system.

⁴⁰ Marco Balboni, ibid (n39), 250.

⁴¹ Athanase Poppov, 'Euratom competence in the area of nuclear security and nuclear safety: An impossible parallel', *Nuclear Law Bulletin*, NEA, No.101, Vol.2018/2, 70.

Regarding physical protection, including protection during the transportation of nuclear materials, international conventions, such as the Agreement Between the Government of Japan and the European Atomic Energy Community for Cooperation for the Use of Nuclear Energy, may be sufficient. Nevertheless, national legislative measures must be taken to ratify such a treaty.

There are also regulations and directives that complement existing treaties, such as the Euratom directives, which require transposition, and the Euratom regulations, which directly bind each member state. One relevant example of this is Council Directive 2006/117/Euratom (done on 20 November 2006) on the supervision and control of shipments of radioactive waste and spent fuel.⁴² This directive entered into force on 25 December 2006, and it was stipulated that it must be implemented as a national regulation by 24 December 2008, at the latest.⁴³ Moreover, Council Regulation (Euratom) No. 1493/93 on shipments of radioactive substances between the member states⁴⁴ has also been directly applied to the member states. As is usual with such documents, another related administrative document is produced by the customs and regulatory authorities.

Several nuclear-weapon-free-zone (NWFZ) treaties have been recognised by Article 7 of the Nuclear Non-proliferation Treaty to consolidate complementary role for nuclear security.⁴⁵ To date, the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco, 1967),⁴⁶ the South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga, 1985),⁴⁷ the Treaty on the Southeast Asia Nuclear-Weapon-Free Zone (Treaty of Bangkok, 1995),⁴⁸ the African Nuclear-Weapon-Free Zone Treaty (Treaty of Pelindaba, 1996), ⁴⁹ and Treaty on a Nuclear-Weapon-Free Zone in Central Asia (Treaty of Semipalatinsk, 2006)⁵⁰ have been ratified.

⁴² Council Directive 2006/117/Euratom (published on 20 November 2006, 1.8.2007, OJ L 337)

⁴³ Republic of Cyprus, 'Radiation Protection'.

at https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/All/FF93420C5EE4D5B2C2257E2A00257ED5 (as of 19 April 2023)

The fourth paragraph of this document describes how the directive is applied in Cyprus as follows: Additionally, on the Safety (Supervision and Control of Shipments of Radioactive Waste and Spent Nuclear Fuel) Regulations of 2009 (P.I. 86/2009), which harmonise national legislation with the Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent nuclear fuel, apply.

⁴⁴ Council Regulation (Euratom) No. 1493/93 (Official Journal L 148,19 June 1993, 1–7)

⁴⁵ Article 7 stipulates that '[n]othing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories'.

⁴⁶ The Treaty for the Prohibition of Nuclear Weapons in Latin America (Treaty of Tlatelolco), 634 UNTS 281 (signed on 14 February 1967 and entered into force 22 April 1968).

⁴⁷The South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga), 1445UNTS117 (signed on 06 August 1985 and entered into force 11 December 1986).

⁴⁸ Treaty on the Southeast Asia Nuclear-Weapon-Free Zone (Treaty of Bangkok, 1995), 35 ILM 635 (Signed 15 December 1995 and entered into force on 27 March 1997).

⁴⁹ African Nuclear-Weapon-Free Zone Treaty (Treaty of Pelindaba, 1996), 35ILM689 (signed on 11 April 1996 and entered force on 15 July 2009).

⁵⁰ The Treaty on a Nuclear-Weapon-Free Zone in Central Asia (1996), 2970UNTS91 (signed on 8 September 2006 and entered into force on 21 March 2009)

The primary objective of a NWFZ treaty is to prevent the proliferation of nuclear weapons and nuclear explosive devices, with relevant verification mechanisms included in each treaty. Thus, these treaties will enhance nuclear security. For example, the African Nuclear-Weapon-Free Zone Treaty includes an article specifically on the 'physical protection of nuclear materials and facilities.⁵¹

In conclusion, nuclear security-related legally binding documents are rather limited, as mentioned in Article 2 of the A/CPPNM. However, cross-border issues, such as international transportation, should be regulated by international agreements. Therefore, other regulations that are important for nuclear security during transportation have been adopted. For example, the United Nations policymaking organs have established various rules and standards, which were later adopted as legally binding documents despite having begun as soft laws.

Examples of following instruments related to international transportation include the Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR),⁵² the International Regulations Concerning the Carriage of Dangerous Goods by Rail (RID),⁵³ and the European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN).⁵⁴ In the chronological order of the entry into force, the first is the ADR, which was adopted by the Economic Commission for Europe Inland Transport Committee, a body responsible for regulating transportation in Europe. The second is the RID, which was originally an annex to the Convention Concerning International Carriage by Rail, which regulates transport by rail, including nuclear and spent fuel in Europe and North Africa. The third is the ADN for International Transportation of Dangerous Goods by Inland Waterway.⁵⁵

⁵¹ Article 10 of this treaty stipulates that '[e]ach Party undertakes to maintain the highest standards of security and effective physical protection of nuclear materials, facilities and equipment to prevent theft or unauthorized use and handling. To that end, each Party, inter alia, undertakes to apply measures of physical protection equivalent to those provided for in the Convention on Physical Protection of Nuclear Material and in recommendations and guidelines developed by IAEA for that purpose'.

⁵² Agreement Concerning the International Carriage of Dangerous Goods by Road/Economic Commission for Europe, Inland Transport Committee, 619UNTS77 (adopted 30 September 1957 and entered into force 29 January 1966).

⁵³ International Regulations Concerning the Carriage of Dangerous Goods by Rail, 1101UNTS226 (signed 25 February 1961 and entered into force 1 January 1975).

⁵⁴ European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) and the annexed regulations 2497UNTS5 (signed 26 May 2000 and entered into force 29 February 2008).

⁵⁵ UN Recommendations on the Transport of Dangerous Goods - Model Regulations Nature, Purpose, and Significance of the Recommendations at https://unece.org/about-recommendations (as of 30 March 2023). Dangerous goods are subject to transport, workplace, storage, consumer and environment protection regulations to prevent accidents to persons, property or the environment, to other goods or to the means of transport employed. To ensure consistency between all these regulatory systems, the United Nations has developed mechanisms for the harmonization of hazard classification criteria and communication tools and for transport conditions for all modes of transport. UNECE also administers regional agreements for effective implementation of these mechanisms for the transport of dangerous goods using roads, rails and inland waterways.

4. Soft Law in Nuclear Security

A. The International Atomic Energy Agency's Nuclear Security Series

Why is soft law important in nuclear security? Herbach provided a clear explanation, writing, 'When it comes to entering binding obligations, due to particular domestic sensitivities or sovereignty cost, soft law could be the preferred option. The threshold for states is lower when an instrument does not take form the hard law. States that view a particular issue as falling squarely in the domestic realm may nonetheless be willing to coalesce around prescribed actions if they entail no legal obligation nor, perhaps more importantly, the possibility of being held responsible for a wrongful act'.⁵⁶

The most well-known case of soft law regarding the topic of nuclear security is the IAEA's NSS. This comprehensive series covers most areas of nuclear security. The IAEA's NSS provides international guidance on all aspects of nuclear security to support countries as they work to fulfil their responsibilities related to nuclear security.⁵⁷ This series is well structured and is composed of four levels: nuclear security fundamentals, recommendations, implementing guides and technical guidance. Nuclear security fundamentals establish the fundamental objectives and essential elements of a state's national nuclear security regime. The recommendations section outlines measures that states should implement to achieve and maintain an effective regime. The implementation guidelines provide guidance on how states can implement these recommendations. The technical guidance section provides more detailed instructions on specific methodologies and techniques for implementing security measures.

The Nuclear Security Summits were held in Washington D.C. in 2010, Seoul in 2012, The Hague in 2014 and again in Washington D.C. in 2016. They resulted in a series of highly politically important soft law documents. These documents are cited frequently, and several initiatives have been based on them, such as the United States–Japan Nuclear Security Working Group, which is a bilateral agreement that is in line with the Nuclear Security Summits. This working group was established to deal with key issues related to nuclear security. Although it has made significant progress, the group is still working to achieve additional goals. As this demonstrates, ⁵⁸ although a project may initially be based on soft law, it can still produce

⁵⁶ N(2). Jonathan Herbach, 'International Arms Control Law and the Prevention of Nuclear Terrorism', 131.

⁵⁷ IAEA official explanation, 'Nuclear Security Series' at https://www.iaea.org/resources/nuclear-security-series (as of January 31).

⁵⁸ United States–Japan Nuclear Security Working Group Fact Sheet, March 2012

https://www.mofa.go.jp/policy/un/disarmament/arms/nuclear_security/2012/factsheet.html. (as of 29 March 2023)

This fact sheet identifies nine critical areas: Goal 1: Co-operation within the Integrated Support Centre for Nuclear Non-proliferation and Nuclear Security (ISCN); Goal 2: Research and Development of Nuclear Forensics,

meaningful results.

B. Regulations Related to Nuclear Security for the Transport of Dangerous Goods

Specialised international organisations, such as the ICAO and the IMO, play important roles because of their mandate, which covers the international transportation of dangerous goods, such as nuclear and radioactive materials. The ICAO was established by the Chicago Treaty, which⁵⁹ governs civil aviation in general. Interestingly, this convention is praised for addressing the technical issues contained in its '19 technical instructions', which are typical soft law documents. Regarding nuclear security, the most important document is 'Annex 18: The Safe Transport of Dangerous Goods by Air'. In Japan, a decision by the Nuclear Energy Commission established that the content of this technical instruction is reflected in Article 2, Paragraph 2 of the implementing regulation of the Civil Aviation Act and related publications of the official journal. However, in the case of maritime transportation, the International Maritime Dangerous Goods code (IMSG code⁶⁰) is transposed into Ship Safety Law and Dangerous Goods Shipping and Storage Regulations in Japan. Thus, it serves as legally binding documents at the municipal level.

The International Maritime Dangerous Goods Code is closely related to the International Convention for the Safety of Life at Sea.⁶¹ Essentially, this document was adopted by the United Nations General Assembly as a resolution that is evidently a soft law. However, together with the IMO convention, some rules, such as the 'Code for the Safe Carriage of Irradiated Nuclear Fuel, Plutonium, and High-Level Radioactive Wastes in Flasks on Board Ships',⁶² are focused on nuclear material. This code is enacted as part of municipal law that regulates dangerous sea shipments and stock under the Shipment Safety Law in Japan⁶³; a similar procedure has also been adopted in many

Measurement and Detection Technologies, and Sharing of Investigatory Best Practices; Goal 3: Cooperation on Safeguard Implementation; Goal 4: Sharing Best Practices for Nuclear Security in New Facility Design; Goal 5: Cooperation on Transport Security to Reduce Theft's Chances or Sabotage; Goal 6: Convert Reactors to Reduce the Use of HEU and Complete Down-Blending Operations; Goal 7: Implement INFCIRC/225 / Rev.5; Goal 8: Integrating Response Forces into Dealing with Theft and Sabotage at Facilities; and Goal 9: Joint Study on Management of HEU and Plutonium: Reduction of Material Attractiveness.

⁵⁹ Convention on International Civil Aviation, 15 UNTS 295 (adopted on 7 December 1944 and entered into force on 4 April 1947).

⁶⁰ IMO Doc. IMDG Code 39th Amendment (2018). This code is updated regularly and the latest version is the IMDG Code, 2022 Edition (inc. Amendment 41-22), which comes into force on 1 January 2024 and may be applied voluntarily as from 1 January 2023. at https://www.imo.org/en/publications/Pages/IMDG%20Code.aspx (as of 18 October 2023)

⁶¹ International Convention for the Safety of Life at Sea, 1184 and 1185UNTS2 (adopted on **1** November 1974 and entered into force 25 May 1980).

⁶² Code for the Safe Carriage of Irradiated Nuclear Fuel, Plutonium, and High-Level Radioactive Wastes in Flasks on Board Ships, Res. 748, IMO, 18th Sess. (4 November 1993).

⁶³ Shipment Safety Law, Law No. 11, 15 March 1933, as amended by Law No. 87, 16 July 1999. at https://jci.go.jp/english/pdf/en_safetylaw.pdf (as of 18 October 2023)

other countries such as 'Marine Guidance Note' from the competent authority in the UK⁶⁴. In this manner, soft law, as 'agreed standards' at the international level, is often transposed in domestic legal systems to ensure the effective implementation of nuclear security.

C. Nuclear Security under Extraordinary Circumstances

Lastly, it should be noted that countries face a variety of nuclear security challenges, including natural disasters, such as tsunamis, as well as insider threats, cyberattacks, and armed conflicts. The risk of a tsunami existed even at the time of the Fukushima No. 1 reactor nuclear accident almost ten years ago⁶⁵, and new nuclear safety measures had already been introduced in Japan. Moreover, the IAEA shared lessons with member states in order to enhance nuclear safety and security policies. In this way, nuclear security is closely related to nuclear safety, which was indicated in the Kyoto Conference report of the International Law Association.⁶⁶ It suggests, especially in the commentary of D2 among other things, that '[t]his objective, confirmed in Article 16 of the amended CPPNM, likewise applies to review conferences of other treaties. and that [D]ecisions adopted by treaty review Conferences may constitute subsequent practice or subsidiary means of interpretation under Article 31(3) and 32 of Vienna Convention on the Law of Treaties.

Amidst the Russian invasion of Ukraine, nuclear security has emerged as a new challenge, and this challenge is one of the root causes of the failure of the 2022 NPT Review Conference.⁶⁷ In an effort to prevent the situation in Ukraine form deteriorating further, the IAEA issued 'seven indispensable pillars of nuclear safety and security'⁶⁸ in the form of soft law. In this way, there have

⁶⁴ MARINE GUIDANCE NOTE: MGN 340 (M), Maritime and Costal guards Agency, May 2007. Based on the official notice of the UK competent authority, this code is applied *mutatis mutandis* at municipal level with a mandatory character.

at https://assets.publishing.service.gov.uk/media/5e7cc2ef86650c743c9bfd26/MGN_340.pdf (as of 18 October 2023)

⁶⁵ World Nuclear Association, 'Fukushima Daiichi Accident (Updated January 2023)'.

Following a major earthquake, a 15-metre tsunami disabled the power supply and cooling of three Fukushima Daiichi reactors, causing a nuclear accident beginning on 11 March 2011. All three cores largely melted in the first three days. (rest of the text omitted by the author) at

https://world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-daiichi-accident.aspx

⁶⁶ International Law Association, report of the 79th Conference in Kyoto (ILA 2021), 121. Paragraph A1 and D2 from Resolution 2/2020 adopted by the Committee on Nuclear Weapons, Non-Proliferation and Contemporary International Law states that states ought to create a universal nuclear security regime. These are items emphases the universalization of nuclear security conventions and offers some suggestions. As the original text of this resolution contains in the A1 to effectively ensure non-proliferation of nuclear weapons and other nuclear explosive devices, both legally binding regulation and politically binding commitment are necessary. Furthermore, D2 Treaty review conferences should serve the objectives to review the implementation of the treaty and its adequacy as concerns the preamble, the operative part and any annexes in the light of the then prevailing situations.

⁶⁷ NPT Doc., Joint Statement at the Tenth Review Conference of the parties to the Treaty on the non-proliferation of Nuclear Weapons, 1–4. In the general debate of this NPT Review Conference, more than 50 states strongly condemned the Russian invasion of Ukraine, and Russia blocked consensus adoption of its final document.

⁶⁸ IAEA doc. press release, 'IAEA Director General Grossi's Initiative to Travel to Ukraine', 4 March 2022.

been several attempts to tackle this complicated situation and avoid a catastrophic nuclear accident. Luckily, nuclear power plants have been able to function without any disasters. Thus, this idea was also welcomed and agreed by later G7 Leaders' Statement on Ukraine⁶⁹ due to the characteristics of soft law.⁷⁰

The Stockholm International Peace Research Institute suggested improving nuclear security by strengthening its linkages with nuclear safety, emergency preparedness and readiness, and international humanitarian law.⁷¹ However, this proposal does not touch on DBT,⁷² which is normally dealt with by states or competent authorities. Thus, this proposal is realistic because DBT is a sensitive issue, and it is classified as confidential information in most states for security reasons. Additionally, it is difficult to assess the policy precisely. However, these three items may make it possible to enhance nuclear security under certain circumstances, such as during an armed conflict. Therefore, even minor adjustments to treaty implementation can be possible with soft law, although a new legally binding document is difficult for parties to agree on within a short amount of time.

5. Conclusion

According to Article 2, Paragraph 2 of the A/CPPNM, '[t]he responsibility for the establishment, implementation, and maintenance of the physical protection within the State Party rests entirely with that States'. States are trusted to independently implement these conventions; that

⁶⁹ G7 Leaders' Statement on Ukraine, 19 May 2023, 1.

accessed at https://www.mofa.go.jp/mofaj/files/100506324.pdff (as of 31 May 2023)

Accessed at

https://www.iaea.org/newscenter/pressreleases/iaea-director-general-grossis-initiative-to-travel-to-ukraine (as of 30 March 2023) The Seven Pillars are as follows: 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 a 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 on- and off-site radiation monitoring systems and emergency preparedness and response measures; and 7. There must be reliable communications with the regulator and others.

⁷⁰ IAEA, 'A Systems View of Nuclear Security and Nuclear Safety: Identifying Interfaces and Building Synergies', (IAEA 2023), 1–38.

In this connection, the IAEA published this document to explore the potential for synergy between nuclear security and nuclear safety. Moreover, in the context of nuclear security during armed conflict, nuclear safety plays an increasingly significant role.

⁷¹ SIPRI Research Policy Paper, 'Nuclear security during arms conflict: lessons from Ukraine', March 2023, 1–23.

⁷² IAEA Doc., 'Development, Use and Maintenance of the Design Basis Threat', IAEA NSS No. 10-G (Rev. 1), 1–39. The design basic threat (DBT) is explained as follows: The national nuclear security threat assessment process results in the production of national nuclear security threat to documentation. Using the national nuclear security threat assessment as a basis, threats in the form of designs based on threats and/or representative threats can be developed. These statements describe credible adversaries against whom facilities and activities using or storing nuclear or other radioactive material are to be protected, as well as the attributes and characteristics of these adversaries.

is, each state must apply the norms suitable for a wide variety of nuclear facilities without exception. Thus, international soft law has proven to be quite useful at accounting for the differences between nuclear facilities due to its flexibility, and this flexibility can be tailored so that it can conform to the needs of the wide variety of nuclear facilities in each member state. However, the relevant regulatory authorities must closely supervise operators to effectively implement soft law regulations after transposing them into legally binding municipal law, as nuclear activities are highly sensitive.

Therefore, soft law in the field of nuclear security is clearly mandatory at the municipal law level, although its original form at the international level is a form of soft law or 'agreed standards'. As international standards that apply to states, compliance with soft law is secured because of its ability to legally bind states through national enactments or the general competence of the competent authority to oversee compliance based on the legal framework between the regulatory authority and the operators responsible for the nuclear facilities or the transportation of nuclear materials.⁷³ In this manner, international nuclear security law will develop alongside soft law in a complementary manner.

In addition to the flexibility of the combined legally binding 'hard law' document and 'soft law' document in the face of a wide variety of nuclear facilities in member states of the IAEA, it should be noted that its advisory activities, such as the mission of the International Physical Protection Advisory Service (IPPAS) will facilitate the this interaction ⁷⁴ The IAEA officially explains that its role is to assist member states 'upon request, in strengthening their national nuclear security regimes, systems and measures'. It also states that '[a]n IPPAS mission compares States existing practice against relevant international instruments and IAEA nuclear security publications. It also includes an exchange of experience and good international practices aimed at strengthening the State nuclear security regime. IPPAS missions comprise an international level review of the legal and regulatory framework'. Despite the sovereign responsibility of states, nuclear security is part of global security issues. Terrorist threats are often international and, therefore, require effective international cooperation to combat them.⁷⁵ Thus, cooperation on international capacity-building efforts is also important tools for nuclear security regimes.

⁷³ To avoid wasting time, operators can consult each other before the design or construction of nuclear facilities to adapt international standards transformed into national standards even before the operation begins. Furthermore, even during construction, it is necessary to amend the construction plan to adapt the necessary modifications.
⁷⁴ 'International Physical Protection Advisory Service (IPPAS)', IAEA. at

https://www.iaea.org/services/review-missions/international-physical-protection-advisory-service-ippas (as of 27 June 2022). In case of Japan, after examining the recommendations of the IPPAS mission, the national expert group meeting normally eliminate the unsuitable recommendations and select only acceptable recommendations for the enhancement of nuclear security. Subsequently, these recommendations are transformed into administrative order or modification of the regulations to be effective in a mandatory manner.

⁷⁵ R. Gaucher et al., 'Building a Nuclear Security Regime: Question to be asked', Nuclear law: The global debate (Asser Press, 2022), 200.

Finally, it should be noted that the first review conference of the State Parties for the A/CPPNM was held in Vienna in the last week of March 2022, and, for the first time, the operation of the convention was examined in line with the provisions of this amended convention. This is indeed a welcome development, as is the International Conference on Nuclear Security, which should occur every two years to enable the exchange of ideas and the sharing of good practices among policymakers, operators and especially industry NGOs. This kind of meeting can contribute to enhancing understanding of nuclear security, and it serves to maintain momentum for the implementation of nuclear security and safety measures.

Recently, during the Karuisawa G7 Foreign Ministers' summit held in Japan, a 'Statement of the G7 Non-Proliferation Directors Group'⁷⁶ was issued. This statement contained a section dedicated to the issues of 'nuclear safety and security' (paragraphs 21–25). This section deals with both issues, focusing on the context of the current critical situation in Ukraine. In this way, international cooperation can be strengthened to promote nuclear security and safety, as mentioned in these documents, which reflect political commitment from the high level. This assures the implementation of a coordinated policy among the member states of the IAEA, including G7 states.

⁷⁶ Karuisawa G7 Foreign Ministers Meeting Summit Document, 'Statement of the G7 Non-Proliferation Directors Group', 17 April 2023, 1–14. Accessed at https://www.mofa.go.jp/mofaj/files/100492332.pdf (as of 18 April 2023). Of course, the essence of this part is also mentioned in the G7 Foreign ministers' meeting communiqué as well. Accessed at https://www.mofa.go.jp/mofaj/files/100492725.pdf (as of 18 April 2023).