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Strengthening the international legal framework for nuclear security: Better sooner rather than later

by Anthony C. Wetherall[*]

Part 1: Introduction

"[t]he threat of nuclear terrorism is real, and the global nuclear security system needs to be strengthened in order to counter that threat"
Yukiya Amano, IAEA Director General (2013)[1]

1.1 *Overview of the article*

In this 21st century global environment, the threat of terrorists or other criminals eventually acquiring and using radioactive material for malicious purposes or sabotaging such material or associated facilities, could be calculated as being an inevitable, albeit a preventable catastrophe.[2] Much has been done to address this situation, such as the International Atomic Energy Agency (IAEA) now having a recognised central role in strengthening nuclear security globally. However, concerns still remain regarding the adequacy of the global nuclear security architecture, consisting of legally binding and non-binding instruments, intergovernmental organisations (IGOs), bodies and various initiatives, as well as internationally-accepted guidance and best practices, such as those reflected in the IAEA Nuclear Security Series of publications. Issues arise with respect to the adequacy of the international framework for nuclear security and the level of effective national implementation thereof. Highlighted in this regard, is a lack of universal adherence to the international nuclear security legal instruments, an absence of sustained information sharing (particularly on national implementation) and the non-existence of binding nuclear security standards and mandatory peer review and assessment.

This article examines the framework's adequacy, its gaps and weak links, as well as the measures proposed to strengthen it. Part 1 considers some past and recent events, efforts, and developments that have contributed to the current status. Thereafter, the purported gaps and weak links and proposed strengthening measures are identified. While acknowledging progress, it is assumed that some overarching considerations, particularly national sovereignty, secrecy and complacency, continue to restrictively influence and determine the extent of state behaviour. Accordingly, these considerations are also briefly addressed in Part 1.

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1. Amano, Y. (2013), "Director General's Statement", International Conference on Nuclear Security: Enhancing Global Efforts, IAEA, Vienna, 1-5 July 2013.
2. Allison, G. T. (2004), *Nuclear Terrorism: The Ultimate Preventable Catastrophe*, Times Books/Henry Holt, New York, 1st ed.

Thereafter, Part 2 provides a concise overview of the current international legal framework. The purported gaps and weak links and proposed strengthening measures initially identified in Part 1 are then assessed in Part 3. Further to that assessment and prior to a conclusion, Part 4 submits that only a "watershed nuclear security event" may provide the momentum needed for the international nuclear community to address the apparent existing deficiencies in the near- to mid-term future, i.e. in the next eight years from now.

Importantly, this article does not dwell on the decades-long academic debate regarding the prospects of nuclear terrorism, motivations, intent and capabilities. Rather, it is based on the views in various international fora, such as the United Nations (UN) and the International Atomic Energy Agency (IAEA), that the threat of terrorism is real, grave and serious; and that it is one of the most challenging and serious threats to international peace and security, if not the greatest to society in our time.[3] Notwithstanding this significance, there is still no legal definition of "terrorism" after a decades-long debate,[4] nor is there a definition of "nuclear terrorism", though some treaties specify certain acts that can be considered as including a terrorist element.[5] Finally, although acutely aware of the vital importance, this article also does not address significant issues such as the need to eliminate highly enriched uranium (HEU) in civil nuclear applications[6] or the pressing need to enhance the security of military nuclear materials (which accounts for the vast majority of nuclear material worldwide (approximately 83%)).[7]

1.2 *Past and recent events, efforts, and developments*

The threat of nuclear terrorism has a very long history that can be traced back to shortly after the dawn of the atomic age. Indeed, the father of the atomic era and mastermind of the Manhattan Project,[8] Robert Oppenheimer, submitted in 1946 that New York could be destroyed if three or four men were to smuggle in a nuclear weapon (NW).[9] Some 30 years later, Theodore Taylor, a veteran of that project,

3. Amano, Y. (2013), *supra* note 1; and Bunn, M. et al. (2016), "Preventing Nuclear Terrorism: Continuous Improvement or Dangerous Decline?", Project on Managing the Atom, Belfer Center for Science and International Affairs, Harvard Kennedy School, Cambridge, Massachusetts.
4. Burgess, M. (2002), "Terrorism: The Problems of Definition", Center for Defense Information, Washington, DC; and Badey, T. (1988), "Defining International Terrorism: A Pragmatic Approach", *Terrorism and Political Violence*, Vol. 10, Issue 1, pp. 90-107.
5. For example, an offence can be committed by a person that intentionally and unlawfully uses radioactive material "[w]ith the intent to compel a natural or legal person, an international organization or a State to do or refrain from doing an act". International Convention for the Suppression of Acts of Nuclear Terrorism (2005), 2445 UNTS 137, entered into force 7 July 2007, Article 2(1)(b)(iii) (Nuclear Terrorism Convention or ICSANT).
6. Fissile Materials Working Group (FMWG) (2014), "A race to the top in nuclear security strategy", *Bulletin of the Atomic Scientists*, 23 April 2014.
7. *Ibid.*; and Bunn, M. et al. (2016), *supra* note 3.
8. This US research and development project led to the development of the first nuclear weapons during World War II.
9. Mowatt-Larssen, R. (2009), "The Armageddon Test", Belfer Center for Science and International Affairs, Harvard Kennedy School, Discussion Paper 2009-09.

described such a threat as an immediate one.[10] Today, some 40 years after Taylor's warning, an elevated threat level exists on a worldwide scale.[11]

During the Cold War, such fears took a backseat to the bigger threat: the spread of communism. With its end, however, there was a marked shift from a bi-polar structure of world security to a more multi-polar structure, often considered to be more unpredictable and complex. Concerns increased of dispersed threats from a wide number of different non-state actors, i.e. terrorists and other criminals. Thereafter, the collapse of the Union of Soviet Socialist Republics (USSR) brought with it revelations of "loose nukes" and fears of state sponsored terrorism.[12] The 1990s also witnessed increases in illicit trafficking of nuclear and other radioactive material, leading the IAEA to, among other actions, create the Illicit Trafficking Database (ITDB) in 1995. Further, the international nuclear community started work in the late 1990s on a new treaty on the suppression of acts of nuclear terrorism and was considering the need to strengthen another on the physical protection of nuclear material. Yet, it was only after the terrorist attacks in the United States (US) on 11 September 2001 (9/11) that the international community, including the IAEA, undertook a major re-evaluation of the nuclear terrorist threat and the adequacy of the international legal framework for nuclear security ("nuclear security framework") as one means of combating this evolving threat.[13]

The rise of new terrorism, characterised by extremists willing to stop at nothing to achieve their goals, led to a redefining of nuclear security. The perspective changed from one focusing on "physical protection" (the set of legal, administrative and technical measures, including physical barriers, to physically protect nuclear material)[14] to one many years later addressing the broader issue of nuclear security covering "[t]he prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities".[15] In addition, the scope was expanded: whereas past activities focused on nuclear material, now other radioactive material, such as radioactive sources, would be a new key focus.

10. Bird, K. and M. J. Sherwin (2005), *American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer*, Alfred A. Knopf, New York.
11. For example, Osama Bin Laden's statement, "The Nuclear Bomb of Islam", declared that it was a religious "duty" for his followers to get NWs. Also, see Albright, D., K. Buehler and H. Higgins (2002), "Bin Laden and the Bomb", *Bulletin of Atomic Scientists*, Vol. 58, Issue 1, pp. 23-24; and Bunn, M. et al. (2016), *supra* note 3.
12. Allison, G. (2000), "Russia's 'Loose Nukes': The Continuing Threat to American Security", *Harvard Magazine*, September/October, No. 103, pp. 34-35. In the US, the perceived threat was reflected in the Nunn Lugar Act (the Soviet Nuclear Threat Reduction Act of 1991, 22 United States Code (USC) § 2551).
13. Brooks, F. (2005), "Preventing Nuclear Terrorism: Towards an Integrative Approach National Nuclear Security", Proceeding of the International Conference on Nuclear Security: Global Directions for the Future, London, 16-18 March 2005, pp. 51-56.
14. Vez Carmona, M. (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*, No. 76, OECD, Paris, pp. 31-48.
15. This working definition was established by the IAEA's Advisory Group on Nuclear Security (AdSec) at its 5th meeting from 1-5 December 2003 and it applies in the context of the IAEA's programmatic activities. Some years later, in 2011, a definition of nuclear security was established in the context of a states' national nuclear security regime as follows: "the prevention of, detection of, and response to, criminal or intentional unauthorized acts [by non-state actors, i.e. terrorists and other criminals] involving or directed at nuclear material, other radioactive material, associated facilities, or associated activities". IAEA (2013), "Nuclear Security Fundamentals: Objective and Essential Elements of a State's Nuclear Security Regime", *IAEA Nuclear Security Series* No. 20, IAEA, Vienna.

In as much as the accident at the Chernobyl nuclear power plant (NPP) in Ukraine (then part of the former USSR) on 26 April 1986 was considered as a "wake-up" call for the international nuclear safety community, Dr Mohammed ElBaradei, then Director General of the IAEA, cited 9/11 as a "wake-up" to all in the field of nuclear security.[16] Although the tragic events of 9/11 did not involve radioactive material and associated facilities and activities, they galvanised an unprecedented response in the field of nuclear security, which "stimulated a degree of risk taking, experimentation, and creativity that would have been impossible under normal circumstances".[17] Subsequent devastating acts of terrorism, such as the deadly bombings in Madrid (2004) and London (2005), re-emphasised the need for action. Similarly, the 2004 discovery of a secret international nuclear supply network that facilitated the illicit acquisition of nuclear technology further exemplified the threat,[18] leading Dr ElBaradei to call for "binding, treaty-based controls".[19]

While a long-standing and fundamental principle of nuclear security is that the primary responsibility for nuclear security rests with each state,[20] "nuclear security is only as good as its weakest link"[21] with terrorists and other criminals seeking to target and exploit any shortcomings. Since a malicious act anywhere is a threat to everyone everywhere (and as highlighted by the above events), international co-operation is increasingly considered a vital component to ensuring global nuclear security.[22] In this respect, a number of recent efforts and developments can be highlighted. Immediately after 9/11, the IAEA took concrete action by moving from an *ad hoc* approach of implementing its nuclear security activities to a more systematic one, encapsulated in a plan of activities approved by the IAEA policy-making organs: the Board of Governors (Board) and the General Conference (GC). Now in its fourth cycle (2014-2017), the "Nuclear Security Plan 2014-2017", reflects a continuing evolvement of the IAEA's approach to nuclear security.[23]

16. IAEA, Press Release, "IAEA General Conference Adopts Resolution on the Physical Protection of Nuclear Material and Nuclear Facilities", *IAEA Press Release* No. 2001/21 (21 September 2001).
17. Mowatt-Larssen, R. (2009), "Preventing Nuclear Terrorism: A Global Intelligence Imperative", Policy #1511, The Washington Institute for Near East Policy.
18. Boureston, J. and A. K. Semmel (2010), "The IAEA and Nuclear Security: Trends and Prospects", Policy Analysis Brief, The Stanley Foundation, Muscatine, Iowa.
19. ElBaradei, M. (2004), "Saving Ourselves From Self-Destruction", *New York Times*, The Opinion Pages, 12 February 2004.
20. IAEA (2013), "Nuclear Security Fundamentals", *supra* note 15. Nuclear security does not encompass the protection of the state against attack by another state.
21. IAEA, Press Release, "Calculating the New Global Nuclear Terrorism Threat", *IAEA Press Release* No. 2001/23 (27 October 2001).
22. See ElBaradei, M. (2005), "Nuclear Terrorism: Identifying and Combating the Risks", proceeding of the International Conference on Nuclear Security: Global Directions for the Future, London, 16-18 March 2005, pp. 3-8; Taniguchi, T. (2005), "Nuclear Security: Lessons Learned from the Past and Future Global Directions", proceeding of the International Conference on Nuclear Security: Global Directions for the Future, London, 16-18 March 2005, pp. 85-90.
23. IAEA (2002), "Protection Against Nuclear Terrorism: Specific Proposals", IAEA Doc. GOV/2002/10, IAEA, Vienna; IAEA (2005), "Nuclear Security – Measures to Protect Against Nuclear Terrorism: Progress Report and Nuclear Security Plan for 2006-2009", IAEA Doc. GC(49)/17, IAEA, Vienna; IAEA (2009), "Nuclear Security Plan 2010-2013", IAEA Doc. GOV/2009/54-GC(53)/18, IAEA, Vienna; and IAEA (2013), "Nuclear Security Plan 2014-2017", IAEA Doc. GOV/2013/42-GC(57)/19 and Corr.1, IAEA, Vienna. The results of the International Conference on Nuclear Security: Commitments and Actions, Vienna, 5-9 December 2016, will also serve as important input for the preparation of the IAEA's next Nuclear Security Plan, which will cover the period 2018-2021.

Although various fora continue to recognise the IAEA's central role in strengthening nuclear security globally,[24] the IAEA is not the only relevant IGO and body in the field. Following 9/11, the UN General Assembly (UNGA) took up the terrorism debate with increased vigour, reaffirming the relevance of co-operation and international law in combating terrorism. Significantly, to deal with the "burgeoning problem",[25] the UN Security Council (UNSC) issued two resolutions (UNSCRs) – UNSCR 1373[26] and UNSCR 1540[27] – that are legally binding on all UN member states. Further, as outlined in Part 2 a number of new and revised international legally binding and non-binding nuclear security instruments were adopted by and under the auspices of the UN, the IAEA, the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO). These are supplemented by non-legally binding technical guidance and recommendations such as INFCIRC/225/Revision 5.[28] In addition, there are voluntary, on request and non-legally binding processes of peer review by experts at the request of a state (IAEA nuclear security peer reviews).[29]

Distinct from an approach centred on multilateral treaties are the various non-treaty based initiatives, the majority being established post-9/11.[30] These include the Nuclear Threat Initiative (NTI), the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (Global Partnership), the European Union's (EU) Strategy against the Proliferation of Weapons of Mass Destruction (WMD) (EU WMD Strategy), the Global Threat Reduction Initiative (GTRI), the Global Initiative to Combat Nuclear Terrorism (GICNT) and the UN Global Counter-Terrorism Strategy.[31]

24. IAEA (2013), Ministerial Declaration, International Conference on Nuclear Security: Enhancing Global Efforts, Vienna, 1-5 July 2013. It was the first time that the Agency had convened such a conference. The second is schedule to be held in 2016 (International Conference on Nuclear Security: Commitments and Actions, Vienna, 5-9 December 2016).
25. Boureston, J. and A. K. Semmel (2010), *supra* note 18.
26. UNSCR 1373 (2001), "Threats to international peace and security caused by terrorist acts", UN Doc. S/RES/1373, adopted on 28 September 2001.
27. UNSCR 1540 (2004), "Non-proliferation of weapons of mass destruction", UN Doc. S/RES/1540, adopted on 28 April 2004.
28. IAEA (2011), "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities", IAEA Doc. INFCIRC/225/Revision 5, *IAEA Nuclear Security Series* No. 13.
29. In particular, there is the International Physical Protection Advisory Service (IPPAS) and the International Nuclear Security Advisory Service (INSServ) missions.
30. Luongo, K. (2012), "Nuclear Security Governance for the 21st Century: An Action Plan for Progress", Partnership for Global Security, NSGEG Workshop on Improving Nuclear Security Regime Cohesion, Seoul, South Korea, 18-19 July 2012.
31. In particular, in January 2001 the NTI was established as non-profit, nonpartisan organisation by Ted Turner and Sam Nunn. In 2002, the Global Partnership ("10 Plus 10 Over 10 Program") was established as a voluntary international partnership within the then framework of the G8. Further, in December 2003 the EU WMD Strategy was adopted. Council of the European Union (2003), "Fight against the proliferation of weapons of mass destruction – EU strategy against proliferation of Weapons of Mass Destruction", 15708/03, Brussels, Belgium, 10 December 2003. In 2004, the GTRI was established by the US, again as a voluntary international partnership. In July 2006, another informal and voluntary international partnership, the GICNT was established by the US and the Russian Federation and it currently comprises more than 86 states and 5 IGOs. In September 2006, the "United Nations Global Counter-Terrorism Strategy" was unanimously adopted by the UN General Assembly in the form of a resolution and an annexed Plan of Action. UNGA (2006), "The United Nations Global Counter-Terrorism Strategy", UN Doc. A/RES/60/288, adopted on 8 September 2006 (20 September 2006). The adoption of the Strategy was the first time that all UN member states agreed to a common strategic and operational framework to fight terrorism. Reviewed every two years, the fifth review of the Strategy took place in July 2016. UNGA (2016), "The United Nations Global Counter-Terrorism Strategy Review", UN Doc. A/RES/70/291, adopted on 1 July 2016 (19 July 2016). Finally, mention should also be made to the Proliferation

Generally, these initiatives can be credited for doing a significant amount of work in strengthening nuclear security world-wide, for example, by addressing a major concern regarding the need to convert research reactors from HEU to low enriched uranium (LEU).[32]

In addition, a significant driver of enhanced high-level international nuclear security co-operation in recent years has been the series of *ad hoc* biennial summits of heads of state and governments, referred to as the Nuclear Security Summit (NSS) process. Formally announced by US President Barack Obama in 2009, four NSSs have been held to-date: the first in 2010 in Washington, then in 2012 in Seoul, thereafter in 2014 in The Hague (2014 NSS) and finally again in Washington in March 2016 (2016 NSS), with this being the last in the series in this format.[33] Complementary to the official process, the Summits inspired collaboration across a broader community involving governments, IGOs, the nuclear industry and civil society. Driven by these Summits, nuclear security has remained a major global issue, at the top of the international security agenda. The NSSs generated substantial tangible achievements and some so-called "quick results", such as the removal of nuclear material from countries and facilities and the minimisation of HEU. Although no legally binding multilateral treaties have resulted from the NSS process, a number of legally non-binding initiatives did result, some of which are relevant to efforts to strengthen the nuclear security framework. Significantly, the NSS process can also be merited with driving states' adherence to the international nuclear security legal instruments. Notably, the outreach in the run-up to and during the NSS 2016 to the state parties to the Convention on the Physical Protection of Nuclear Material (CPPNM)[34] by the IAEA and the US (together with other like-minded states such as the Netherlands and the UK), is directly linked to the entry into force of the Amendment to the Convention on

Security Initiative (PSI) and the World Institute for Nuclear Security (WINS). The PSI was launched by the US in May 2003 and it is another voluntary international partnership that is currently comprised of more than 100 states. The PSI is a global effort that aims to stop trafficking of WMD, their delivery systems, and related materials to and from states and non-state actors of proliferation concern. In 2008, WINS was created as a membership-based international non-governmental organisation. WINS provides an international industry-level forum to share best practices in strengthening the physical protection and security of nuclear and other radioactive materials and associated facilities worldwide.

32. In this context, the GTRI (and its predecessor programmes) are responsible for the removal or disposition of more than 5 140 kilograms of HEU and plutonium, which is more than enough material for over 205 nuclear bombs. Further, since 2004, the GTRI has successfully converted to LEU fuel or verified the shutdown of 49 HEU research reactors in 25 countries. NNSA (2014), "GTRI: Reducing Nuclear Threats", https://nnsa.energy.gov/mediaroom/factsheets/reducingthreats.
33. Communiqué of the Washington Nuclear Security Summit, 2010; Communiqué of the Washington Nuclear Security Summit, 2012; Communiqué of The Hague Nuclear Security Summit, 2014; and Communiqué of the Washington Nuclear Security Summit, 2016. For a background on the NSSs from 2010-2014, see Loukianova, A. (2015), "Improving Nuclear Security – One Summit at a Time", *Global Summitry*, No. 2015/1, Oxford University Press, Oxford, pp. 84-94; Wilke, S. (2010), "Q&A with Gary Samore and Laura Holgate", Belfer Center for Science and International Affairs, Harvard Kennedy School; Holgate, L. (2011), "The Outcomes of the 2010 Washington Summit", US Department of State; Cann, M., K. Davenport and S. Williams (2014), "The Nuclear Security Summit: Assessment of Joint Statements", Arms Control Association and Partnership for Global Security, Washington, DC.; Toby, W. (2016), "Descending From the Summit: The Path Toward Nuclear Security 2010-2016 and Beyond", Policy Analysis Brief, The Stanley Foundation, Muscatine, Iowa; Cann, M., K. Davenport and J. Parker (2015), "Keeping tabs on nuclear security commitments", *Bulletin of the Atomic Scientists*, 31 March 2015.
34. Convention on the Physical Protection of Nuclear Material, (1980), IAEA Doc. INFCIRC/274 Rev. 1, 1456 UNTS 125, entered into force 8 February 1987.

the Physical Protection of Nuclear Material (ACPPNM or CPPNM Amendment),[35] on 8 May 2016.[36]

1.3 Purported gaps, weak links and proposed strengthening measures

> "… we must not wait for a 'watershed' nuclear security event to provide the needed security upgrades"
> Dr Mohamed ElBaradei, IAEA Director General (2005)[37]

Despite the dire warnings of Oppenheimer and Taylor, fortunately there has not been a "watershed nuclear security event"[38] such as the detonation by terrorists or other criminals of a NW, the detonation of an improvised nuclear explosive device (IND), the explosion of a radiological dispersal device (RDD or, in other words, a "dirty bomb"), the use of a radiation exposure device (RED) or the sabotage of nuclear or other radioactive material or associated facilities.[39] Yet, there are examples of the willingness of non-state actors to carry-out such acts.[40] Further, ongoing terrorist activities by the Islamic State and other terrorist organisations in countries such as Syria, Iraq and beyond, will likely continue to influence the nuclear terrorist threat in the near- to mid-term future.

Against the backdrop of the continuing threat, the progress made to-date and the high-level political attention on nuclear security through the NSS process, concerns still remain regarding the adequacy of the nuclear security framework. A deeper analysis identifies a number of common issues, in the form of apparent gaps and weak links. In particular, some commentators cite unease with the apparent complexity of the framework and the lack of universal adherence to the key international legal instruments on nuclear security and an absence of binding nuclear security standards and mandatory peer review, as well as a lack of sustained reporting and information sharing.[41] In this context, it has been asserted that the nuclear security framework is inadequate and uneven, that real-world international co-operation and consensus on nuclear security remains weak and that the

35. Amendment to the Convention on the Physical Protection of Nuclear Material (2005), IAEA Doc. INFIRC/274/Rev.1/Mod.1, entered into force 8 May 2016.
36. This was a month after the deposit of the instrument of ratification by Nicaragua, which brought the number of adherences to 102 states parties to the CPPNM, the threshold required, pursuant to Article 20, for the agreement to come into effect in 30 days. Wetherall, A. and V. Fournier (2016), "Key Nuclear Security Agreement to Enter into Force on 8 May", IAEA News (8 April 2016).
37. ElBaradei, M., *supra* note 22.
38. IAEA (2005), "'New Reality', Shaping Nuclear Security's Global Directions", IAEA News (16 March 2005).
39. A first scenario could concern an incident involving the acquisition of fissile material (stolen or purchased) from a country, and subsequent construction, delivery and successful detonation of a crude IND in the capital of that country, together with multiple credible threats in other cities worldwide. A second scenario could concern an incident involving the successful insider sabotage of a research reactor or NPP located in a country. Finally, a third scenario could concern an incident involving the acquisition of radioactive sources (stolen or purchased) in a country and the subsequent construction, delivery and successful large explosions of two RDDs in the capitals of two other countries, together with multiple credible threats to other cities worldwide. The potential acquisition and subsequent detonation of an intact nuclear weapon is not considered in the context of a "watershed nuclear security event" for the purpose of this article.
40. Osama Bin Laden's statement, "The Nuclear Bomb of Islam", *supra* note 11.
41. Brill, K. C. and J. Bernhard (2015), "Closing the gaps in nuclear security", *The Washington Post*, 26 March 2015; Bunn, M. et al. (2014), *Advancing Nuclear Security: Evaluating Progress and Setting New Goals*, Cambridge, Mass., Report for Project on Managing the Atom, Belfer Center for Science and International Affairs, Harvard Kennedy School, 18 March 2014; and FMWG (2014), *supra* note 6.

co-ordinated global response has been inadequate.[42] For example, some commentators attribute the apparent gaps to the fragmented and largely voluntary nature of the framework.[43] They also consider that the framework lags behind other branches of international nuclear law, such as the international legal framework for nuclear safety ("nuclear safety framework").[44] On this point, however, it should not be overlooked that nuclear security, when considered as a whole, is essentially the branch of international nuclear law that can be deemed as being most recently established and as having witnessed the most recent significant developments.[45]

Overall, commentators have differing views on how to address the apparent deficiencies with various strengthening measures being proposed and which can be grouped in two categories: legally binding (so-called "hard law") and legally non-binding (so-called "soft law"). The Nuclear Security Governance Experts Group (NSGEG),[46] for example, foresees the need for a mix of soft and hard law approaches over a period of time. As a first step, the focus is to take advantage of the existing instruments. These so-called "easy fixes" include consolidating the framework through universal adherence to the instruments while more long-term measures are focused on closing the gaps, for example, by establishing binding nuclear security standards.

In this context, there are those who see the creation of law as the panacea and continue to repeat calls for legally binding approaches to address the apparent deficiencies. They advocate the development of legally binding measures consisting of mandatory peer reviews and binding standards which, for example, could be established by way of a proposed legally binding, overarching and comprehensive framework convention on nuclear security (the "framework convention").[47] Others may nurture such a hard law approach but appear somewhat resigned to the probability that such a legally binding approach is extremely unlikely to be established in the near- to mid-term future. Consequently, their focus for now appears to be on developing legally non-binding measures[48] in which the framework integrates incentive-based approaches utilised in the nuclear safety framework. For example, voluntary assurances and confidence-building actions, such as voluntarily inviting IAEA nuclear security peer reviews[49] and the giving of certain political commitments.

1.4 *Sovereignty, secrecy and complacency*

Before examining in more detail the purported gaps and weak links, the overarching considerations of sovereignty, secrecy and complacency that impact on state behaviour, and thus the development of the framework, are briefly considered.

42. FMWG (2014), *supra* note 6; Boureston, J. and A. K. Semmel (2010), *supra* note 18; and Bunn, M. et al. (2014), *supra* note 41.
43. Brill, K.C. and J. Bernhard (2015), *supra* note 41.
44. Luongo, K. (2012), *supra* note 30.
45. Stoiber, C. (2012), "Recent Developments in Nuclear Security Law", 20th Nuclear Inter Jura Congress on "The Evolution of Nuclear Law after Fukushima", Manchester, United Kingdom, 8-11 October 2012.
46. The NSGEG includes experts representing the Global Partnership, Stanley Foundation and the Asan Institute for Policy Studies. NSGEG (2014), "Preventing Weak Links in Nuclear Security: A Strategy for Soft and Hard Governance: Summary Report & Initial Policy Recommendations, March 2014", NSGEG.
47. Brill, K. C. and Bernhard J. (2015), *supra* note 41; and FMWG (2014), *supra* note 6.
48. FMWG (2015), "The Results We Need in 2016: Policy Recommendations for the Nuclear Security Summit".
49. Communiqué of The Hague Nuclear Security Summit (NSS) 2014, *supra* note 33.

An essential internationally agreed element of nuclear security is that responsibility for nuclear security within a state rests entirely with the state.[50] Yet, a major nuclear security event anywhere would pose an unacceptable risk and threat everywhere. All countries therefore have an interest in the effectiveness of the global nuclear security architecture. International co-operation (as well as greater openness and transparency, including the sharing of information) to eliminate weak links is therefore increasingly considered as being a hallmark of the international nuclear community's efforts to combat nuclear terrorism. In this regard, a major challenge in developing the nuclear security framework is the need to carefully balance international responsibility and national sovereignty so that both can be properly addressed. In this context, some commentators have emphasised that states' efforts to protect their sovereignty over nuclear security matters mean that "everyone has the right to do as little" as they choose, which has been considered as tightly constraining efforts to establish binding nuclear security standards.[51] Another major challenge is the need to delicately maintain a balance between transparency and secrecy, the latter having dominated nuclear security, more so than in the field of nuclear safety. As the IAEA International Nuclear Safety Advisory Group (INSAG) highlights, "the general rule in the nuclear safety area […] is to pursue transparency [while] in the security field, the sharing of information should typically be restricted to […] prevent sensitive information […] from falling into the hands of adversaries".[52] For example, a legitimate concern of states means they are less willing to share information related to physical protection for fear of compromising their material and facilities. Such states insist that information on physical protection be classified to avoid misuse. While there may well be a common interest of states to have assurances regarding the status of nuclear security in other states, secrecy continues to outweigh transparency. Even though the sharing of information on national legislation and regulations is not *per se* sensitive, there is a pervading lack of commitment of states to demonstrate to one another the level of compliance and extent of national implementation of their respective obligations. Taken together with sovereignty, it follows (as highlighted below) that compared to the treaty-based mandatory mechanisms in the nuclear safety framework, peer reviews and information exchange have, to date, not played as significant a role in the context of the development and implementation of the framework.

Finally, the complacency of leaders and politicians, as well as officials at all levels, including nuclear managers, security-relevant staff and others, has been identified as the single most important obstacle to nuclear security progress: more particularly, it is considered as being "the enemy of action", with an unwillingness to act if the threat is not deemed real and urgent.[53] Indeed, three years after 9/11, the US Nuclear Security Advisory Group in referring to the US as "sleepwalking on WMD", identified that the connections between the rhetoric of politicians and

50. IAEA (2013), *supra* note 15.
51. Bunn, M. (2007), "Guardians at the Gates of Hell: estimating the risk of nuclear theft and terrorism – and identifying the highest-priority risks of nuclear theft", Massachusetts Institute of Technology; and Squassoni, S. (2012), "U.S. Official Rejects Call for International Nuclear Security Standards", Global Security Newswire, Guarino D., 1 May 2012.
52. INSAG (2010), "The Interface Between Safety and Security at Nuclear Power Plants", INSAG-24, IAEA, Vienna, p. 10.
53. Bunn, M. (2007), *supra* note 51; Bunn, M. et al. (2016), *supra* note 3; and Toby, W. (2016), *supra* note 33. Worryingly, the survey by Bunn, M. and E. Harrell identifies that "security officials in many countries still see nuclear theft or sabotage as implausible". Bunn, M., and E. Harrell (2016), "Threat Perceptions and Drivers of Change in Nuclear Security Around the World: Results of a Survey", Cambridge, MA: Project on Managing the Atom, Belfer Center for Science and International Affairs, Harvard Kennedy School, March 2014.

leaders and the necessary actions had not been made.[54] Similarly, Dr ElBaradei[55] also queried five years after 9/11 why "with clear signs of terrorists trying to acquire nuclear material through criminal networks [is the international nuclear community] still moving so sluggishly to get rid of global HEU stockpiles, and to minimise civilian uses of HEU?" Although clearly debatable, it was more recently submitted that getting states to now focus on nuclear security appears more difficult following the accident at the Fukushima Daiichi NPP on 11 March 2011[56] since they considered nuclear safety to be a more pressing concern than nuclear security.[57] Finally, in the context of complacency it is noted that as the NSS process was drawing to an end, it was observed that some states considered that the political agenda of the Summits had in fact been exhausted.

The purpose of raising these overarching considerations is not to address them in detail, as each merits its own study. Indeed, there are also other considerations such as political disputes, bureaucratic procedures and organisational incentives, as well as technical and cost concerns that can be considered as obstacles to nuclear security progress. The aim, rather, is to simply note that such overarching considerations have clearly impacted the development of the nuclear security framework. Until these barriers can be overcome, they will continue to play a role in determining the likelihood of the proposed strengthening measures being used to address the gaps and weak links, if at all.

Part 2: Overview of the international legal framework for nuclear security

2.1 Introduction to the international legal framework for nuclear security

Before exploring the purported gaps and weak links of the framework, an important first step is to identify the main relevant international legally binding and non-binding instruments in the field of nuclear security. These instruments, adopted by and under the auspices of the UN, IAEA, IMO and ICAO, can be divided into the following three groups: treaties, UNSCRs, and other IAEA instruments and texts. Since there already exists a rich body of literature on the history and substantive provisions of these instruments a detailed examination is not undertaken.[58]

2.1.1 IAEA, UN, IMO and ICAO treaties comprising the common universal legal framework against terrorism

The nuclear security framework currently includes seven treaties that are also part of the 19 treaties (adopted since 1963) comprising the so-called "common universal legal framework against terrorism".[59] In particular, there are the two key treaties on

54. Ashton, C. (2005), "Worst Weapons in Worst Hands: U.S. Inaction on the Nuclear Terror Threat since 9/11, and a Path of Action", Report for National Security Advisory Group, Washington, DC, July 2005.
55. ElBaradei, M. and J. G. Store (2006), "How the world can combat Nuclear Terrorism", *IAEA Bulletin*, Vol. 48-1, September 2006.
56. An overview of the accident is available at IAEA (2016), Fukushima Nuclear Accident, www.iaea.org/newscenter/focus/fukushima.
57. Findlay, T. (2013), "Unleashing the Nuclear Watchdog: Strengthening and Reform of the IAEA", Centre for International Governance Innovation, Waterloo, Ontario, Canada.
58. IAEA (2011), "The International Legal Framework for Nuclear Security", IAEA *International Law Series* No. 4, IAEA, Vienna.
59. This framework also includes UNSCRs. See also "United Nations Global Counter-Terrorism Strategy", Resolution adopted by the UN General Assembly, 13 October 2010, A/RES/64/297. See also United Nations Office on Drugs and Crime (UNODC) (2010), The Universal Legal Framework Against Terrorism, Counter-Terrorism Legal Training Curriculum, Module 2, UNODC, Vienna.

the physical protection of nuclear material and nuclear facilities, namely, the CPPNM and the CPPNM Amendment,[60] adopted under the auspices of the IAEA in 1979 and 2005, respectively.

The CPPNM has a threefold scope of application. First, it applies to the physical protection of nuclear material used for peaceful purposes during international transport (and storage incidental to such transport). More particularly, the CPPNM addresses the physical protection of international nuclear transport of material (further to the three categories of material and the levels of protection as set out in the two Annexes thereto). It does not, however, include requirements for the physical protection of nuclear material used for peaceful purposes in domestic use, storage and transport and nuclear facilities. Further, in focusing on nuclear material used for peaceful purposes, it excludes the approximately 83% of fissile material held in military stocks.[61] Second, it provides for the criminalisation of offences, such as the theft or robbery of nuclear material. Finally, it addresses international co-operation, for example, in the case of theft, robbery or any other unlawful taking of nuclear material or credible threat thereof. Although the focus of the CPPNM is considered as being primarily on the physical protection of nuclear material during international transport (used for peaceful purposes), its criminalisation and international co-operation provisions apply equally to nuclear material (used for peaceful purposes) in domestic use, storage and transport.[62]

In July 2005, CPPNM states parties agreed to amend the Convention so as to also make it legally binding to protect nuclear facilities and nuclear material in peaceful domestic use, storage as well as transport.[63] In this context, the Convention on the Physical Protection of Nuclear Material and Nuclear Facilities was finally established upon the entry into force of the CPPNM Amendment on 8 May 2016. It provides a "core" undertaking and useful principles (i.e. Fundamental Principles) though it does not, strictly speaking, include particular standards for how secure nuclear material should be. The Amended Convention also provides for expanded co-operation between and among states, for example, to mitigate any radiological consequences of sabotage of a nuclear facility. States also need to prevent and combat the specified offences such as "smuggling" of nuclear material and the "sabotage" of a nuclear facility.

60. On 8 May 2016, some ten years after the adoption of the CPPNM Amendment, it finally entered into force creating the Convention on the Physical Protection of Nuclear Material and Nuclear Facilities. INFCIRC/274/Rev.1/Mod.1, 9 May 2016, contains an unofficial consolidated text of the amended Convention, known as the Convention on the Physical Protection of Nuclear Material and Nuclear Facilities (CPPNMNF or Amended Convention).
61. It is noted that a preambular paragraph to the ACPPNM provides that: "Recognizing also that effective physical protection of nuclear material and nuclear facilities used for military purposes is a responsibility of the State possessing such nuclear material and nuclear facilities, and understanding that such material and facilities are and will continue to be accorded stringent physical protection".
62. More particularly, paragraph 2 of Article 3 of the CPPNM provides that "[w]ith the exception of articles 3 and 4 and paragraph 3 of article 5, th[e] Convention shall also apply to nuclear material used for peaceful purposes while in domestic use, storage and transport".
63. For additional information on the negotiating history and the Final Act of the Conference see IAEA (2005), "Nuclear Security – Measures to Protect Against Nuclear Terrorism: Amendment to the Convention on the Physical Protection of Nuclear Material", IAEA Doc. GOV/INF/2005/10-GC(49)/INF/6, IAEA, Vienna. Also, see Vez Carmona, M. (2005), *supra* note 14.

Additionally, the framework includes the International Convention for the Suppression of Terrorist Bombings (the Terrorist Bombings Convention)[64] and the Nuclear Terrorism Convention[65] adopted under the auspices of the UN in 1997 and 2005, respectively. Further, there is the 2005 Protocol to the 1988 SUA Convention[66] and the Protocol to the 1988 Fixed Platforms Protocol,[67] both adopted under the IMO's auspices in 2005. Finally, there is the 2010 Beijing SUA Convention,[68] adopted under the auspices of ICAO in 2010 (and which is not yet in force). These IMO and ICAO treaties, focused on the "suppression of unlawful acts" (SUA), are considered as simply applying the broad template in existing terrorism treaties to nuclear terrorism.[69] Furthermore, unlike the CPPNM and CPPNMNF, these instruments (ICSANT and the Terrorist Bombings Convention) do not substantively address physical protection.[70] However, as for the CPPNM and CPPNMNF, they do share a common obligation for states parties to make certain specified acts criminal offences in national law. In this context, the instruments can be considered as establishing offences in three broadly defined categories: those related to dangerous materials (i.e. UN terrorist instruments); those related to ships and fixed platforms (i.e. IMO SUA instruments); and those related to civil aviation (i.e. ICAO SUA instrument). In this context, these instruments identify bases for the establishment of jurisdiction over an offence and incorporate the principle of *aut dedere aut judicare* (extradite or prosecute). Finally, they enable parties to engage in international co-operation and assistance, in particular, as concerns mutual legal assistance and extradition of alleged offenders, with regard to their respective objectives.

64. International Convention for the Suppression of Terrorist Bombings (1997), 2149 UNTS 284, entered into force 23 May 2001 (Terrorist Bombings Convention). The Terrorist Bombings Convention is not solely focused on precisely demarcated types of activity, i.e. involving maritime navigation or civil aviation, but focuses on the suppression of terrorist bombings, irrespective of location and medium used.
65. Although adopted in April 2005 shortly before the CPPNM Amendment, the ICSANT only required, in accordance with its Article 25(1), 22 parties for it to enter into force, which it did on 7 July 2007. At the time of writing, it has 107 parties and 115 signatories. The UN *Ad hoc* Committee established by UNGA Resolution A/RES/51/210 (1996) "Measures to eliminate international terrorism" was mandated to elaborate, as a matter of priority, the Terrorist Bombings Convention and the ICSANT. In 1998, based on a text presented by the Russian Federation, the *Ad hoc* Committee commenced its work on the draft ICSANT. See Jankowitsch-Prevor, O. (2005), "International Convention for the Suppression of Acts of Nuclear Terrorism", *Nuclear Law Bulletin*, No. 76, OECD, Paris, pp. 7-27.
66. Protocol to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (2005), IMO Doc. LEG/CONF.15/21, entered into force 28 July 2010.
67. Protocol of 2005 to the Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms Located on the Continental Shelf (2005), IMO Doc. LEG/CONF.15/22, entered into force 28 July 2010.
68. Convention on the Suppression of Unlawful Acts Relating to International Civil Aviation (2010), ICAO Doc. 9960, not yet in force (2010 Beijing Convention). The 2010 Beijing Convention will enter into force on the first day of the second month following the date of deposit of the 22nd instrument of ratification, acceptance, approval or accession (Article 22, 2010 Beijing Convention). It currently has 32 signatures, 9 ratifications, 6 accessions and 1 acceptance. Upon entering into force, it will replace the Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation (1971) 974 UNTS 178, entered into force 26 January 1973 (Montreal Convention).
69. Saul, B. (2014), *Research Handbook on International Law and Terrorism*, Research Handbooks in International Law, University of Sydney, Australia, p. 109.
70. That said, under Article 8, ICSANT states parties are still required, for example, to make every effort to adopt appropriate measures to ensure the protection of radioactive material, taking into account relevant recommendations and functions of the IAEA. Also, under Article 18.1, ICSANT states parties are to have regard to the physical protection recommendations and health and safety standards published by the IAEA with respect to radioactive material, devices or nuclear facilities brought under control or seized after an offence.

2.1.2 *UNSCRs*

The nuclear security framework also includes two important UNSC Resolutions adopted under Chapter VII of the UN Charter concerning threats to the peace, breaches of the peace and acts of aggression. Consequently, both Resolutions are binding on all (currently 193) UN member states.[71] UNSCR 1540 is the first ever resolution to focus on the potential acquisition of WMD by non-state actors. It provides, *inter alia*, that all states must adopt and enforce "appropriate effective" laws prohibiting any non-state actor to manufacture, acquire, possess, develop, transport, transfer or use NWs and their means of delivery, in particular for terrorist purposes, as well as ancillary crimes associated therewith. In this context, states must put in place "appropriate effective" physical protection measures for NWs and related materials, though the term "appropriate effective"[72] was (intentionally) not defined and nor has it been subsequently elaborated upon by the 1540 Committee (or its Group of Experts), which was established to monitor and foster implementation of the Resolution.[73] Prior to the entry into force of the CPPNM Amendment on 8 May 2016 (with the exception of the regional Treaty of Pelindaba[74] and Semipalatinsk Treaty[75]) it was essentially the only international legal instrument requiring physical protection measures for nuclear material in domestic use, storage and transport. The other Resolution adopted under Chapter VII, UNSCR 1373, primarily focuses on preventing and suppressing the financing and preparation of any acts of terrorism.[76] It establishes a framework for improved international co-operation against terrorism. One of its substantive provisions is the call on states to adhere to and fully implement the universal terrorism treaties.

71. Charter of the United Nations, 24 October 1945, 1 UNTS XVI.
72. Bunn, M. (2008), "'Appropriate Effective' Nuclear Security and Accounting – What is It?", Presentation, "Appropriate Effective" Material Accounting and Physical Protection: Joint Global Initiative/UNSCR 1540 Workshop, Nashville, Tennessee, 18 July 2008. The important role of UNSCR 1540 in strengthening global nuclear security and reducing the threat of nuclear terrorism has been underscored in the 2010 Washington Nuclear Security Summit Communiqué and Work Plan; the 2012 Seoul Nuclear Security Summit Communiqué; the 2014 Hague Nuclear Security Summit Communiqué; and the follow-up resolutions to UNSCR 1540, particularly UNSCR 1977 (2011), "Non-proliferation of weapons of mass destruction", UN Doc. S/RES/1977, adopted on 20 April 2011. Understandably so, however, the 2016 NSS Communiqué and the "Joint Statement on Promoting Full and Universal Implementation of [UNSCR 1540 (2004)]", as with other such statements and Communiqués, does not clarify the issue of the meaning of "appropriate effective" physical protection measures.
73. The resolution also established a committee (the "1540 Committee") consisting of all UNSC members, tasked with monitoring implementation. In 2011, the UNSC extended the life of the 1540 Committee for another ten years to 2021. It also strengthened its role with respect to providing assistance and co-operating with other organisations (UNSCR 1977). Over the years, the UNSC has reaffirmed the measures foreseen in UNSCR 1540 (2004) in other UNSCRs, e.g. 1673 (2006); 1810 (2008); 1977 (2011); and 2055 (2012).
74. African Nuclear-Weapon-Free Zone Treaty (1996), 35 I.L.M. 698, entered into force 15 July 2009 (Pelindaba Treaty).
75. Treaty on a Nuclear-Weapon-Free Zone in Central Asia (2006), No. 51633, entered into force 21 March 2009 (Semipalatinsk Treaty).
76. UNSCR 1373 (2001), *supra* note 26. The Counter Terrorism Committee (CTS) (assisted by a Counter Terrorism Committee Executive Directorate (CTED)) was established as a subsidiary UNSC body to facilitate the provision of assistance to states and monitor compliance.

2.1.3 *Other legally binding and non-binding IAEA instruments not comprising the common universal legal framework against terrorism*

This final group includes the Early Notification[77] and Assistance Conventions[78] adopted under the auspices of the IAEA in 1986. Although adopted primarily as a direct response to the Chernobyl accident, they provide the basis for the practical and operational international emergency preparedness and response system (implied by the IAEA) that applies to events regardless of origin, i.e. an accident or an intentional act.

In addition, there is also the legally non-binding revised IAEA Code of Conduct on the Safety and Security of Radioactive Sources of 2003 (the Code of Conduct).[79] This instrument is widely accepted by states as the primary instrument for the security of sealed radioactive sources that may pose a significant risk to individuals, society and the environment, i.e. those listed in Annex I of the Code (as Categories 1 to 3). Its objectives include preventing the unauthorised access or damage to, and loss, theft or unauthorised transfer of, sealed radioactive sources, so as to, for example, reduce the likelihood of their malicious use. Initially adopted in September 2000, this revised Code reflects the change in states' perception of threats in light of 9/11. It therefore includes strengthened provisions relating to the security of sealed radioactive sources and additional components concerning national registries of such sources. Established in 2005 (and revised in 2012), supplementary guidance to the Code addresses the import and export of sealed radioactive sources.[80] As a counterbalance to the legally non-binding nature of the Code and Guidance (and its supplementary guidance), the endorsing resolutions of the GC provide for states to voluntarily write to the IAEA Director General to express their commitment to implement them.[81] To date, 133 states have done so for the Code

77. Convention on Early Notification of a Nuclear Accident (1986), IAEA Doc. INFCIRC/335, 1439 UNTS 275.
78. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986), IAEA Doc. INFCIRC/336, 1457 UNTS 133.
79. Code of Conduct on the Safety and Security of Radioactive Sources (2004), IAEA Doc. IAEA/CODEOC/2004, IAEA, Vienna. The Code was first published in 2001 but was revised in order to strengthen, *inter alia*, its nuclear security provisions further to the findings of the IAEA's International Conference on Security of Radioactive Sources, Vienna, 10-13 March 2003. The Code of Conduct addresses "radioactive source[s]", which "means radioactive material that is permanently sealed in a capsule or closely bonded, in a solid form and which is not exempt from regulatory control. It also means any radioactive material released if the radioactive source is leaking or broken, but does not mean material encapsulated for disposal, or nuclear material within the nuclear fuel cycles of research and power reactors". In addition to these categories, states should also give appropriate attention to radioactive sources considered by them to have the potential to cause unacceptable consequences if employed for malicious purposes, and to aggregations of lower activity sources which require management under the principles of the Code. As reflected in the reports of the Chairman of the various meetings on the sharing of information between states (see *infra* note 83), there is no agreement to change the legally non-binding status of the Code to a legally binding one.
80. IAEA Guidance on the Import and Export of Radioactive Sources (2012) (Guidance), IAEA Doc. IAEA/CODEOC/IMO-EXP/2012, IAEA, Vienna. The supplementary Guidance was first adopted by the Board and endorsed by the GC in 2004 (to support the import and export provisions of the Code of Conduct) but was revised in 2012.
81. IAEA (2003), General Conference Resolution: "Measures to Strengthen International Co-operation in Nuclear, Radiation and Transport Safety and Waste Management", IAEA Doc. GC(47)/RES/7.B (2003), adopted on 19 September 2003 and IAEA (2004), General Conference Resolution, "Measures to Strengthen International Cooperation in Nuclear, Radiation and Transport Safety and Waste Management", IAEA Doc. GC(48)/RES/10.D, adopted on 24 September 2004.

and 106 for the Guidance.[82] Additionally, in 2006 the Board endorsed a voluntary and formalised peer review process pursuant to which states, in international and regional meetings, can periodically exchange information and lessons learnt and evaluate each other's progress.[83] In this context, the Resolution of the 2015 GC "encourage[ed] Member States to [continue to] support the[se] dedicated international [review] meetings under the auspices of the IAEA on the Code of Conduct".[84]

Finally, the legal instruments are also supplemented by new and revised non-legally binding IAEA technical guidance published since 2006 in the IAEA Nuclear Security Series.[85] Most significant, with respect to the implementation of the

82. More particularly, IAEA member states were urged "to write to the Director General that [they] fully support and endorse the IAEA's efforts to enhance the safety and security of radioactive sources, [that they are] working toward following the guidance contained in the [Code], and encourage[d] other countries to do the same" (see operative paragraph 6 of IAEA General Conference Resolution GC(47)/RES/7.B). Similarly, the 2004 GC encouraged states, with respect to the Supplementary Guidance, "to act in accordance with the Guidance on a harmonized basis and to notify the Director General of their intention to do so as supplementary information to the Sources Code". See operative paragraph 8 of IAEA General Conference Resolution GC(48)/RES/10.
83. Report of the Chairman (2006), "A Process for the Sharing of Information as to States' Implementation of the Code of Conduct on the Safety and Security of Radioactive Sources and its associated Guidance on the Import and Export of Radioactive Sources", Attachment to Chair report, Meeting of technical and legal experts for Consultations with States with a view to establishing a formalized process for a periodic exchange of information and lessons learned and for the evaluation of progress made by States towards implementing the Code of Conduct on the Safety and Security of Radioactive Sources (TM-28817). The last international meeting of this kind was held this year in Vienna. See the Report of the Chairman (2016), "Open-ended Meeting of Technical and Legal Experts for Sharing of Information on States' Implementation of the Code of Conduct on the Safety and Security of Radioactive Sources and its supplementary Guidance on the Import and Export of Radioactive Sources", Vienna, 30 May-3 June 2016. Of note are the Guidelines regarding National Papers on the Implementation of the Code of Conduct on the Safety and Security of Radioactive Sources and its Associated Guidance on the Import and Export of Radioactive Sources, Version 2016-06-03, *ibid*., pp. 1-8.
84. IAEA (2015), General Conference Resolution: "Measures to strengthen international cooperation in nuclear, radiation, transport and waste safety", IAEA Doc. GC(59)/RES/9, adopted on 17 September 2015. It is also noted that the Resolution of the 2016 GC "[r]equest[ed] the Secretariat to continue to foster information exchange on implementation of the Code […] and its supplementary Guidance […];". IAEA (2016), General Conference Resolution: "Measures to strengthen international cooperation in nuclear, radiation and transport and waste safety", IAEA Doc. GC(60)/RES/9, adopted on 29 September 2016, para. 122.
85. The single top tier publication, the Nuclear Security Fundamentals, contains objectives and essential elements of nuclear security and provides the basis for security recommendations (IAEA (2013), *supra* note 15). Recommendations are the second tier and they elaborate on the essential elements of nuclear security and present the recommended requirements that should be implemented for the application of the Nuclear Security Fundamentals. There were three such documents published in 2011: INFCIRC/225/Revision 5; IAEA (2011), "Nuclear Security Recommendations on Radioactive Material and Associated Facilities", *IAEA Nuclear Security Series* No. 14; and IAEA (2011), "Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control", *IAEA Nuclear Security Series* No. 15. The third and fourth tiers, Implementing Guides and Technical Guidance, provide more detailed information on implementing the Recommendations using appropriate measures. Implementing Guides provide further elaboration of the Recommendations in broad areas and suggest measures for their implementation. Technical Guidance publications include: Reference Manuals, with detailed measures and/or guidance on how to apply the Implementing Guides in specific fields or activities; Training Guides, covering the syllabus and/or

CPPNM and the Amended Convention, is the non-binding recommendations document on the physical protection of nuclear material and nuclear facilities, commonly referred to as INFCIRC/225/Revision 5 (or NSS No. 13).[86] This text represents the current global minimum "standards" – the benchmark – for physical protection of nuclear material and nuclear facilities. While the recommendations are *per se* legally non-binding, they can be made legally binding, for example through incorporation (explicitly or by reference) in bilateral nuclear co-operation agreements and bilateral and trilateral agreements that the IAEA concludes with states involving the application of safeguards to material and/or equipment, as well as those agreements addressing certain technical assistance, as a condition of assistance.

Part 3: Assessing the purported gaps and weak links, and proposed strengthening measures

3.1 Purported gaps and weak links in the framework

3.1.1 Complexity of the framework

"Many of the tiles of the nuclear security mosaic are in place,
but the picture is only beginning to emerge"
Matthew Bunn (2010)[87]

- i. Some aspects of the development of the framework

It is apparent that there has been a rather multifaceted and complex response by states to the threat of nuclear terrorism with the development of a significant number of legally binding instruments, non-binding instruments and underlying technical guidance, as well as non-binding initiatives.[88] Yet, in many respects this position can also be considered as the case for the international nuclear safety framework (see below). However, in citing concerns regarding the complexity of the nuclear security framework, some commentators refer to it as being a "plethora" of overlapping national, bilateral, and multilateral tools and instruments.[89] Others consider it an ineffective and fragmented "patchwork of unaccountable voluntary arrangements that are inconsistent across borders" and which are not well suited to

manuals for IAEA training courses in the area of nuclear security; and Service Guides, which provide guidance on the conduct and scope of IAEA nuclear security advisory missions.

86. INFCIRC/225/Revision 5 applies to the physical protection of nuclear material against unauthorised removal with the intent to construct a nuclear explosive device and the physical protection of nuclear facilities and nuclear material (whether peaceful or military), including during transport and against sabotage. The IAEA published "Recommendations for the Physical Protection of Nuclear Materials" in 1972. That document was later revised in 1975 and published as INFCIRC/225/Corrected. Modification started in 1977 resulting in INFCIRC/225/Rev.2 being completed in 1989. A revised version was completed in September 1993 and was published as INFCIRC/225/Rev.3. It included, *inter alia*, the concept of "in-depth" protection. A fourth revision was published in 1999 as INFCIRC/225/Rev.4. It addressed the prevention of sabotage of material and facilities for the first time. It also included the concept of the Design Basis Threat (DBT), which facilitated a state-by-state approach.
87. Bunn, M. (2010), *Securing the Bomb 2010*, Cambridge, Mass. and Washington, DC: Project on Managing the Atom, Belfer Center for Science and International Affairs, Harvard Kennedy School and Nuclear Threat Initiative, April 2010.
88. Barker, J. C. (2007), "The Politics of International Law-Making: Constructing Security in Response to Global Terrorism", *Journal of International Law and International Relations*, Vol. 3, pp. 5-16.
89. Boureston, J. and A. K. Semmel (2010), *supra* note 18.

future challenges.[90] Further, other commentators have asserted that the instruments as a whole do not add-up to an effective global framework for securing all NWs, weapons-usable nuclear material and major nuclear facilities worldwide against today's threat, let alone future ones.[91]

While significant, these views could be considered as representing just one side of the debate. In reflecting upon the differing objectives, scope and legal forms of the various instruments, their complementary and reinforcing nature has in fact been positively recognised.[92] Indeed, the perspective presented at important international conferences is that as a whole, the instruments amount to a significant strengthening of the pre-9/11 framework.[93] Perhaps these distinct positions could be better understood within the context of the historical development of the nuclear security framework, which even IAEA Director General Yukiya Amano has identified as being rather complex.[94] One way to consider the development is through the diverse objectives in IGOs' responses (including the UN and IAEA) to the Cold War period as well as the pre- and post-9/11 world.[95] Additional context to the expansion of the framework is the development of the aforementioned broader universal legal counterterrorism regime. In this regard, UNODC explains that due to the complex and politically sensitive task of defining "terrorism" within a single globally accepted and legally binding instrument, the international community took a pragmatic approach: specific instruments were adopted in response to specific instances of international terrorism, which compartmentalised the approach to terrorism.[96] Thus, the result is a multi-layered broad anti-terrorism framework that currently includes 19 multilateral treaties and UNSCRs.

- ii. Criminalisation and physical protection provisions

Indeed, an advantage in having a large number of instruments is that the synergies between them can add layers of protection.[97] This perspective is consistent with the aforementioned international conferences, which recognises the complementary nature of the current regime, finding that it provides a solid platform for nuclear security. However, a disadvantage of numerous instruments developed at different times, for different purposes and in different forums, is the possibility of inconsistent and contradictory provisions.[98] For example, it has been asserted that the implementation and integration of ICSANT and the CPPNM (presumably also the CPPNM Amendment) are impacted because they were adopted under different

90. FMWG (2012), "Seoul Nuclear Security Summit Delivers Modest Results: Experts Call for Bolder Action to Prevent Nuclear Terrorism" (27 March 2012), statement by K. Luongo, co-chair of the FMWG and president of the Partnership for Global Security; and Bunn, M. et al. (2016), *supra* note 3.
91. Shin, C. (2013), "Creating a Nuclear Security Framework Convention, Asian Institute for Policy Studies", NSGEG Roll-Out Events for the Publication of Policy Recommendations, 24 March 2013. See also the statement by K. Luongo in Guarino, D. (2012), "Nuclear Security Standards Still Lacking After Summit, Advocates Say", Global Security Newswire, NTI.
92. President's Summary, International Conference on Nuclear Security: Enhancing Global Efforts, 1-5 July 2013, Vienna, Austria.
93. President's Finding, "International Conference on Illicit Nuclear Trafficking: Collective Experience and the Way Forward", 19-22 November 2007, IAEA, Edinburgh.
94. IAEA (2011), *supra* note 58.
95. Khripunov, I. (2014), "International Legal Framework for Strengthening Nuclear Security", University of Georgia, USA, Peace Palace Library.
96. UNODC (2010), *supra* note 59.
97. Stoiber, C. (2012), *supra* note 45.
98. Indeed, it has been referred to as a "legacy of inconsistencies, overlaps and duplications". Khripunov, I. (2014), *supra* note 95.

auspices (respectively the UN and IAEA), although at the same time it is acknowledged that "it necessarily shouldn't". [99]

There are two different aspects to the treaties, however, that in seeking to gain a clearer understanding of the framework should be considered separately in any analysis of it: the substantive physical protection aspects of the instruments (e.g. primarily the CPPNM and Amended Convention) and their criminalisation (and related) aspects (e.g. ICSANT and other UN, IMO and ICAO treaties, as well as the CPPNM and Amended Convention). In highlighting the complexity, some of the literature focuses primarily on the physical protection aspects, though the criminalisation (and related) aspects may be considered as being actually more troublesome. Peri Lynne Johnson, Legal Adviser and Director of the IAEA Office of Legal Affairs, identifies that the main features of the ICSANT (and other UN, IMO and ICAO treaties) are the common obligations on states parties to make certain specified acts criminal offences in national law (and related provisions) and to co-operate, particularly, in the context of extradition and the provision of mutual legal assistance.[100] While the CPPNM and the Amended Convention include similar obligations (albeit with variances in the scope of application of the specified acts), they also go much further than criminalisation and related measures. The distinguishing feature of the CPPNM and the Amended Convention is that they are the only internationally legally binding undertakings in the area of physical protection of nuclear material and nuclear facilities used for peaceful purposes, and, with respect to all modes of land, sea and air transport, in one place. Neither the ICSANT nor any of the other aforementioned treaties expressly and comprehensively address these matters.

At first there may appear to be a number of duplications, overlaps and inconsistencies. However, a deeper analysis identifies that such concerns should perhaps better focus on the criminalisation and related obligations of the instruments, rather than the other aspects of nuclear security, in particular, the physical protection requirements. This point arises since the criminalisation requirements generally concern related or identical offences. It follows that the purported complexity and so-called "patchwork" of the framework, as identified by some commentators, should not necessarily be considered an issue from the perspective of the substantive technical aspects of physical protection of nuclear material and facilities. In this context, the core instruments on the physical protection of nuclear material used for peaceful purposes during international transport are the CPPNM and the Amended Convention, the latter being also applicable to the protection of nuclear facilities and nuclear material in domestic use, storage and transport. These instruments are supplemented by IAEA technical guidance, in particular, INFCIRC/225/Revision 5. As for the need to achieve and maintain a high level of security of radioactive sources, generally speaking, regard need only be had to the Code of Conduct (and its supplementary guidance on the import and export of radioactive sources, leaving aside Article 28 of the Joint Convention).

Further, the aforementioned assertion that implementation is negatively impacted due to the adoption of treaties under different auspices needs to be considered in light of the extensive practical co-operation between the IAEA and the UN[101] through UNODC (which is mandated by the UNGA to provide legal and related

99. Luongo, K. (2012), *supra* note 30.
100. Johnson, P. (2014), "Facilitating the entry into force and implementation of the Amendment to the Convention on the Physical Protection of Nuclear Material: Observations, challenges and benefits", *Nuclear Law Bulletin*, No. 94, OECD, Paris.
101. Agreement Governing the Relationship Between the United Nations and the International Atomic Energy Agency, IAEA Doc. INFCIRC/11, 30 October 1959.

assistance to requesting states to join and implement the universal legal instruments against terrorism). Such co-operation includes legislative assistance activities, in respect of which model legislative provisions were jointly published in 2010 by both organisations in the IAEA publication, the *Handbook on Nuclear Law: Implementing Legislation*.[102] In any case, strictly speaking, the primary focus of UNODC's co-operation and assistance to states is essentially limited to criminal justice and related procedural aspects of countering terrorism, rather than the technical aspects of physical protection: the latter subject falling within the scope of IAEA legislative and technical assistance activities. Further, if indeed there is any such complexity, this does not necessarily prevent the instruments' coexistence; nor, as demonstrated by the practical use of the model legislative provisions in the *IAEA Handbook on Nuclear Law*, does it unduly restrict their actual practical implementation at the domestic level.[103]

- iii. Comprehensive international legal instruments on nuclear safety and nuclear security

> "You can't be safe without being secure –
> and you can't be secure without being safe"
> Matthew Bunn (2011)[104]

As a final point, a comparison can also be made with the instruments establishing the nuclear safety framework. With the exception of those instruments primarily focused on criminalisation (ICSANT and the Terrorist Bombings Convention, as well as the IMO and ICAO SUA instruments), the international legal instruments on nuclear safety[105] and security share the common objective of protecting people, society and the environment from the harmful effects of a nuclear incident, which may include exposure to ionising radiation.[106] Some commentators differentiate the international legal frameworks on nuclear security and nuclear safety by stating that there is not a single comprehensive international legal instrument on nuclear security, unlike in the area of nuclear safety.[107] However, it should be clarified though that there is *per se* no single international legal instrument that comprehensively addresses nuclear safety. In particular, the Convention on Nuclear Safety (CNS)[108] deals with only one type of facility – land based civil NPPs – whereas civil research reactors are addressed by the Code of Conduct on the Safety of

102. Stoiber, C. et al. (2010), *Handbook on Nuclear Law: Implementing Legislation*, IAEA, Vienna.
103. Many states when drafting comprehensive national nuclear legislation use, as a reference, the model provisions in the *Handbook on Nuclear Law: Implementing Legislation*. However, there are many aspects of nuclear security that will not be found in a single comprehensive nuclear law, such as those laws related to national security and intelligence functions or those related to trustworthiness assessment, laws related to information security, border controls, customs and prohibited goods or substances, etc. In addition, in fulfilling the requirements for criminalisation, states need to determine whether the offences will be prescribed in the comprehensive nuclear law, special anti-terrorism law, or criminal and penal legislation.
104. Bunn, M. (2011), "Next steps to strengthen nuclear security and prevent nuclear terrorism", Next Generation Nuclear Security: Measuring Progress and Charting the Way Forward, 13 April 2011, Vienna, Austria.
105. According to INSAG, "nuclear safety" means "[t]he achievement of proper operating conditions, prevention of accidents or mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation hazards". INSAG (2010), *supra* note 52.
106. *Ibid*.
107. Chang-Hoon Shin (2013), "Creating a Nuclear Security Framework Convention", Asian Institute for Policy Studies, NSGEG Roll-Out Events for the Publication of Policy Recommendations, 24 March 2013.
108. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293.

Research Reactors.[109] Occupational exposure of workers is addressed in the Convention concerning the Protection of Workers against Ionizing Radiations.[110] Further, the safety of radioactive waste and spent fuel management is again addressed in another international legal instrument, the Joint Convention.[111] Emergency preparedness and response, as already identified, is addressed in the Early Notification and Assistance Conventions.[112] Further, the safe transport of radioactive material by all modes is addressed in various modal instruments,[113] due to the incorporation of the UN's Recommendations on the Transport of Dangerous Goods,[114] which include the IAEA Regulations on the Safe Transport of Radioactive Material.[115] Thus, there are a variety of international instruments addressing nuclear safety that does not unduly impact on matters of implementation.

3.1.2 Lack of universal adherence to the international nuclear security instruments

In recent years, a number of treaties on and related to nuclear security have been adopted, revised and entered into force (albeit with the exception of the 2010 Beijing SUA Convention). Despite positive developments such as an overall increase in their status of adherence, concerns remain regarding the overall lack of universal adherence. Although reference can be made to the legal obligation to join the universal legal instruments pursuant to UNSCR 1373, not all states have done so. It is not the purpose of this article to analyse the reasons why states choose to join one legal instrument and not another. However, in the context of nuclear security, the aforementioned overarching considerations, particularly, complacency, can be cited as influencing the lack of universal adherence. Additionally, the volume of international instruments addressing nuclear security, particularly those criminalising related offences, should not be overlooked. In this context, some states (whether rightly or wrongly) may consider that there is little need to join another treaty if the specified acts have already been criminalised in national law (and they are of the view that they have also established a legal basis for extradition, establishment of jurisdiction, mutual legal assistance, etc.) pursuant to being party to a different treaty(ies).

The IAEA continues to highlight that "global effectiveness requires States' adherence to, and implementation of, all the relevant legal instruments".[116] Such universalisation is considered to be of utmost importance, to be promoted, not only

109. Code of Conduct on the Safety of Research Reactors (2006), IAEA Doc. IAEA/CODEOC/RR/2006.
110. Convention concerning the Protection of Workers against Ionising Radiations (1960), ILO Convention No. 115, 431 UNTS 41, entered into force 17 June 1962.
111. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997) ("Joint Convention"), IAEA Doc. INFCIRC/546, 2153 UNTS 357. See Tonhauser, W. and O. Jankowitsch-Prevor (1997), "The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management", *Nuclear Law Bulletin*, No. 60, OECD, Paris, pp. 9 and seq.
112. Convention on Early Notification of a Nuclear Accident, *supra* note 77; Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, *supra* note 78.
113. For the purpose of this article it is not necessary to elaborate in detail this complex area of law. Rather, reference can be made to various literatures on the subject. See for example, Jankowitsch-Prevor, O. (2006), "International Law of Transport of Nuclear and Radioactive Material", *OECD/NEA International Nuclear Law*, p. 187-218; and World Nuclear Transport Institute (WNTI) (2001), "Radioactive Materials Transport. The International Safety Regime. An Overview of Safety Regulations and the Organisations Responsible for their Development", Information Paper, WNTI.
114. UNECE (2013), UN Recommendations on the Transport of Dangerous Goods. Model Regulations, 18th revised edition.
115. IAEA (2014), "Regulations for the Safe Transport of Radioactive Material – 2012 Edition", *IAEA Safety Standards Series* No. SSR-6, IAEA, Vienna.
116. IAEA (2013), "Nuclear Security Achievements 2002-2012", IAEA, Vienna, p. 10.

by the states concerned, but also by the IAEA, UNODC, etc.[117] An important aspect of the need for universalisation lies not only in the need for robust national nuclear security regimes so as to prevent weak links in the nuclear security chain but also in the principle of *aut dedere aut judicare* (extradite or prosecute), which is embedded in the aforementioned universal legal instruments. Its aim is to make the world inhospitable to terrorists (and those who finance and support them) by denying them safe havens: the basic premise being that those perpetrators should either be brought to trial or be extradited.[118]

In considering the measure of universalisation, a benchmark can be whether all current 193 UN member states are party. However, no such universalisation exists in respect of the international instruments in the nuclear safety[119] and nuclear security fields. With currently 169 parties, the Terrorist Bombings Convention, is the most adhered to universal instrument relevant to nuclear security. Importantly, the CPPNM with 153 parties (152 states parties and EURATOM) is currently the most adhered to multilateral treaty adopted under the auspices of the IAEA, while the ACPPNM has 105 parties (104 states parties and EURATOM). Further, it is also noted that 133 political commitments have been made to the legally non-binding Code of Conduct and 106 to its supplementary guidance (as of 17 August 2016).[120]

Some commentators, prior to the entry into force of the ACPPNM on 8 May 2016, cited this as a "significant gap",[121] since it had been more than a decade after its adoption in 2005.[122] This entry into force is considered as the single most important step the international community could have taken to strengthen nuclear security globally since it helps in reducing the vulnerability of states to nuclear terrorism.[123] The concerted push prior to the NSS 2016 entry into force demonstrates the inclination of states to finally take the necessary action when the spotlight is on. Now, the focus is on universalising the Amended Convention, with the last IAEA GC encouraging the IAEA to continue with its efforts to promote adherence.[124] In this regard, countries with nuclear facilities and weapons-usable nuclear material that are still not party are: Belarus, Iran, Pakistan, North Korea and Syria.[125] Of those countries, Iran, North Korea and Syria are still not even party to the original Convention. Ultimately, the remaining one-third of the existing CPPNM states parties need to join the ACPPNM, irrespective of whether they possess nuclear material or nuclear facilities. There is also a need to assess the adequacy of national implementation, particularly, in some of those countries that joined the ACPPNM in the months prior to its entry into force.

On review, there continues to be an overall increase in adherence to the relevant international legal instruments. Yet, despite the legal obligation and repeated calls

117. President's Summary, *supra* note 92.
118. UNODC (2010), *supra* note 59.
119. The Convention on Early Notification and the Convention on Assistance have 119 and 112 parties, respectively. The CNS has 78 parties and the Joint Convention has 73 parties.
120. A current status list of those states that have made a political commitment with regard to the Code of Conduct and/or notified the IAEA of their intention to act in accordance with the Guidance is available on the IAEA website at: http://www-ns.iaea.org/downloads/rw/imp-export/status-list.pdf (last change of status: 17 August 2016).
121. President's Summary, *supra* note 92.
122. Johnson, P. (2014), *supra* note 100.
123. Quevenco, R. (2015), "United States Ratifies Key Nuclear Security Amendment", IAEA News (31 July 2015).
124. IAEA (2016), General Conference Resolution: "Nuclear Security", IAEA Doc. GC(60)/RES/10, adopted 30 September 2016.
125. IAEA, Status List, Amendment to the Convention on the Physical Protection of Nuclear Material (2005), GOV/INF/2005/10-GC(49)/INF/6, Attachment pp. 3-11.

in various fora to join the universal legal instruments, there is still a continuing lack of universal adherence. Further, following the recent entry into force of the ACPPNM, there is now a need for concerted efforts leading to its universalisation. While a lack of universalisation exists in other fields of nuclear law, in this particular field, the issue continues to be particularly important since nuclear security is only as good as its weakest link and there is a need to ensure that there is no safe haven for terrorists.

3.1.3 Absence of binding nuclear security standards

- i. Calls for stringent global standards

Turning now to the call for binding nuclear security standards, Part 2 identified the existence of relevant instruments and technical guidance such as the ACPNMM and INFCIRC/225/Revision 5. It has been asserted, however, that there are apparently no specific requirements as to how secure material should be (particularly weapons-usable nuclear material). For some, the ACPPNM leaves too much to the discretion of the states parties. For example, in 2010 it was stated that further to the ACPPNM "countries should set national rules for nuclear security" but at the same time it was submitted that it "says nothing about what those rules should say".[126] In addition, although identified as being more specific, the IAEA recommendations (i.e. INFCIRC/225/Revision 5) have been considered as being "quite vague" and the "discussion process, in which essentially any participating state can object to a particular recommendation, tend[ing] to result in least-common denominator outcomes".[127] Further, some commentators reflect concerns regarding the absence of specific binding global rules, standards, baselines or best practices for how secure nuclear material and facilities should be. The absence of such standards is cited as being a gap,[128] indeed a significant one,[129] which urgently needs filling.[130] For example, the point was made over ten years ago that the absence of such standards meant that even if the IAEA recommendations were fully implemented, one might "still not be adequately secured against attack".[131]

Over the years, calls for such binding standards have taken different forms. From the national US perspective, there is the ambitious proposed goal of 1994 to establish a so-called international binding "stored weapons standard" (established by the US Department of Energy in 1997).[132] In addition, there is the proposal for a so-called "gold standard" of 2004[133] (reflected in the July 2005 report by the US Nuclear Security Advisory Group[134] and also in testimony before the US House of Representatives

126. Tobey, W. (2012), "Building a Better International Nuclear Security Standard", US-Korea Institute Working Paper Series, Paul H. Nitze School of Advanced International Studies, Johns Hopkins University, March 2012.
127. Bunn, M. (2010), *supra* note 87.
128. Brill, K. C. and J. Bernhard (2015), *supra* note 41; and Bunn, M. et al. (2016), *supra* note 3.
129. FMWG (2015), *supra* note 48.
130. Bunn, M. (2007), *supra* note 51.
131. Bunn, M., J. P. Holdren and A. Wier (2002), "Securing Nuclear Weapons and Materials: Seven Steps for Immediate Action", Project On Managing The Atom, Belfer Center For Science And International Affairs, John F. Kennedy School Of Government, Harvard University, May 2002.
132. US National Academy of Sciences (1994), Management and Disposition of Excess Weapons Plutonium, National Academy Press, Washington, DC, pp. 31, 136-137.
133. This argues that given the given immense stakes if weapons-usable material were stolen, it should be secured to levels similar to those used for large stores of gold such as at Fort Knox. Allison, G. T. (2004), *supra* note 2.
134. Ashton, C. (2005), *supra* note 54.

Committee on Foreign Affairs in 2010).[135] In the international context, just over a month after 9/11, in October 2001, there was a call for the creation of legally binding international standards for physical protection, albeit not citing the aforementioned proposals.[136] Later, in May 2002, the urgent need for legally binding "stringent global standards" of security for civilian material and facilities (as well as covering military uses) was also cited.[137] In the post 9/11 environment, this proposal appears the most repeated, even finding its way into the so-called IAEA's 20/20 report of May 2008[138] prepared by an independent commission of high-level international experts. Significantly for the IAEA, the report somewhat ambitiously proposed that states negotiate legally binding agreements that set "effective global nuclear security standards" and that over time states not only give the IAEA an important role and mandate in developing such standards but also in "assisting in and confirming their implementation".[139]

In an attempt to facilitate implementation, proposed new "stringent global standards" are considered as needing to be performance based rather than rule (prescriptive) based.[140] Thus, instead of requiring nuclear material to be in a locked vault or for a physical barrier (i.e. a fence) to be around a nuclear facility, it is proposed that the standard state how hard the lock should be to pick or break and how difficult it should be to get through a barrier undetected. A fundamental point for such standards is the need for an effective physical protection system that works when challenged, i.e. that the system is able to defeat threats that terrorists and other criminals have demonstrated. In this regard, the proposed standard is centred on a minimum "Design Basis Threat" (DBT)[141] that nuclear security systems worldwide should be designed to be able to meet and which all states should, at a

135. See Luongo, K. (2010), Prepared Statement, "The Nuclear Security Summit: Achievements and Agenda for Action", testimony before the US House of Representatives, Committee on Foreign Affairs, 111th Congress, 2nd Session, 21 April 2010. In the testimony, Kenneth N. Luongo President, Partnership for Global Security, called for the creation of a global nuclear security "gold standard". In doing so, he highlighted that "[d]espite the detailed technical information that is provided by the IAEA for the safeguarding of nuclear facilities and the other domestic and international conventions and regulations that govern nuclear material protection, no universally accepted standard exists for securing nuclear materials and weapons. In advance of the 2012 [nuclear security] summit nations should agree to the establishment of a minimum, but effective, nuclear security standard that all nations can work toward".
136. Curtis, C. (2010), "Reducing the Nuclear Threat in the 21st Century", Symposium on International Safeguards: Verification and Nuclear Material Security, IAEA, Vienna, 9 October 2001.
137. Bunn, M., J. P. Holdren and A. Wier (2002), *supra* note 131.
138. IAEA (2008), Note by the Director General, Report of the Commission of Eminent Persons on the Future of the Agency, Reinforcing The Global Nuclear Order For Peace And Prosperity: The Role of the IAEA to 2020 and Beyond, GOV/2008/22-GC(52)/INF/4, 23 May 2008, IAEA, Vienna.
139. It is recalled that this is something that Professor Ramesh Thakur also called for. This proposition was in fact consistent with the views of Bunn who significantly "played a key role in the research and drafting of the report" and with Allison who served as a co-Executive Director.
140. As in the case of INFCIRC/225/Revision 5, *supra* note 28; Bunn, M., J. P. Holdren and A. Wier (2002), *supra* note 131.
141. According to INFCIRC/225/Revision 5, *supra* note 28, the "design basis threat" means "[t]he attributes and characteristics of potential insider and/or external adversaries, who might attempt unauthorized removal or sabotage, against which a physical protection system is designed and evaluated". The following four important themes of a DBT are: insider and/or external adversaries; malicious acts leading to unacceptable consequences; attributes and characteristics; and design and evaluation. See Implementing Guide, IAEA (2009), "Development, Use and Maintenance of the Design Basis Threat", *IAEA Nuclear Security Series* No. 10, IAEA, Vienna.

minimum, be obliged to meet. It is recalled that a state's current evaluation of the threat is formalised through (but not necessarily limited to) a "threat assessment" process, pursuant to which a DBT can be derived. As identified in 2007,[142] 2008[143] and again in 2014,[144] the advocated minimum baseline threat includes a well-placed insider; a modest group of well-trained and well-armed outsiders, capable of operating as more than one team; and both the insider and the outsiders working together (states facing more capable adversaries should provide higher levels of protection). Such a proposal for establishing "stringent global standards" centred on a minimum DBT; however, this raises the question of whether such an approach is sufficiently flexible to deal with evolving threats and inherent national differences in culture and threat environments.[145] In this regard, is it really feasible to develop a single DBT for all facilities with weapons-usable nuclear material, even a minimum one, given that threats of terrorism differ from state to state, as do the various factors that influence approaches taken by states to address such threats?

One could point to developments, such as the NSS 2016 "Joint Statement on Strengthening Nuclear Security Implementation", which may indicate progress in the area of building commitment to stringent nuclear security principles and standards. However, despite the purported significance of the gap, the repeated long-standing calls for a remedy, the impetus of 9/11 and more recently the high-level political attention given to nuclear security through the past four Summits, states on the whole continue to reject the call for such standards.[146] While it has been stated that it is more important to "begin taking large strides in the right direction than to agree on just how far to travel", a critical assessment reveals that in practice, states have taken only some relatively minor strides in the direction of international binding standards, never mind large ones. Thus, there continues to remain a distinct lack of political will among states to establish such binding standards: the quest does not therefore appear any closer to fruition.

- ii. Non-binding nature of IAEA Safety Standards and IAEA Nuclear Security Guidance

Both the international legal frameworks for nuclear safety and nuclear security are underpinned by voluntary and non-legally binding technical guidance. The technical guidance on nuclear safety is considered by a number of states and some commentators as being more legitimate and valid than its counterpart guidance on nuclear security. In the nuclear safety field, this guidance is essentially referred to as "standards", which are developed as an express function under the IAEA Statute[147]

142. Bunn, M. and T. Bielefeld (2007), "Reducing Nuclear and Radiological Terrorism Threats", Institute for Nuclear Materials Management, 48th Annual Meeting, Tucson, AZ, July 2007.
143. Bunn, M. and A. Newman (2008), "Preventing Nuclear Terrorism: An Agenda for the Next President", Project On Managing The Atom, Belfer Center For Science And International Affairs, John F. Kennedy School Of Government, Harvard University.
144. Bunn, M. (2007), *supra* note 51.
145. Tobey, W. (2012), Building a Better International Nuclear Security Standard, US-Korea Institute (USKI) at the Paul H. Nitze School of Advanced International Studies, Johns Hopkins University.
146. The Final Report of the Informal Open-Ended Expert Meeting to Discuss Whether there is a Need to Revise the Convention on the Physical Protection of Nuclear Material was circulated by the IAEA Secretariat as an attachment to a Note dated 3 August 2001 (Secretariat 2001/Note 18) to all CPPNM states parties and IAEA member states. It is also noted that in 1998 it was proposed to make the INFCIRC/225 guidelines internationally legally binding. See Jenkins, B. D. (1998), "Viewpoint: Establishing International Standards for Physical Protection of Nuclear Material", *The Nonproliferation Review*, Spring-Summer (1998)5 3, pp. 98-110; Bunn, M. and T. Bielefeld (2007) *supra* note 142.
147. Statute of the International Atomic Energy Agency (1956), 276 UNTS 3, entered into force 29 July 1957 (IAEA Statute), Article III.A.6.

and published in the IAEA Safety Standards Series. Nuclear security technical documents, however, are referred to as "guidance", not standards. Their development is *per se* not expressly required under the IAEA Statute (although a legal basis for their development clearly stems from the Statute). Starting only a decade ago, in 2006, the IAEA Nuclear Security Guidance Series is obviously less mature than the IAEA Safety Standards Series, with the origin of some of the standards being traced back to 1958.[148] It is also less comprehensive, comprising approximately only 30 security publications as opposed to currently more than over 200 safety standards.[149] Notwithstanding this imbalance, a number of steps have been taken to further strengthen and legitimise the IAEA Nuclear Security Guidance Series, including the application of a threefold structure similar to that in the IAEA Safety Standards Series; the adoption by the Board in 2012 of two top-tier sets of documents: the Nuclear Security Fundamentals and Recommendations; and the establishment in 2012 of the Nuclear Security Guidance Committee (NSGC) open to all IAEA member states.

In contrasting nuclear security and safety approaches, some commentators identify the "absence of universal mandatory nuclear security standards", as if they already existed (when they do not) in the nuclear safety field.[150] In addition, some identify aspects of the international nuclear safety framework that might be adapted to help improve nuclear security by proposing that "introducing more binding international standards" could address concerns about weak links.[151] Even more ambitiously, there is a call for mandating the IAEA to "negotiate binding agreements that establish global nuclear security standards" and giving the IAEA the "authority and the responsibility to certify compliance with these standards by monitoring national implementation".[152] By the same token, however, it is conceded that "it is difficult to visualize states agreeing to give the IAEA mandatory and intrusive authority and powers in the foreseeable future".[153] Again, somewhat ambitiously and optimistically, a three-phased approach is proposed in which first the guidance is re-named "standards", and then it is submitted that the NSGC should establish minimum baseline nuclear security standards, which together with the other texts will thereafter all become mandatory.[154]

While the difference in the use of the terms "standards" and "guidance" appears in many respects to be simply one of nomenclature, proposals seek nonetheless to vest the nuclear security guidance with the same standing as the safety standards

148. FMWG (2015), *supra* note 48.
149. IAEA (2013), Strategies and Processes for the Establishment of IAEA Safety Standards (SPESS), Version 2.1, IAEA, Vienna, 25 March 2013. Note that while the IAEA Statute does not expressly mandate the IAEA in the area of nuclear security, as it does for nuclear safety, the IAEA's mandate and activities are derived, *inter alia*, from the objectives in Article II of the Statute. In both the fields of nuclear safety and security, the IAEA does not establish binding standards or carry out mandatory peer reviews. Finally, the feasibility of developing an integrated series of safety and security still remains a long-term goal.
150. Loukianova, A. (2015), *supra* note 33.
151. Squassoni, S. (2012), "Learning from Nuclear Safety", Workshop on Improving Nuclear Security Regime Cohesion, Center for Strategic & International Studies, Asan Institute, Seoul, 18-19 July 2012, NSGEG.
152. Thakur, R. (2013), "The Global Governance Architecture of Nuclear Security", Policy Analysis Brief, The Stanley Foundation, Muscatine, Iowa.
153. *Ibid*.
154. Findlay, T. (2013), *supra* note 57.

with the aim of seeking to provide the former texts with a higher status.[155] Regardless of their title, however, it should already be understood that the two sets of documents are both essentially of a legally non-binding nature.

3.1.4 Lack of a legally binding peer review process

- i. Treaty-based processes

Some of the identified literature continues to highlight the need to assess the effectiveness of national nuclear security regimes through strengthened and additional nuclear security peer reviews focusing on the physical protection of nuclear material and nuclear facilities, as well as self-assessments and international peer review missions. More particularly, in highlighting the ways in which the gaps and weak links can be filled and strengthened, a number of commentators, in calling for mandatory peer reviews,[156] point to approaches in the nuclear safety framework, including existing treaty based peer reviews.[157] Before considering the lack of a binding peer review process in the nuclear security field, two core features of the approach in the international nuclear safety framework can be distinguished. The first feature concerns the mandatory and legally binding processes under two of the safety treaties, the CNS and Joint Convention. The second aspect is the voluntary and non-legally binding processes of nuclear safety peer reviews and advisory services undertaken by experts at the request of a state in the context of the IAEA's nuclear safety programme activities.

With regard to the CNS and Joint Convention, it is recalled that they are considered as being so-called "incentive instruments":[158] they do not rely on mechanisms of oversight by an international body (such as the IAEA Secretariat) or

155. *Ibid*. Professor Gunther Handl has highlighted the quasi-normative nature of the IAEA Safety Standards pursuant to the CNS in preambular paragraph (viii) and the post-Fukushima changes to the guidance documents underpinning the peer review process of the CNS (as found in the following documents: IAEA (2015), "Guidelines regarding the Review Process under the Convention on Nuclear Safety", IAEA Doc. INFCIRC/571/Rev.7; IAEA (2015), "Guidelines regarding National Reports under the Convention on Nuclear Safety", IAEA Doc. INFCIRC/572 Rev.5; and IAEA (2015), "Convention on Nuclear Safety: Rules of Procedure and Financial Rules", IAEA Doc. INFCIRC/573Rev.6), and, in particular, the Guidelines regarding National Reports under the CNS. See Handl, G. (2015), "Preventing Transboundary Nuclear Pollution: A Post-Fukushima Legal Perspective", in S. Jayakumar et al. (eds.), *Transboundary Pollution: Evolving Issues of International Law and Policy*, NUS Centre for International Law Series, Edward Elgar Publishing, Cheltenham and Camberley, UK, Chapter 8, pp. 190-232. A similar point as raised by Professor Handl could also be submitted with respect to the amended CPPNM, in particular, further to the new preambular inserted by the CPPNM Amendment, which provides "… that there are internationally formulated physical protection recommendations that are updated from time to time which can provide guidance on contemporary means of achieving effective levels of physical protection". The reference to "internationally formulated physical protection recommendations" would clearly include INFCIRC/225/Revision 5 and subsequent revisions thereof.

156. Rauf, T. (2015), "Promoting a Successful Outcome of the 2015 NPT Review Conference", Session IV: Nuclear Security, Stockholm International Peace Research Institute (SIPRI), Vienna, 1 April 2015; and FMWG (2015), *supra* note 48.

157. Luongo, K., S. Squassoni and J. Wit (2011), "Integrating Nuclear Safety and Nuclear Security: Policy Recommendations", CSIS Policy Perspectives Paper, 13 December 2011; and Luongo, K. and M. Cann (2013), "Nuclear Security: Seoul, the Netherlands, and Beyond, 2013", US-Korea Institute at SAIS.

158. De Wright, T. (2007), "The 'Incentive' Concept as Developed in the Nuclear Safety Conventions and its Possible Extension to Other Sectors", *Nuclear Law Bulletin*, No. 80, OECD, Paris, p. 29-47; and Handl, G. (2004), "The IAEA Nuclear Safety Conventions: An Example of Successful Treaty Management?", *Nuclear Law Bulletin*, No. 72, OECD, Paris, pp. 7-27.

sanctions for non-compliance. Rather, they rely primarily on the common aim of contracting parties to achieve and maintain a high-level of safety worldwide. This is essentially achieved through a peer review process pursuant to which contracting parties are obliged to produce, every three years, national reports on their implementation for review by the other contracting parties (but not the IAEA). In this context, they are obliged to exchange written questions, answers and comments prior to the meeting, as well as to participate in the meeting.[159] On the whole, this process is considered as being successful.[160] Weaknesses, though, do exist, including the lack of attendance by all the contracting parties in meetings, the non-submission by some contracting parties of the required national reports and the lack of transparency in the availability of submitted national reports. As an example (admittedly somewhat of an exceptional one), the continuing non-participation of Bangladesh in the peer review process, even though in 2015 the site for a proposed NPP (Rooppur) was licensed and construction at the Rooppur site is planned for 2017, is highlighted.[161]

Unlike in the nuclear safety instruments, such as the CNS and Joint Convention, no express legally binding peer review mechanisms focusing on national implementation are included in the primary nuclear security treaties, namely the CPPNM, the Amended Convention, the Terrorist Bombings Convention and ICSANT.[162] Thus, there is no formalised and mandatory treaty based peer review process by which states parties (or an IGO such as the IAEA) can review implementation. However, Article 16 of the CPPNM and the Amended Convention foresees the convening of conferences to "review" implementation and adequacy.[163] While this provision does not *per se* provide a basis for establishing a peer review process comparable to that in the CNS and Joint Convention, commentators such as Jonathan Herbach positively identify the future potential of utilising Article 16 as a legal basis for the convening of review conferences every five years, with possible

159. *Ibid*.
160. *Ibid*.
161. It is only hoped that Bangladesh will participate in the seventh review meeting of the contracting parties, which is to be held from 27 March to 7 April 2017, Vienna, Austria. The country's continuing lack of participation in the process, at an important stage of the development of its sought-after nuclear power programme, undermines the role of the CNS in providing a framework to ensure the safety of NPPs world-wide.
162. Luongo, K., S. Squassoni and J. Wit (2011), *supra* note 157. Although the identified literature is generally more focused on physical protection of nuclear material and nuclear facilities, ICSANT does provide a possible limited option for consultations among states to ensure effective implementation of the ICSANT (Article 20). In line with its scope of application which simply speaking concerns criminalisation and related matters, the focus could be considered as being rather narrow when considering nuclear security as a whole. United Nations High-Level Meeting on Countering Nuclear Terrorism with a Specific Focus on Strengthening the Legal Framework, Chair's Summary, United Nations, 28 September 2012.
163. Article 16 of the Amended Convention provides:
    1. A conference of States Parties shall be convened by the depositary five years after the entry into force of the Amendment adopted on 8 July 2005 to review the implementation of this Convention and its adequacy as concerns the preamble, the whole of the operative part and the annexes in the light of the then prevailing situation.
    2. At intervals of not less than five years thereafter, the majority of States Parties may obtain, by submitting a proposal to this effect to the depositary, the convening of further conferences with the same objective.

annual intersessional meetings.[164] In this context, it is also worth highlighting that the NSS 2016 "Action Plan in Support of the International Atomic Energy Agency", provided "[f]or States Parties to the CPPNM, [to] advocate for the Director General of the IAEA, in his or her role as depositary, to convene regular review conferences, as provided for in Article 16.2 of the Convention, further to the conference to be convened by States Parties after the entry into force of its 2005 Amendment".[165] It can be expected that the IAEA Director General will actively pursue the convening of the first Article 16 conference for the amended CPPNM.

It is also recalled that the IAEA Secretariat organised the first ever meeting of the points of contact and central authorities of the parties as identified in the CPPNM, from 14-16 December 2015, in Vienna (Technical Meeting of the Point of Contact and Central Authority of State Parties to the Convention on the Physical Protection of Nuclear Material). The purpose of that meeting was to recall the responsibilities of the CPPNM points of contact and to identify mechanisms to meet the additional responsibilities that would be introduced upon entry into force of the ACPPNM. The second meeting of the points of contact (and central authorities) identified in the CPPNM and the Amended Convention is to be held during the week immediately preceding the International Conference on Nuclear Security: Commitments and Actions, Vienna, from 5-9 December 2016 (the 2016 Ministerial Conference). With a view to preparing for the first Article 16 conference, this and future meetings could provide an opportunity to, *inter alia*, engage with states' representatives (although the majority may have a limited (technical) mandate) on matters of peer review, information sharing and reporting mechanisms (including the identification of the types of information that could be shared without compromising confidentiality of sensitive information). In this regard, it can also be highlighted that the NSS 2016 "Action Plan in Support of the International Atomic Energy Agency", "[a]dvocate[d] for the IAEA to continue to organize and support regular meetings of CPPNM Points of Contact to support and promote their active engagement and to further facilitate the implementation of CPPNM and its 2005 Amendment, including the sharing of good practices".

Notwithstanding these developments, it is recalled that states expressly decided not to establish a legally binding and mandatory treaty based process (whether by states parties or by an international body, such as the IAEA). Although this decision was made in 1999 during the lengthy discussions as to whether the CPPNM needed amending,[166] the position did not change after 9/11 or during the years of negotiation resulting in the adoption of the ACPPNM in July 2005. Neither is any change reflected in the more recent various NSS Communiqués and other outputs of the Summits. Further, consistent with the views expressed by the representatives of some states parties at the abovementioned first ever meeting of the points of contact, the initiative should in no way be considered a form of peer review of national implementation (such as that in the CNS or Joint Convention), or even serving to open the door to such a process. It cannot be ruled out though that some

164. For a discussion of the possibility of utilising Article 16 and other ways to strengthen the framework, see Herbach, J. D. (2014), "Strengthening the International Legal Framework for Nuclear Security: Means and Methods to Facilitate Compliance and Enhance Transparency", Proceedings of the International Conference on Nuclear Security: Enhancing Global Efforts, Vienna, Austria, 1-5 July 2013; and Herbach, J. and Pitts-KieferMore, S. (2015), "Work to Do: A Pathway for Future Progress on Strengthening Nuclear Security", Arms Control Association, October 2015.

165. Additionally, the NSS 2016 "Action Plan in Support of the United Nations" provides "[f]or States Parties to ICSANT, seek to convene through an UNGA resolution, a high-level meeting of ICSANT States Parties in 2017 to review implementation of the ICSANT on the occasion of the 10th anniversary of its entry into force".

166. IAEA, Final Report (2001), *supra* note 146.

like-minded states will use the Article 16 conference as an opportunity to demonstrate leadership by circulating detailed national reports with the aim of encouraging other states to follow. Overall though, it would seem that utilising existing treaty provisions to establish a review process, such as in the Amended Convention, appears difficult, requiring innovative interpretation and the agreement of all the parties, which is unlikely to exist in the near- to mid-term future. Finally, making political commitments to request existing peer reviews (and to implement existing guidance) could, as an interim measure, increase the momentum to strengthen the framework (see below) but whether they could provide a "springboard" to legally binding approaches remains a matter for future discussion.

- ii. IAEA peer review and advisory services

Existing IAEA activities in the form of nuclear safety peer review and advisory services are not compliance-monitoring mechanisms but rather a means of assisting states in assessing national and facility level nuclear safety frameworks and systems, etc. They include the IAEA Integrated Regulatory Review Service (IRRS), designed through peer review to strengthen and enhance the effectiveness of the national regulatory infrastructure of states. It also includes operational safety services, such as the Operational Safety Review Team (OSART), which started in the early 1980s, and the Peer Review of Operational Safety Performance Experience (PROSPER), as well as the Emergency Preparedness Review (EPREV) Service. These nuclear safety peer reviews are undertaken pursuant to the aforementioned IAEA statutory function of establishing standards and providing for their application.[167] In this context, further to the 2011 Fukushima Daiichi accident, the 2011 IAEA Action Plan on Nuclear Safety provided for "[IAEA] Member States to be strongly encouraged to voluntarily host [such] peer reviews, including follow-up reviews, on a regular basis".[168] This outcome was also reflected in the post-accident amendments to the underlying documents of the CNS in order to strengthen its effectiveness.[169]

As for nuclear safety, a range of upon request and voluntary IAEA nuclear security advisory services (and peer reviews) are available to IAEA member states, such as the IPPAS and the INSServ. Despite lacking an express statutory basis like the IAEA nuclear safety peer review process, member states are nonetheless increasingly availing themselves of these activities, as recognised by the IAEA GC.[170] A total of 73 IPPAS missions have been undertaken in 46 member states since its inception in 1996[171] and 74 INSServ missions in 63 member states.[172] During an IPPAS mission, a state's physical protection system is reviewed and compared with international guidelines[173] and internationally recognised best practices. IPPAS missions were initially only requested by developing countries or states transitioning from communism, though they are now increasingly requested by developed countries (e.g. the US, UK and France being the first NW states to host such missions, following the first request by a developed country, Norway, in 2003).

167. IAEA Statute, Article III.A.
168. IAEA Action Plan on Nuclear Safety (2011). The draft (IAEA (2011), "Draft IAEA Action Plan on Nuclear Safety: Report by the Director General", IAEA Doc. GOV/2011/59-GC(55)/14) was adopted in September 2011 by the Board, the decision of which was endorsed by the GC the same month.
169. IAEA Docs. INFCIRC/571/Rev.7 (2015); INFCIRC/572 Rev.5 (2015); and INFCIRC/573Rev.6 (2015). See also Johnson, P. (2013), "The post-Fukushima Daiichi response: The role of the Convention on Nuclear Safety in strengthening the legal framework for nuclear safety", *Nuclear Law Bulletin*, No. 91, OECD, Paris, pp. 7-22.
170. IAEA (2016), *supra* note 124.
171. IAEA (2016), "Nuclear Security Report 2016", IAEA Doc. GOV/2016/47-GC(60)/11, p. 11.
172. These numbers are current as of the date of publication.
173. INFCIRC/225/Revision 5, *supra* note 28.

This growing number, including those states with large NPP programmes, indicates that such missions, while remaining voluntary, are becoming widely seen as an important tool.[174] In this context, Director General Amano considered in 2013 such reviews a "no brainer" for a state's nuclear security arrangements and noted that they are being used effectively to improve nuclear safety.[175] This rather bold statement is also reflected in various fora, such as the Ministerial Declaration of the 2013 Conference,[176] the 2014 Hague Communique[177] and the work of an *ad hoc* panel established by the EU,[178] all of which essentially encouraged states to use them on a voluntary basis.

Although at an earlier stage of development as compared to those in nuclear safety, over time, nuclear security peer reviews can be expected to become a regular, normal and commonplace part of doing business, as reflected in the 20/20 report[179] and as sought by some commentators.[180] Yet, despite the purported significance of the gap, the repeated calls for a remedy and the high-level attention given to nuclear security through the past four NSSs, progress to-date is really reflected through an increase in states' voluntarily requesting such missions. It follows that crystallising IAEA nuclear security peer review in a legally binding form appears more aspirational rather than attainable in the near- to mid-term future, not least since mandatory IAEA peer review (and safety standards) does not exist in the more mature field of nuclear safety.

- iii. Proposed framework convention on nuclear security

The NSGEG has recommended that the standards of conduct embodied by the INFCIRC/869[181] initiative (stemming from the NSS 2016 "Joint Statement on Strengthening Nuclear Security Implementation" (see below)) be codified in a legally binding framework convention.[182] Proponents of a framework convention state that it would not affect existing obligations or voluntary agreements but would supplement them by filling the gaps.[183] Importantly, the proposed convention would

174. IAEA (2013), Nuclear Security Plan 2014-2017, IAEA Doc. GOV/2013/42-GC(57)/19.
175. Amano, Y. (2013), "Securing Nuclear Material", Project Syndicate, 28 June 2013.
176. IAEA (2013), Ministerial Declaration, *supra* note 24.
177. Communiqué of The Hague Nuclear Security Summit (NSS) 2014, *supra* note 33.
178. Council of the European Union (2012), Final Report of the *Ad hoc* Group on Nuclear Security, 10616/12, Brussels, 31 May 2012.
179. IAEA (2008), *supra* note 138. It is stated that:
[w]ithin the constraints of necessary secrecy, measures should be developed to give all states confidence that other states are implementing the agreed standards. Ultimately, international reviews of both safety and security should become a regular part of business at nuclear facilities with HEU or separated weapons-usable plutonium, and at nuclear facilities whose sabotage could have widespread consequences, as well as at entities that transport HEU or separated weapons usable plutonium.
180. Bunn, M. and G. Bunn (2002), "Strengthening Nuclear Security Against Post-September 11 Threats of Theft and Sabotage", *Journal of Nuclear Materials Management*, (2002)30, pp. 48-60; and Bunn, M. (2011), "Nuclear Security: What is required?", Harvard Kennedy School Peking University, 12 October 2011.
181. IAEA (2014), "Communication Received from the Netherlands Concerning the Strengthening of Nuclear Security Implementation: Joint Statement on the Strengthening of Nuclear Security Implementation", IAEA Doc. INFCIRC/869.
182. For a text of the draft framework convention see NSGEG (2015), "International Convention on Nuclear Security: Washington, DC, March 2015". In addition, see Bernhard, J. et al. (2015), "International Convention on Nuclear Security", Policy Report, NSGEG, March 2015; and Brill, K. C. and J. Bernhard (2015), "International Convention on Nuclear Security: A Needed Step Against Nuclear Terrorism", *Arms Control Today*, Arms Control Association, Volume 45.
183. Brill, K. C. and J. Bernhard (2015), *supra* note 182.

create a mechanism – the conference of the parties to the convention – to meet periodically to review and make needed improvements.

In considering the need for a new convention, and notwithstanding the potential benefits, the legal complexities of adding one more convention would appear to make it preferable to move incrementally until there is more support for a comprehensive overhaul. There is in fact still much to be done in strengthening the IAEA's role before negotiating a new legal instrument.[184] In addition, if the lack of universalisation of the existing treaties is considered as a weakness of the framework, then further diluting the focus by adding another treaty would appear to be an unnecessary complication. Further, while a legally binding mechanism may be desirable in the future, the search for it now, when no consensus exists, is likely to delay feasible voluntary mechanisms such as the INFCIRC/869 initiative.[185] In addition, past treaty making experience suggests that the negotiation process can often take too long, resulting in too few specific requirements. The multi-year effort leading to the 2005 adoption of the ACPPNM and its entry into force over a decade later can be highlighted in this regard, as can the seven and ten years it took to respectively negotiate and bring into force the ICSANT and CPPNM.

Establishing a proposed framework convention with periodic review meetings of the parties could be a step in the right direction; however, much of the literature considers its development as more of a realistic long-term prospect, rather than a near- to mid-term goal. Without a compelling reason to do so, a simple conclusion is that states are unlikely to negotiate a new nuclear security convention with legally binding standards and peer reviews any time soon. On a final note, it should not be forgotten that a legally binding and robust framework (as sought by some commentators) will be unlikely to enjoy universal support (as sought by others, who critique the current framework for such a deficiency). Thus, to attract the needed support, universal legally binding obligations such as on physical protection, would still most likely need to be vague and weak (which would still not meet the demands of others that seek to avoid a so-called "least-common-denominator diplomacy"). In this context, it is recalled that while the CNS and Joint Convention are legally binding instruments, their provisions have been identified as being merely drafted in general terms,[186] albeit being reinforced through peer review processes.[187]

- iv. Strengthening national implementation and consolidated reporting and information sharing

In light of the foreseen difficulties, including the considerable diplomatic capital necessary to reach agreement on any new legally binding instrument, such as the aforementioned framework convention, a proposed way forward could be for states

184. Findlay, T. (2013), *supra* note 57; Findlay, T. (2016), "What Price Nuclear Governance? Funding the International Atomic Energy Agency", Cambridge, Mass.: Report for Project on Managing the Atom, Belfer Center for Science and International Affairs, Harvard Kennedy School, 24 March 2016; Findlay, T. (2016), "Sustaining the Nuclear Watchdog with a Grand Budgetary Bargain", Op-Ed, Bulletin, Atomic Scientists, 11 May 2016; and Findlay, T. (2014), "Beyond Nuclear Summitry: The Role of the IAEA in Nuclear Security Diplomacy After 2016", Discussion Paper, Project on Managing the Atom, Belfer Center for Science and International Affairs, Harvard Kennedy School, 11 March 2014.
185. NTI (2012), Options for Strengthening the Global Nuclear Security System, Global Dialogue on Nuclear Security Priorities, NTI, Washington, DC, 2 October 2012.
186. Boustany, K. (1998), "The Development of Nuclear Law-Making or the Art of Legal Evasion", *Nuclear Law Bulletin*, No. 61, OECD, Paris, pp. 39-53; Khripunov, I. and D. Nikonov (eds.) (2012), *Legal Framework for Strengthening Nuclear Security and Combating Nuclear Terrorism*, IOS Press. See also Johnson, P. (2013), *supra* note 169, pp. 9-42; and Handl, G. (2015), *supra* note 155, pp. 7-27.
187. Handl, G. (2004), *supra* note 158.

to make legally non-binding political commitments. Simply because a text is legally non-binding should not be a matter of concern. As Dr ElBaradei stated in the context of IAEA safety standards, many states have accepted them as a basis for their national legislation.[188] By doing so, states have in effect voluntarily undertaken to comply with recommendations because they believe it is in their best interest to do so. As discussed earlier, a mechanism already exists within the IAEA framework for the giving of political commitments to the Code of Conduct (and its supplementary guidance), which is reinforced through a formalised process for periodic exchange of information and lessons learned.

Significantly, within the framework of the 2014 NSS, 35 states made voluntary commitments in the form of a "Joint Statement on Strengthening Nuclear Security Implementation" to take specific steps, including to subscribe to the IAEA Nuclear Security Fundamentals and to meet the intent of the Code of Conduct and nuclear security recommendations (i.e. IAEA Nuclear Security Series Nos. 13-15) in national rules and regulations, to periodically host voluntary peer reviews to ensure effective implementation, and commit that those responsible for nuclear security are demonstrably competent.[189] As a way of providing a basis for further strengthening the framework, the Joint Statement was published as an IAEA Information Circular on 22 October 2014. All IAEA member states can subscribe to INFCIRC/869, in particular, by writing to Director General Amano committing to fully implement its objectives. Three more countries – China (INFCIRC/896, 21 June 2016), India (INFCIRC/897, 24 June 2016) and Jordan (INFCIRC/892, 13 November 2015) – have pledged to strengthen nuclear security implementation, bringing the total number of subscribing states to 38. While attracting new countries to subscribe to the initiative is a slow process, the initiative demonstrates the possibility for countries (albeit currently a limited number) to collectively make commitments on matters of nuclear security implementation. It is therefore hoped that additional countries will get on board in the future but the extent to which they do will likely be determined by a number of factors, such as the degree of integration of the initiative into the IAEA framework, in particular, the recognition given to it by the IAEA policy making organs (the GC and Board).

Transparency is an important input to fostering greater co-operation, enhancing confidence and raising stakeholders' awareness of nuclear security issues, including national implementation. Various mechanisms exist for sharing information on a state's legislative and regulatory framework and nuclear security practices. The result is considered as creating a situation in which reporting and information sharing is limited and in which existing mechanisms are underutilised.[190] For example, pursuant to UNSCR 1540, there are the national reports on the steps countries have taken to implement the Resolution, i.e. to prevent the spread of weapons and materials of mass destruction and their delivery systems. Additionally, some states have on a voluntary basis provided additional information on their implementation of UNSCR 1540, including their effective national practices in implementing it. Because of this, UNSCR 1540 is an essential mechanism for increasing transparency in nuclear security and there are positive trends, such as the voluntary preparation of and submission to the UNSCR 1540 Committee of national implementation action plans, which map out priorities and plans for implementing key provisions of the Resolution. However, further attention is still required in a number of areas, including the need to address the varying quality of

188. ElBaradei, M., E. Nwogugu and J. Rames (1995), "International law and nuclear energy: Overview of the legal framework", *IAEA Bulletin*, (1995)3, IAEA, Vienna, pp. 16-25.
189. IAEA (2014), Doc. INFCIRC/869, *supra* note 181.
190. FMWG (2016), "Information Sharing, Standards and Best Practices, and Security Culture", FMWG Working Group Report, 20 April 2016.

states' reports with a view to ensuring that there is a clear and common understanding of the nuclear security regime, as it falls within the framework of UNSCR 1540. Further, 17 countries still have not submitted a report and many others need to submit answers to the clarifying questions posed by the UNSCR 1540 Committee.[191]

There is also the obligation to submit information to the IAEA Director General pursuant to Article 14 of the CPPNM and the Amended Convention. More particularly, states parties are obliged to inform the IAEA Director General, as Depositary, of the laws and regulations that give effect to those instruments. The Depositary is then obliged to periodically communicate this information to all states parties. It is understood that to-date, no substantive guidance has been given, or established by the states parties and/or the IAEA, on the form and content of the information. It follows that some states parties have simply chosen to submit the titles of the relevant laws and regulations, whereas others have gone further by submitting copies thereof. In the run up to the 2014 NSS, a few states parties (Australia, the UK and the Netherlands) proactively provided what in effect may be considered by some to be national reports on their implementation of the Amended Convention, along the lines envisaged by NSS 2016 "Joint Statement on Sustainability in Reporting and Information Sharing" (which provides that "[s]tates are already *obligated to submit reports* pursuant to Article 14 of the [CPPNM]" (emphasis added)). There is a need therefore for guidance to be established with respect to the form and content of the information to be submitted, as well as the process for doing so. Currently, the submitted information is accessible via a password restricted website, presumably a reflection of the specific Depositary obligation to communicate information on implementing laws and regulations to the states parties. In contrast, UNODC (for ICSANT and the Terrorist Bombings Convention) and the UNSCR 1540 Committee facilitate the access of this type of information on national implementation to the public. Some of the practical elements of the implementation of Article 14.1 are likely to arise during the second meeting of the points of contact (and central authorities) identified in the CPPNM and the Amended Convention, to be held in the first week of December 2016. On a final note, in respect of information sharing and reporting in the context of a broader number of instruments (such as UNSCR 1540, the Code of Conduct and ICSANT, as well as the INFCIRC/869 initiative), the potential relevance of the NSS 2016 "Joint Statement on Sustainability in Reporting and Information Sharing" and its "Consolidated National Nuclear Security Report" as a tool to facilitate information sharing and reporting, is also noted.

Whereas prior to the entry into force of the CPPNM Amendment on 8 May 2016, Article 14 obligations were minimally implemented, the IAEA Secretariat is likely to pursue an increased level of information sharing by states parties, while being acutely conscious of the limitations. In this regard, it is recalled that the Ministerial Declaration of the 2013 International Conference on Nuclear Security had already "[e]ncourage[d] the IAEA, in consultation with Member States, to consider ways of further promoting the exchange, *on a voluntary basis*, of information on the implementation of the legal instruments relevant to nuclear security" (emphasis added). This message was also echoed by the IAEA GC, most recently in Resolution GC(60)/RES/10. More pointedly, the NSS 2016 "Action Plan in Support of the

191. Letter dated 29 December 2015, from the Chair of the Security Council Committee established pursuant to resolution 1540 (2004) addressed to the President of the Security Council, S/2015/1052; and Bunn, M. et al. (2016), *supra* note 3. The outcome of the 2016 comprehensive review of the status of the implementation of UNSCR 1540 being undertaken by the UNSCR 1540 Committee, when released, should provide further ways and means to improve implementation of the resolution.

International Atomic Energy Agency" already "[a]dvocate[d] for the IAEA to play a central role in assisting States Parties in the implementation of the CPPNM and its 2005 Amendment, including States Parties informing the IAEA of their laws and regulations in accordance with Article 14.1 of the Convention". Such a message, if not in such detail, could be echoed in the upcoming Ministerial Declaration of the 2016 Ministerial Conference. There is therefore potential in utilising existing provisions to further increase information sharing and to possibly provide a basis for some form of more detailed reporting on national implementation in the future.

Part 4: Momentum for action

"The Day After an Attack, What Would We Wish We Had Done?
Why Aren't We Doing It Now?"
Sam Nunn, Co-Chairman and Chief Executive Officer, NTI (2005)[192]

Given the purported gaps and weak links, what will finally be the tipping point for the international nuclear community to comprehensively and fully address them? In considering this issue, it is possible to turn to the international legal framework for nuclear safety, as an example of how nuclear law has been driven by events and incidents. Although former IAEA Director General Hans Blix called for a "progressive development" of international nuclear law, more often than not, nuclear law developed in a more reactive manner rather than a progressive one. To recall, nuclear law seeks to balance the risks and benefits arising from the use of nuclear energy and ionising radiation.[193] In fulfilling this objective, various legal measures have been established at the international and national level in the core branches of nuclear law, namely, nuclear safety, security and safeguards, as well as civil liability for nuclear damage.

In considering the international legal framework for nuclear safety, the accident at the Three Mile Island NPP in the US in 1979 might be deemed as being somewhat of a "wake-up call" for the US;[194] however, its effects were not of a transboundary nature. It was not sufficient at that time, therefore, to lead to the development of any legally binding international legal instruments on nuclear safety. Rather, the "wake-up call" for the international nuclear community occurred with the Chernobyl accident in 1986. That accident brought a new vision and approach to nuclear safety: the safety of NPPs was no longer considered a strictly national concern.[195] It was thus a defining moment, leading to calls by the Presidents of the US and USSR for the creation of an international nuclear safety framework. It gave birth to new international legal instruments primarily adopted by and under the auspices of the IAEA (such as the Early Notification and Assistance Conventions) and led to a fundamental expansion of the IAEA's safety programme.[196] As Professor Norbert

192. Nunn, S. (2005), "The Day After an Attack, What Would We Wish We Had Done? Why Aren't We Doing It Now?", Co-Chairman and Chief Executive Officer, NTI, Testimony Before the 9/11 Public Discourse Project, Washington, DC, 27 June 2005.
193. The IAEA considers that the role of nuclear law is to "[t]o provide a legal framework for conducting activities related to nuclear energy and ionizing radiation in a manner which adequately protects individuals, property and the environment". Stoiber, C. et al. (2003), *Handbook on Nuclear Law*, IAEA, Vienna.
194. US NRC (2013), "Backgrounder on the Three Mile Island Accident", Office of Public Affairs, February 2013.
195. Horbach, N. and P. Bekker (2002), "The Concept of Sovereignty within Nuclear Energy Law", in K. Gerard, *State, Sovereignty and International Governance*, Oxford University Press, Oxford, p. 459.
196. Rautenbach, J., W. Tonhauser and A. Wetherall (2006), "An Overview of the International Legal Framework Governing the Safe and Peaceful Uses of Nuclear Energy – Some Practical Steps", in NEA (ed.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, pp. 7-36.

Pelzer describes, "it resulted in major and significant amendments to the international body of nuclear law".[197]

Most recently, Director General Amano identified the second watershed nuclear safety event, the 2011 Fukushima Daiichi accident, as another "wake-up" call for the international nuclear community.[198] Following the accident, a number of questions were raised.[199] Was a new international legal instrument on nuclear safety required? Should there be an overhaul of the approach to nuclear safety moving beyond an incentive-based approach? Should the IAEA safety standards be made legally binding and, if so, should they be supplemented with mandatory peer review? Further, should the general safety obligations in the CNS and other relevant instruments be made more mandatory and precise? However, while the effectiveness of the framework and mechanisms to enhance its effective implementation were strengthened after the accident, states did not propose binding safety standards or mandatory safety peer reviews.[200]

With respect to the nuclear security framework, it has been stated that there appears to be no legitimate reason to wait for a catastrophe to occur before further developing the framework. Over a decade ago, Sam Nunn[201] stated that "[t]he world cannot afford what [he] call[ed] a security Chernobyl". Additionally, it has been submitted that "there can be no doubt that the current piecemeal approach [...]

197. Pelzer, N. (2006), "Learning the Hard Way: Did the Lessons Taught by the Chernobyl Nuclear. Accident Contribute to Improving Nuclear Law?", in NEA (ed.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, p. 73-118.
198. Amano, Y. (2012), Statement at Fukushima Ministerial Conference on Nuclear Safety, 15 December 2012, IAEA, Vienna.
199. Pelzer, N. (2011), "Does the Fukushima Nuclear Incident Require a Revision of the International Legal Regime on Nuclear Safety?", Presentation at the IAEA Ministerial Conference on Nuclear Safety, 20-24 June 2011, Working Session 3: Possible Ways for Strengthening the Global Nuclear Safety Framework, IAEA, Vienna.
200. Further to the Fukushima Daiichi accident, the 2011 IAEA Action Plan on Nuclear Safety (*supra* note 168) was adopted, which focused on strengthening of the effectiveness of the main international legal instruments most relevant to the accident: the CNS, the Joint Convention, and the Early Notification and Assistance Conventions. Notwithstanding this action, some states submitted formal proposals to amend the CNS and the Early Notification Convention. To-date, the proposed amendment to the Early Notification Convention has still not gained the requisite support for its consideration. Additionally, the contracting parties to the CNS, rather than adopting the proposed amendment, which would have strengthened the effectiveness of the CNS through changes to the guidance documents underpinning the review process, decided to make a legally non-binding Declaration, which they determined achieved the same aims as the proposed amendment (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). For some, this may be considered a rather weak approach to nuclear safety, considering that what was sought had already been established at the EU level in the context of a 2014 Directive (Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, *Official Journal of the European Union* (OJ) L 219, 25 July 2014, pp. 42-52). Yet, the outcome of these proposed amendments are a reflection of the substantive aspects of the actual amendment that was proposed, the lack of transboundary consequences (directly impacting other countries) arising from the accident and states lacking the appetite to amend an existing nuclear treaty. More significantly, however, they may be deemed as being a reflection of the international approach to nuclear safety, which is based on the joint common efforts of states to achieve and maintain high-levels of safety (it being an incentive driven approach rather than one based on strictly prescribed legal binding obligations, coupled with intrusive oversight and verification mechanisms and sanctions for non-compliance).
201. Nunn, S. (2005), *supra* note 192.

would be seen as woefully and probably irresponsibly deficient".[202] In 2002, US President George W. Bush also warned that "history will judge harshly those who saw this coming danger but failed to act".[203]

Although primarily driven by a reaction to events, the international community can be considered as having taken a number of preventative actions in strengthening the international legal framework. Indeed, five of the seven instruments relevant to nuclear security that comprise the universal counter-terrorism legal framework, were adopted in the decade from 2005 to 2010. However, there appears to still be a need for continued action. It would therefore be unfortunate if only a "watershed nuclear security event" was to provide the required momentum to address the identified gaps and weak links and more, such as to change the legally non-binding status of the Code of Conduct to a legally binding one. But, despite the need for action, it may take such an event to create the required momentum.

Although perhaps controversial, the basis for this assertion is strong. First, the evolving threat of nuclear terrorism remains real. Second, a main driver for significant developments in the nuclear security framework can be attributed to the evolving threat of terrorism, most prominently highlighted by the tragic events of 9/11, as well as subsequent terrorist atrocities and other events. Although not involving radioactive material and associated facilities and activities, 9/11 nevertheless acted as a wake-up call for the international nuclear community, in a similar manner as the Chernobyl accident did in 1986. Third, in considering the need to strengthen the existing framework, it appears that states are unwilling and unlikely, in the near- to mid-term, to go beyond approaches in the nuclear safety framework. More particularly, it is unlikely that any time soon will there be an agreement to legally binding standards and mandatory peer review and assessment (whether by the IAEA or by states parties within the framework of a multilateral treaty). Rather, only a limited number of states appear to be willing to follow an approach based on voluntary measures. Finally, despite high-level political attention through initiatives such as the NSS process, the nuclear security problem has not been solved (nuclear security in any case being a continuous process): a number of gaps and weak links remain, though this article has sought to put them into better context.

The result is that concerns still remain regarding the adequacy of the global nuclear security architecture, in particular, the nuclear security framework and the effectiveness of the national implementation thereof. It is clear therefore that the work of building a strengthened, sustained and comprehensive global nuclear security architecture is going to require continuous consideration. In this regard, a number of influencing factors and some as yet unknown outcomes can be highlighted. For example, there remains the extent to which states (and other stakeholders) decide to maintain the momentum and awareness of the NSS process, to create a path towards a strengthened international nuclear security regime and further shape the institutional framework post-NSS 2016. What will be their resolve to enhance the nuclear security role and capabilities of the IAEA[204] and the UN, as well as other relevant IGOs, bodies and initiatives? In this context, is it feasible that there could be a multilateral political track outside the IAEA? Also, what is the likelihood of the IAEA's mandate being strengthened to the extent that it is able to undertake mandatory peer reviews and establish binding nuclear security standards? There is also the matter as to whether the IAEA's high-level international

202. NSGEG (2015), International Convention on Nuclear Security, *supra* note 182.
203. Bush, G. W. (2002), "Introduction" to US, The National Security Strategy of the United States", September 2002.
204. Findlay, T. (2013), *supra* note 57.

conference on nuclear security (such as the 2016 Ministerial Conference) can be a forum to maintain the needed high-level political momentum and also whether it can continue to raise awareness of nuclear security among key stakeholders. The Ministerial Declaration of the 2016 Ministerial Conference will be informative in this respect. Further, there is the issue of the extent to which existing reporting and transnational information sharing mechanisms can be better utilised and strengthened. In this context, there is a need to better articulate the type of (non-sensitive) information that states could be further encouraged to share, including, in the case of a nuclear security event.

An additional factor concerns whether the INFCIRC/896 initiative can be further integrated into the IAEA framework, thus unshackling it from its NSS origin, which would hopefully lead to a greater number of non-NSS states subscribing to it. In this context, states will need to demonstrate support and build momentum for the effort and its objectives. A measure of success would be the number of subscribed and committed states and the degree of voluntary reporting, in particular, the manner in which states demonstrate implementation (such as through a formalised process). Also relevant is the level of explicit recognition of such initiatives in the 2016 Ministerial Declaration, if at all (noting that no reference was made in the 2016 IAEA GC Resolution GC(60)/RES/10 on "Nuclear Security"). Additionally important will be the continuing resolve of those states comprising the post-2016 NSS Nuclear Security Contact Group[205] and those subscribed and committed to the INFCIRC/896 initiative, as well as other likeminded states, to sustain high-level attention on nuclear security. It will also be significant to see whether more non NSS participating states will join the Contact Group in the future. Of further importance with respect to effective national implementation will be the number of states requesting peer reviews and the periodicity thereof, as well as the degree of transparency of such activities and the subsequent actions to resolve identified issues, as well as the availability of assistance.

Another relevant factor will be whether the currently foreseen biannual meetings of CPPNM and CPPNMNF points of contact could eventually act as a vehicle for discussions on national implementation. Additionally, the extent to which these meetings can in fact lay some of the groundwork for the preparations of the Article 16 conference, the first of which is to be held in 2021, will be relevant. In this regard, the openness of states parties to utilise the Article 16 process as a future mechanism for discussing matters of national implementation will be vital. Whether the CPPNMNF is determined as being inadequate, necessitating its strengthening, in light of the situation prevailing at the time of the first Article 16 conference, should

205. This senior level contact group (currently consisting of 40 nations and the UN and INTERPOL) was established at the 2016 NSS with the "the objectives of advancing implementation of nuclear security commitments and building a strengthened, sustainable and comprehensive global nuclear security architecture". Importantly, the contact group is not limited to those NSS participating countries but to all countries that subscribe to the goals set out in the "Statement of Principles" of the group. Meetings are planned to be convened annually in the margins of the IAEA GC, and, as may be useful, in connection with other related meetings. In the context of "sustained action and ambition", discussions are expected to address a broad range of nuclear security-related issues, including identifying emerging trends that may require more focused attention. Further, the contact group aims to promote and assess implementation of nuclear security commitments, including those made during the summits. Its first meeting was held during the margins of the 60th IAEA General Conference in September 2016. See the "Communication dated 24 October 2016 received from the Permanent Mission of Canada concerning the Statement of Principles of the Nuclear Security Contact Group", IAEA Doc. INFCIRC/899, 2 November 2016; and "The Nuclear Security Summits: Securing the World from Nuclear Terrorism", Fact Sheet, White House, US, 29 March 2016.

not be overlooked. On a final note, clearly relevant is the willingness of world-leaders to fulfil their respective "undelegatable responsibility" for nuclear security by co-operating in building a strengthened, sustained, and comprehensive global nuclear security architecture. The openness of the newly elected American president to continue the important nuclear security work of the previous administration and the degree of commitment by the US and the Russian Federation to co-operation and joint efforts on nuclear security will also be crucial in setting the future stage.

4.1 Final conclusion

In this 21st century, post-9/11 global environment, the threat of nuclear terrorism is the most urgent, pressing and critical challenge facing the international community today. For more than a decade, significant efforts undertaken by the international nuclear community (including the IAEA) have focused on strengthening the international legal framework for nuclear security. This has included the adoption of new and revised treaties and new legally binding UNSCRs. High-level political attention through the recent NSS process has identified nuclear security as a critical global governance challenge, including the continuing need to strengthen the international legal framework for nuclear security. However, as in other international nuclear legal frameworks, specifically the nuclear safety framework, major developments have unfortunately, on the whole, been reactive to events.

Although adherence to the international legal instruments continues to increase and the ACPPNM is now in force, the lack of universalisation of the treaties is an ongoing issue that needs to be continuously addressed. Notwithstanding the repeated calls by commentators for the purported gaps to be filled and the purported weak links to be comprehensively strengthened, they continue to remain. Moreover, despite some demands for a hard law regime comprised of mandatory peer review and the adoption of binding standards, such as through the conclusion of a new framework convention, increased emphasis was placed in the run-up to the 2016 NSS on an incentive-based and voluntary framework in the near- to medium-term. The focus of proponents of an incentive-based and voluntary nuclear security framework is to build upon the concept of shared responsibility of states, some harking back to the incentive-based nuclear safety framework, as well as other successful incentive-based and voluntary regimes in other fields. To-date, a number of strengthening measures have been proposed, including voluntary and confidence building measures, such as the giving of certain political commitments to implement existing nuclear security guidance and to request existing peer reviews. In this context, the INFCIRC/869 initiative can be considered as one positive step towards a strengthened, sustained and comprehensive global nuclear security architecture; however, it clearly needs greater support and does not address many aspects of the basic premise of proponents for a binding approach.

Even though the proposed strengthening measures may have laudable goals, in the current political climate, a number of them appear to be more aspirational and unlikely to be implemented any time soon. For now, and looking some years ahead, there appears to be a lack of strong and sustained political will by a majority of states, which even impedes the giving of political commitments on strengthening national implementation. While there are some forms of information sharing and national reporting currently taking place, the proposed establishment of binding IAEA nuclear security standards and mandatory nuclear security peer reviews still appears unrealistic, as does the possibility of any discussion on the adoption and entry into force of a new framework convention on nuclear security. It is therefore difficult to consider that without some compelling reason to do so, states, in the near- to mid-term future, will agree to go beyond the existing approaches. Yet, to contemplate that only a "watershed nuclear security event" may provide the

required momentum for the identified gaps and weak links to be comprehensively addressed in such a time period is very disheartening. It is therefore hoped that the international nuclear community seriously considers whether more can be done sooner, rather than later.

Brexit, Euratom and nuclear proliferation

by Anna Södersten[*]

1. Introduction

One of the issues absent from the academic (and public) debate on the United Kingdom's (UK) referendum vote to withdraw from the European Union (EU) (commonly referred to as "Brexit") is what will happen to the UK's membership in the European Atomic Energy Community (Euratom). The Euratom Treaty was signed in Rome in 1957,[1] together with the European Economic Community (EEC) Treaty.[2] It was concluded for an unlimited period and it establishes a Community that has a separate legal personality from the EU. Thus, the EU and Euratom form two separate, although closely linked entities.

Euratom's principal mission is related to the economy, tasked with "creating the conditions necessary for the speedy establishment and growth of nuclear industries";[3] in other words, to promote the nuclear industry. This reflects the high expectations for nuclear energy in the 1950s. Some even believed that the development of nuclear energy would trigger an industrial revolution; however, Euratom only came to play a minor role in the European integration process. Despite this, the Euratom Treaty has remained, almost unchanged, since its adoption[4] and is still frequently applied, although it is unclear to what extent it has boosted the nuclear industry.

This article has a two-fold purpose. The first purpose is to address the constitutional issue of "partial membership". All EU member states are also members of Euratom. It has always been assumed that with membership in the EU also comes a membership in Euratom. But, what about withdrawal? What are the arguments for "partial membership"?

The second purpose of this article is to shed light on some implications of Brexit as it relates to Euratom. The most serious consequences are perhaps found in the

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1. Treaty Establishing the European Atomic Energy Community (1957), 298 UNTS 167, entered into force 1 January 1958 (Euratom Treaty) (consolidated version *Official Journal of the European Union* (OJ) C 203 (7 June 2016)).
2. Treaty Establishing the European Economic Community (1957), 298 UNTS 11, entered into force 1 January 1958 (EEC Treaty or Treaty of Rome).
3. Euratom Treaty, *supra* note 1, Article 1.
4. Euratom's activities are listed in Article 2 of the Euratom Treaty. Euratom shall, *inter alia*, promote research, disseminate information, establish uniform safety standards for the protection of workers and the general public, facilitate investment, ensure the supply of ores and nuclear fuels, make certain that nuclear materials are not diverted to purposes other than those for which they are intended, create a nuclear common market, and establish relations with countries and international organizations as will foster progress in the peaceful uses of nuclear energy.

area of nuclear non-proliferation. The United Kingdom is one of two nuclear weapon states in the EU (France being the other one). Withdrawal from Euratom means withdrawal from its control system, the system of so-called nuclear safeguards. Under this system, the European Commission sends inspectors to the member states to ensure that nuclear material is not being diverted and used for military purposes.

This article begins, in Part 2, by exploring the possibility for the United Kingdom to stay a member of Euratom, while leaving the EU. Part 3 examines the implications of Brexit in the area of nuclear industrial development – the main task of Euratom. The article addresses Brexit and non-proliferation in Part 4 and concludes in Part 5.

2. Brexit: A full exit or a possibility for partial membership?

There are different legal options as to the future relationship between the United Kingdom and the European Union.[5] The UK government has recently announced its intentions in this regard.[6] In addition, the UK government has also recently announced that it will leave Euratom as well.[7] This means that special "Euratom solutions" must be crafted. But, when it comes to Euratom, there is an even more fundamental question that must first be addressed: Does exit from the EU automatically mean withdrawal from Euratom? Or, is it legally possible for the UK to withdraw from the EU, but stay in Euratom?

a. Withdrawal from the European Union

Euratom and the European Community[8] have always shared the same institutions, but the Communities had separate sets of institutional provisions. Just like the EC, Euratom was long lacking a withdrawal clause and the possibility of exit was unclear. This changed when the Lisbon Treaty came into force in 2009.[9] The EU[10] now contains a withdrawal clause: Article 50 of the TEU states that "Any Member State may decide to withdraw from the Union." In order to "trigger" Article 50, the UK must notify the European Council and a withdrawal agreement shall be crafted. The EU Treaties[11] shall cease to apply to the United Kingdom two years after the

5. The legal options available include the United Kingdom becoming a European Economic Area (EEA) member, becoming a European Free Trade Association (EFTA) member and negotiating a free trade and association agreement with the EU. Piris, J-C (2015), "Should the UK Withdraw from the EU: Legal Aspects and Effects of Possible Options", *European issues*, No. 355, available at: www.robert-schuman.eu/en/doc/questions-d-europe/qe-355-en.pdf.
6. See Department for Exiting the European Union and The Rt Hon David Davies MP (2017), "The United Kingdom's exit from and new partnership with the European Union White Paper", available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/589191/The_United_Kingdoms_exit_from_and_partnership_with_the_EU_Web.pdf.
7. See *ibid*., para. 8.30.
8. Originally the European Economic Community (EEC), the EEC was renamed the European Community (EC) upon the entry into force of the Treaty on European Union, OJ C 191 (29 July 1992), entered into force 1 November 1993 (TEU or Maastricht Treaty) (consolidated version OJ C 202/13 (7 June 2016)).
9. Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007, OJ C 306 (17 December 2007), entered into force 1 December 2009 (Lisbon Treaty).
10. Following the Lisbon Treaty, the EC became the EU. Euratom remains as a separate entity.
11. The so-called "EU Treaties" are the TEU and the Treaty on the Functioning of the European Union, OJ C 115/47 (9 May 2008) (consolidated version) (TFEU) (consolidated version OJ C 202/47 (7 June 2016)).

notification to the European Council.[12] The Brexit referendum took place in June 2016, and the UK government has announced it will trigger Article 50 by the end of March 2017.[13]

b. Withdrawal from Euratom

The Lisbon Treaty repealed the institutional provisions of the Euratom Treaty and replaced them with a reference to the institutional provisions in the EU Treaties.[14] One of the provisions that applies to the Euratom Treaty is Article 50 of the TEU.[15] Consequently, the same provision that is used for withdrawal from the EU can be used for withdrawal from Euratom. But, while the withdrawal clause applies to Euratom, there is nothing that prevents "partial membership", i.e. withdrawal from only the EU or from only Euratom. The EU Treaties do not mention Euratom and the only link between the EU Treaties and the Euratom Treaty is found in the earlier mentioned Euratom Treaty Article 106a, which incorporates certain institutional provisions in the EU Treaties to Euratom. Therefore, the conclusion must be that Euratom and the EU are separate entities with separate legal personalities, although closely linked through the shared institutional framework.

Of course, one may object to this conclusion and say that prior to the Lisbon Treaty, it would not have been possible to withdraw from only the EC or only the EU, although they could have been seen as separate "entities". In the (for EU law scholars) well-known Kadi case, the Court of Justice of the European Union (CJEU) stated that the EU and the EC formed two "integrated but separate legal orders".[16] Consequently, why would it be possible to withdraw from the Euratom Treaty when it was not possible to withdraw from only the EU (and stay as a member of the EC)? One answer is that prior to the Lisbon Treaty, the EU lacked an express legal personality. Moreover, some argued that the EU was itself a weak legal entity; some viewed it merely as a "nominal framework for inter-state cooperation without any legal existence of its own".[17] Leaving this EC/EU comparison aside, it is perhaps more important to point to the fact that the Euratom Treaty is a sectoral treaty with a separate set of objectives and that it is still "functional" in nature. Unlike the TEU, the Euratom Treaty does not contain values and the individual is not at "the centre

12. This timeline applies unless the European Council, in agreement with the United Kingdom, unanimously decides to extend this period.
13. On 1 February 2017, the Members of Parliament in the House of Commons voted 498 to 114 in favour of triggering Article 50. See BBC (2017), "Brexit: MPs overwhelmingly back Article 50 bill", www.bbc.com/news/uk-politics-38833883.
14. Article 106a of the Euratom Treaty refers to certain provisions in the TEU and the TFEU that shall apply to the Euratom Treaty.
15. On the EU withdrawal clause, see Tatham, A. F. (2012), "'Don't Mention Divorce at the Wedding, Darling!': EU Accession and Withdrawal after Lisbon", in A. Biondi, P. Eeckhout and S. Ripley (eds.), *EU Law after Lisbon*, Oxford University Press, Oxford, pp. 128-154. See also, Herbst, J. (2005), "Observations on the Right to Withdraw from the European Union: Who are the 'Masters of the Treaties'?", *German Law Journal*, Vol. 6, No. 11, pp. 1755-1760; Łazowski, A. (2012), "Withdrawal from the European Union and Alternatives to Membership", *European Law Review*, Vol. 37, pp. 523-540; and Weiler, J. H. H. (1985), "Alternatives to Withdrawal from an International Organization: The Case of the European Economic Community", *Israel Law Review*, Vol. 20, pp. 282-298.
16. Joined Cases C-402/05 P and C-415/05 P, Yassin Abdullah Kadi and Al Barakaat International Foundation v. Council of the EU and Commission of the EC, ECLI:EU:C:2008:461, para 202.
17. See de Witte, B. (2001), "Chameleonic Member States: Differentiation by Means of Partial and Parallel International Agreements," in B. de Witte, D. Hanf and E. Vos (eds.), *The Many Faces of Differentiation in EU Law*, Intersentia, Antwerp, p. 258, who refers to Pechstein, M., and C. Koenig (1998), *Die Europäische Union: Die Verträge von Maastricht und Amsterdam*, 2nd ed., Mohr Siebeck, Tübingen.

of its construct".[18] While the EU has evolved over the years, much due to the development of human rights, this is not the case for Euratom; the EU and Euratom are very different in nature.

This argument on "separate entities" could of course be countered by pointing to the fact that there is now a shared institutional framework. Without the EU's institutional provisions, Euratom cannot (after the Lisbon Treaty) stand on its own, so the argument goes. Further, one might argue that Article 50 refers to membership of the "Union" and that this is not simply a withdrawal procedure, but a "withdrawal from the Union" procedure. The view defended here, however, is that "partial membership" is legally possible. That is because Euratom Article 106a clarifies that the references to the "Union" in the referenced institutional provisions (inter alia, TEU Article 50), shall be taken as references to Euratom. In other words, Article 50 becomes in this way a "procedure of Euratom". Strictly speaking, this means that the UK withdrawal notice must specifically mention Euratom if the intention is to leave Euratom as well.[19]

Although legally possible, partial membership would, however, likely create some practical difficulties as Euratom and the EU share the same institutions. The institutions would need a different composition depending on whether it is an issue decided by Euratom or the EU. This could make it more complicated to adopt measures on a joint legal basis, that is, one legal basis in the EU Treaties and one in the Euratom Treaty. And the EU and Euratom have adopted quite a few such instruments.[20] Moreover, a decision to stay as a member of Euratom would likely give rise to objections from the other EU member states. After all, Euratom seems to be regarded as an integrated part of the EU. So, although legally possible, other member states might not see it as desirable for the UK to remain in Euratom. And, of course, the question is also whether it would be desirable for the UK to stay.

3. Nuclear industrial development

Almost all of Euratom's activities (as listed in the Euratom Treaty) revolve around nuclear industrial development. Perhaps paradoxically, when it comes to the nuclear industry, the most important implication of Brexit has to do with the EU rather than Euratom: the application of the EU state aid rules.[21] These rules have, for example, come into play regarding the decision by the UK to provide support for the construction of a new nuclear power plant at Hinkley Point – a decision that has been challenged by Austria and Luxembourg. And further expansion of the

18. See Weiler, J. H. H. (2010), Editorial, "Individuals and Rights: The Sour Grapes", *European Journal of International Law*, Vol. 21, No. 2, pp. 277-280.
19. A separate question is what the domestic UK law stipulates. The UK's European Union (Amendment) Act of 2008 states at paragraph 3(2) that: "a reference to the EU in an Act or an instrument made under an Act includes, if and in so far as the context permits or requires, a reference to the European Atomic Energy Community". One might argue that the European Union Referendum Act 2015 includes Euratom. ("A referendum is to be held on whether the United Kingdom should remain a member of the European Union." Para. 1(1).)
20. One example is the Community Civil Protection Mechanism, which can be used for all kinds of emergencies, including nuclear accidents and radiological emergencies. Council Decision 2007/779/EC, Euratom of 8 November 2007 establishing a Community Civil Protection Mechanism (recast), OJ L 314 (1 December 2007), p. 9.
21. The core state aid provisions can be found in Articles 107-109 of the TFEU. The European Commission defines states aid "as an advantage in any form whatsoever conferred on a selective basis to undertakings by national public authorities." European Commission (2016), "State aid control", http://ec.europa.eu/competition/state_aid/overview/index_en.html (emphasis in original).

UK nuclear industry is planned. Following Brexit, the EU state aid rules might no longer apply. This means that the United Kingdom might be able to operate a more active industrial policy, but the situation is far from clear. Depending on the future relationship between the United Kingdom and the EU, EU state aid rules might continue to apply, but through another arrangement.[22]

When it comes to the Euratom Treaty, the implications of Brexit are perhaps even less obvious. One implication is that contracts on nuclear material will no longer have to go through the Euratom Supply Agency (ESA).[23] The ESA has an exclusive right to conclude supply contracts.[24] This enables Euratom to balance demand and supply, with an overall objective of EU energy security. In the 1950s, when the treaty was adopted, resources (i.e. nuclear material) were scarce. But, a shortage of nuclear materials has not occurred since then. Consequently, ESA involvement is only a formality. Yet, the ESA has the discretion to refuse to conclude supply contracts, which could run counter to the attainment of Euratom objectives.[25] And indeed, in the recent past, the ESA has refused to sign contracts that would make individual users too dependent on uranium from Russia.[26] Therefore, Brexit means that British nuclear operators will no longer have to deal with this.

Another area that is linked to the development of the nuclear industry is research. Brexit means that the United Kingdom will no longer be a part of the Euratom research programmes. Much more could be said here, but suffice it to say that some kind of association agreements might be carved out, and perhaps there will be a similar construction for general (EU) research.

Finally, it should be mentioned that in practice, Euratom has moved away from its original main task of promoting the nuclear industry. Today, Euratom has a "new rationale"; most of Euratom's actual activities revolve around nuclear safety. Relatively recently, in 2009 and 2011, Euratom adopted a legal framework in the form of two directives on respectively nuclear safety and nuclear waste.[27] Brexit means that any further amendments of these directives will not affect the

22. For a discussion, see Froggatt, A., T. Raines and S. Tomlinson (2016), "UK Unplugged? The Impacts of Brexit on Energy and Climate Policy", Research Paper, Europe Programme & Energy, Environment & Resources Department, Chatham House, the Royal Institute of International Affairs, London, p. 17.
23. The Euratom Supply Agency was established under Articles 2(d) and 52 of the Euratom Treaty to ensure a "supply of ores, source materials and special fissile materials" "by means of a common supply policy on the principle of equal access to sources of supply". Euratom Treaty, *supra* note 1, Article 52(1). The full provisions are outlined in Articles 52-76 of the Euratom Treaty.
24. Euratom Treaty, *supra* note 1, Article 52(2)(b).
25. Case C-357/95 P, Empresa Nacional de Urânio SA (ENU) v. Commission of the European Communities, ECLI:EU:C:1997:144 ("the ENU Case").
26. Case C-161/97 P, Kernkraftwerke Lippe-Ems GmbH v. Commission of the European Communities, ECLI:EU:C:1999:193 ("the KLE Case"). For the same reason, in 2015, Hungary had to revise its deal with Russia on nuclear material. See, e.g. Byrne, A. and C. Oliver (2015), "Hungary to revise Russia nuclear deal blocked by EU", *Financial Times*, available at: www.ft.com/content/d473b86c-c99c-11e4-b2ef-00144feab7de.
27. Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, OJ L 172 (2 July 2009) (2009 Safety Directive); Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, OJ L 199 (2 August 2011) (2011 Waste Directive). For an overview, see, e.g. Södersten, A. (2012), "The EU and Nuclear Safety: Challenges Old and New", Swedish Institute for European Policy Studies, European Policy Analysis, Issue 2012:10epa.

United Kingdom.[28] But this does not mean that nuclear safety will be put at risk. When the nuclear safety framework was adopted, the main concern was the new member states in Eastern Europe, where nuclear safety was not up to western standards. At it currently stands, the EU nuclear safety framework is not particularly far-reaching; it does not go much further than the international instruments in the field (although there are ongoing discussions to adopt more detailed legally binding technical standards). However, on a symbolical level, Brexit is damaging.

4. Nuclear non-proliferation

When the UK joined the European Communities (the EEC, Euratom and the European Coal and Steel Community) in 1973, it had already developed nuclear weapons. The UK's possession of nuclear weapons was not an immediate obstacle to accession. France, one of the original member states, also had nuclear weapons; therefore, membership could not be denied on this ground. It should also be pointed out that the Euratom Treaty is not a non-proliferation treaty; it does not prohibit the use or production of nuclear weapons. Having said that, one of Euratom's main tasks is to make sure that "nuclear materials are not diverted to purposes other than those for which they are intended".[29] In order to achieve this task, the Euratom Treaty establishes a system of nuclear safeguards.[30]

The Euratom Treaty requires that nuclear operators, for example, give the European Commission information on their facilities.[31] The operators also have to provide information on nuclear material in their possession and they are required to keep and produce operating records. A central aspect of the safeguards system is the use of inspections and the Commission sends inspectors into the territories of member states.[32] In 2014, there were 161 inspectors working for Euratom and 1 234 inspections were carried out.[33] The Euratom Treaty states that "inspectors shall at all times have access to all places and data and to all persons who … deal with materials, equipment or installations".[34] Their task is to verify that nuclear materials are not diverted from their intended use.

a. Purpose of the Euratom safeguards system

When it was established in the 1950s, the purpose of the Euratom safeguards system was to make it possible to import nuclear materials from the United States, the

28. The 2009 Safety Directive has already been amended once, in 2014. Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, OJ L 219 (25 July 2014).
29. Euratom Treaty, *supra* note 1, Article 2(e).
30. The safeguards provisions are laid out in Title II, Chapter 7 Euratom. The Commission has two main tasks, which are laid out in Article 77. First, the Commission is to satisfy itself that nuclear materials are "not diverted from their intended uses as declared by the users". Second, it must assure that "any particular safeguarding obligations assumed by the Community under an agreement concluded with a third State or an international organisation are complied with". This reflects the very rationale behind the system: it guarantees its trading parties that the provisions are complied with.
31. Euratom Treaty, *supra* note 1, Article 78.
32. Euratom Treaty, *supra* note 1, Article 81.
33. Of the 1 234 inspections, 216 were carried out in the United Kingdom. EC, Directorate-General for Energy, Directorate E – Euratom Safeguards (2014), Report on the Implementation of Euratom Safeguards in 2014, EC, Luxembourg, p. 5, available at https://ec.europa.eu/energy/sites/ener/files/documents/20151211%20Annual_Report%202014.pdf.
34. Euratom Treaty, *supra* note 1, Article 81.

world's then leading supplier of fissile material.[35] The United States required that its exported materials would only be used for civil purposes and that the exports could be tracked. The US therefore imposed unilateral inspection rights in their bilateral agreements.[36] For some, a clause on unilateral inspection rights would equal an infringement of Euratom's sovereignty. But, with a safeguards system in place, such a clause could be avoided; Euratom would have the direct responsibility.

Of course, the Euratom safeguards system was also a way of preventing Germany from developing nuclear weapons; no country of the original six would be able to covertly develop nuclear weapons. The purpose of the Euratom safeguards system is to make sure that nuclear materials are not diverted to purposes other than those for which they are intended. But as mentioned, the Treaty does not prohibit diversion. In fact, the Treaty even explicitly exempts from the safeguards system materials declared for military use.[37] In 2003, the Court of Justice of the European Union (CJEU) also confirmed that nuclear energy for military application falls outside the entire scope of the Treaty. This ruling was the result of an infringement procedure against the UK.[38]

Euratom inspections of nuclear weapon states are especially important because they make the safeguards system credible, which then allows Euratom to guarantee to its trading partners that the conditions on the use of materials are adhered to.[39] Therefore, controlling nuclear weapon states is mainly about facilitating trade for Euratom/the EU as a whole. But, the control is also necessary in order for the EU to

35. For an overview of the development of the Euratom Safeguards system (until 1990), see Howlett, D. A. (1990), *EURATOM and Nuclear Safeguards*, Palgrave Macmillan, New York. See also Lindroos, A. (1997), "The Role of Euratom in the Non-Proliferation Regime", *Finnish Year Book of International Law*, Vol. 8, p. 307; Gorove, S. (1965), "The First Multinational Atomic Inspection and Control System at Work: Euratom's Experience", *Stanford Law Review*, Vol. 18, No. 2, pp. 160-186; and Patel, B. and P. Chare (2007), "Fifty Years of Safeguards under the Euratom Treaty – a Regulatory Review", *ESARDA Bulletin*, Vol. 36, pp. 3-10.
36. The US, however, did not do this with Canada and the UK. Nanes, A. S. and R. Efron (1960), "The European Community and the United States: Evolving Relations", *The Review of Politics*, Vol. 22, No. 2, pp. 179-180.
37. Euratom Treaty, *supra* note 1, Article 84(3) reads: "The safeguards may not extend to materials intended to meet defence requirements which are in the course of being specially processed for this purpose or which, after being so processed, are, in accordance with an operational plan, placed or stored in a military establishment".
38. Case C-61/03, Commission v. United Kingdom, ECLI:EU:C:2005:210. The case concerned a reactor, which was used in the UK's nuclear propulsion programme for nuclear submarines. The reactor was to be decommissioned and the European Commission requested that the UK send detailed information so that it could determine whether "general data" required under Euratom Treaty Article 37 should be provided. Under this provision, each member state shall provide the Commission with general data relating to any plan for the disposal of radioactive waste. The data has to be such that the Commission can determine whether the implementation of such a plan has transboundary effects. In the view of the UK, the reactor did not fall within the scope of the Euratom Treaty, as it was used for military purposes. The Euratom Treaty does not contain a general derogation clause similar to Article 346 of the TFEU, which provides that no member state shall be obliged to supply information that the member state considers contrary to the essential interests of its security should such information be disclosed. The Court decided that the absence of such a clause must mean that military activities are excluded from the scope of the Euratom Treaty. The Court's finding was confirmed in Case C-65/04, Commission v. United Kingdom, ECLI:EU:C:2006:161 ("Gibraltar Submarine Case").
39. See Euratom Treaty, *supra* note 1, Article 77(b). See also Schleicher, H. W. (1980), "Nuclear Safeguards in the European Community: A Regional Approach", *IAEA Bulletin*, Vol. 22, No. 3/4, pp. 45-50.

be a credible global actor; it shows that the EU takes non-proliferation seriously in that it makes certain that no covert diversion will take place on European soil.

b. Implications of Brexit on European nuclear non-proliferation

Euratom is safeguarding nuclear material in the United Kingdom, except for material intended for military use. When the United Kingdom exits Euratom, this control will stop. However, this does not mean that there will be no external safeguards control in the UK whatsoever. All Euratom member states are subordinated to two sets of controls. The International Atomic Energy Agency (IAEA) has a safeguards system, which works in parallel with the Euratom one. The IAEA system was created a decade after the Euratom system by the adoption of the non-proliferation treaty (NPT).[40] Under the IAEA system, which is global in its approach, non-nuclear weapon states are obliged to conclude so-called comprehensive safeguards agreements (CSA) with the IAEA. Such agreements imply that all nuclear material and all nuclear activities in a state are subject to IAEA safeguards. Euratom concluded a CSA with the IAEA in 1973.[41] It is a mixed agreement where the member states are parties alongside Euratom and the IAEA.[42] The UK and France are not parties since they are nuclear weapon states. They have instead concluded separate agreements, so-called "voluntary offer" agreements with the IAEA.[43] A voluntary offer agreement is of more limited scope than CSAs in that they exclude facilities with national security

40. Treaty on the Non-Proliferation of Nuclear Weapons (1968), IAEA Doc. INFCIRC/140, 729 UNTS 169, entered into force 5 March 1970 (NPT).
41. Agreement between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the European Atomic Energy Community and the International Atomic Energy Agency in Implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (1973), IAEA Doc. INFCIRC/193. See also Agreement between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of Article III (1) and (4) of the Treaty on the non-proliferation of nuclear weapons (78/164/Euratom), OJ L 51 (22 February 1978), p. 1. The NPT provides that its requirements can be met by states either individually or together with other states. NPT, Article III.4.
42. The Euratom Treaty has a specific clause on so-called mixed agreements. See Euratom Treaty, *supra* note 1, Article 102.
43. These agreements are "tripartite", that is, the parties are the UK, the IAEA and Euratom. The UK concluded a safeguards agreement with Euratom and the IAEA on 6 September 1976. The Text of the Agreement of 6 September 1976 between the United Kingdom of Great Britain and Northern Ireland, the European Atomic Energy Community and the Agency in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (1978), IAEA Doc. INFCIRC/263, entered into force 14 August 1978. France, Euratom and the IAEA concluded a safeguards agreement in July 1978. The Text of the Agreement of 27 July 1978 between France, the European Atomic Energy Community and the International Atomic Energy Agency for the Application of Safeguards in France (1981), IAEA Doc. INFCIRC/290, entered into force 12 September 1981. At that time, France was not yet a party to the NPT, not joining until 1992.

significance. Thus, the IAEA only performs safeguards in a small number of installations in the UK, installations that are under "voluntary offer".[44]

Euratom's safeguards system is much wider in scope than the IAEA system as it does not differentiate between nuclear weapon states and non-nuclear weapon states; the Commission has inspection rights in all EU member states and it safeguards all civil nuclear material. When Brexit takes place, the "regional" layer of safeguards, that is, the Euratom safeguards, will not be exercised in the UK. Although the international layer at the IAEA level will continue, the result is a significant downscaling of safeguarding activities in the UK.

Another implication of Brexit concerns enforcement. As opposed to the international (IAEA) system of safeguards, the Euratom system has real "teeth" in the event a member state breaches its obligations. The Commission can initiate an infringement procedure and eventually bring the matter before the CJEU. Moreover, the Commission may impose sanctions in the event of an infringement on the part of persons or undertakings.[45] These can take the form of: a) a warning; b) the withdrawal of financial or technical assistance; c) the placing of the undertaking under the administration of a person or board; or d) the withdrawal of nuclear materials. The sanctions are in order of severity, with the withdrawal of nuclear material being the most severe. Over the years, the Commission has issued several warnings (some of them to operators in the UK),[46] but it has also (at least on one occasion) placed a company under administration.[47]

The IAEA system has none of this, as it is much softer. Unlike the Euratom system, the IAEA system is not backed up by a court. The IAEA controls are also less detailed and less "intrusive". There is no system of sanctions directed to the operators. There are fewer inspections and the scope of inspections is much more narrow. For the UK and the nuclear operators, Brexit means that the supranational actor will no longer be there. Brexit might not lead to proliferation risks, but on a global level – and on a symbolical level – downscaling safeguards efforts is not a positive thing.

At the EU, a considerable amount of money is devoted to the inspection of nuclear weapon states; about 70% of the Euratom budget for safeguards goes to inspecting the reprocessing plants at Sellafield in the UK and at La Hague in

44. See Office for Nuclear Regulation (ONR) (2016), "IAEA Safeguards in the UK", www.onr.org.uk/safeguards/iaeauk.htm. ONR explains that the IAEA currently inspects "parts of the Sellafield facility … and the gas centrifuge enrichment facility at Capenhurst". Also, in 2014, Euratom carried out 1 234 inspections and 643 of them were joint inspections together with the IAEA. EC, Directorate-General for Energy, Directorate E – Euratom Safeguards (2014), Report on the Implementation of Euratom Safeguards in 2014, EC, Luxembourg, p. iv, available at https://ec.europa.eu/energy/sites/ener/files/documents/20151211%20Annual_Report%202014.pdf.
45. More specifically, in case an inspection is opposed, the Commission can apply to the ECJ for an order to make the completion of the inspection compulsory. If there is a "danger in delay", the Commission itself may issue a written order to proceed with the inspection.
46. See, for example, the warning issued by the Commission addressed to BNG Sellafield Limited. Commission Decision 2006/626/Euratom of 15 February 2006 pursuant to Article 83 of the Treaty establishing the European Atomic Energy Community, OJ L 255 (19 September 2006), p. 5. In 2006, BNG Sellafield Limited brought an action to the Court to annul that decision. It submitted, *inter alia*, that the Commission lacked the competence to adopt the decision and the measures imposed. In 2009, the applicant informed the Court that it wished to discontinue proceedings. See Case T-121/06, British Nuclear Group Sellafield v. Commission, ECLI:EU:T:2009:469.
47. This decision was challenged in the ECJ. See Case C-308/90, Advanced Nuclear Fuels v. Commission, ECLI:EU:C:1993:23 ("ANF Lingen").

France.[48] On a positive note, Brexit means money saved as the Commission no longer will have to inspect the UK. Of course, Brexit also means less money going to Euratom, as the UK will no longer contribute to the budget.

Brexit also means that there will be a symbolic loss; European control of a nuclear weapon state will be lost. However, one might also argue that the EU's credibility as a global actor will increase; the EU will only have one nuclear weapon state rather than two. This can make it somewhat easier to put pressure on other states.[49] So, when it comes to non-proliferation, Brexit is not necessarily a bad thing. However, it should be pointed out that in any event, as an international actor, the EU would remain stronger with the United Kingdom as a member than without it.

5. Concluding remarks

Rightly so, Euratom is not at the centre of the Brexit debate. But, there are some important implications that should be put into light. This brief article has discussed some of them. The most important implication is probably to be found in the area of nuclear non-proliferation. Brexit means a significant downscaling of safeguards in the UK; the Euratom safeguards system will no longer apply. The IAEA safeguard system, which works in parallel with the Euratom one, will continue to apply to the UK, but the scope is not as far-reaching as the Euratom system. However, it would be a clear overstatement to say that Brexit will lead to a risk for nuclear proliferation. The most important implication is rather to be found at the symbolic level; the downscaling of control of a nuclear weapon state is obviously not a good thing. Yet, for the EU as a global actor, there might actually be some unforeseen changes; Brexit might make it easier for the EU to act globally in the field of nuclear non-proliferation.

The article has also pointed to the possibility for the United Kingdom to stay as a member of Euratom. If the United Kingdom wishes to stay in Euratom but exit the EU, this is legally possible. However, this sets up some practical problems as the institutional composition will vary depending on whether a legal instrument is to be adopted on the basis of the EU Treaties or the Euratom Treaty. Although problematic, this should not be an impossible issue to solve. But, it is more likely that a complete, full-fledged, exit is to be preferred, both for the United Kingdom and the other member states.

48. In 2014, the budget for Euratom's safeguards was EUR 20 520 000. EC, Directorate-General for Energy, Directorate E – Euratom Safeguards (2014), Report on the Implementation of Euratom Safeguards in 2014, EC, Luxembourg, p. 18, available at https://ec.europa.eu/energy/sites/ener/files/documents/20151211%20Annual_Report%202014.pdf.
49. Cf. the situation before 1992, when France was not a party to the NPT. It was for many years difficult for the member states to formulate a credible non-proliferation policy. France's accession to the NPT in 1992 created the opportunity for a more active policy. In 1995, the first important step was taken when the EU adopted a Joint Action to help build consensus on the indefinite extension of the NPT. See Council Decision 94/509/CFSP of 25 July 1994 concerning the joint action adopted by the Council on the basis of Article J.3 of the Treaty on European Union regarding preparation for the 1995 Conference of the States parties to the Treaty on the Non-Proliferation of Nuclear Weapons, OJ L 205 (8 August 1994), p. 1.

McMunn, et al. v. Babcock and Wilcox Power Generation Group, Inc., et al.: The long road to dismissal

*by Marjorie Berger**

McMunn, et al. v Babcock and Wilcox Power Generation Group, Inc., et al. was one of 17 related public liability actions (all 17 cases are hereafter referred to as "McMunn") filed between 2010 and 2015 by individuals living and/or working in the vicinity of two former fuel fabrication facilities[1] who alleged that releases of radioactive materials from those facilities contaminated the air, soil, surface water and groundwater in the surrounding communities, causing them personal injury and property damage. The plaintiffs in all 17 cases claimed they had contracted various cancers and their property was contaminated with uranium. Plaintiffs brought their claims pursuant to the Price-Anderson Amendments Act (PAA)[2] and the Atomic Energy Act of 1954, as amended (AEA),[3] and also asserted related state law claims of negligence, negligence *per se*, strict liability, civil conspiracy, and wrongful death and survival. The defendants, Babcock & Wilcox Power Generation Group, Inc., B&W Technical Services, Inc. (collectively, B&W) and Atlantic Richfield Company (ARCO), were unrelated companies who, at different times, owned and operated those facilities.

The PAA,[4] which became law on 2 September 1957, is a federal statute that governs claims for personal injury and property damage "arising from the activities of NRC licensees and DOE contractors".[5] These claims are defined in the PAA as public liability actions.[6] In order to prevail in a public liability action, plaintiffs must establish through expert evidence that the defendants released radiation into the environment in excess of the limits then permitted by federal regulations and that the plaintiffs were exposed to those releases. They must also establish that their respective exposures to radionuclides were capable of causing their illnesses and that the doses of radiation they received did in fact cause their illnesses.

The PAA also provides for jurisdiction in the federal district court where the alleged nuclear incident took place. The McMunn cases were filed in the Federal

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1. The facilities were located in Apollo Borough and the Parks Township, both in the western part of the US state of Pennsylvania. The two facilities respectively fabricated uranium and plutonium fuel for the federal government and commercial customers.
2. Title 42 United States Code (USC) § 2210(n)(2).
3. 42 USC § 2011.
4. The Price-Anderson Act amended the Atomic Energy Act and is codified at section 170 of the AEA. 42 USC § 2210.
5. OECD Nuclear Energy Agency (NEA) (2016), "Nuclear Legislation in OECD and NEA Countries: Regulatory and Institutional Framework for Nuclear Activities: United States", available at: www.oecd-nea.org/law/legislation/usa.pdf. See also NRC (2014), "Backgrounder on Nuclear Insurance and Disaster Relief", available at: www.nrc.gov/reading-rm/doc-collections/fact-sheets/nuclear-insurance.html.
6. 42 USC § 2210(n)(2).

District Court for the Western District of Pennsylvania (WD PA). In September 2015, that District Court granted defendants' motions for summary judgment in 11 of the pending cases, and in December 2015, the District Court granted defendants' motion for an order to show cause why judgment should not be entered in an additional four cases. Two other late-filed cases were also subsequently dismissed, and all 17 cases involving over 100 plaintiffs are now on appeal before the Third Circuit Court of Appeals. This article highlights the significant developments in the litigation that led up to the dismissal of all 17 cases and the issues raised on appeal.

Rather than file a single action and seek class action certification, the law firm representing the McMunn plaintiffs filed a series of separate law suits. Although the allegations regarding the operations of the facilities in each case were identical, the 17 cases were deemed to be unrelated and assigned to different judges. They were, however, consolidated before a single magistrate judge[7] (Magistrate Judge Robert Mitchell) for purposes of common discovery only.

In 2011, the plaintiffs filed a motion to consolidate the then seven pending cases. The defendants opposed the motion on the grounds that the seven cases involved 85 plaintiffs, 40 separate diseases, 11 different radionuclides and more than 50 years of operating histories. The diseases included the following types of cancers: brain, breast, gynecological, hematological, lung and skin. The radionuclides of primary concern were uranium and plutonium. The defendants further asserted that the claims involved individualised issues of duty, exposure and causation. The court granted the motion, in part, consolidating the cases for all pre-trial purposes including motions relating to pleadings, discovery and case management, as well as dispositive motions.

The parties thereafter filed competing case management orders. The plaintiffs urged the court to adopt a "bellwether" approach, in which they would select eight plaintiffs for completion of fact and expert discovery, mediation and trial. The defendants opposed on the grounds that the approach would not resolve common issues and that the plaintiffs' claims required unique exposure, dose and causation determinations. The defendants urged the court to issue a "Lone Pine"[8] type order requiring the plaintiffs to produce *prima facie* evidence of the specific radionuclides in excess of the applicable federal regulations in issue, exposure pathways, facility implicated, numerical dose and epidemiological evidence to support their claims. In January 2012 the court granted the defendants' motion and issued a case management order (CMO), directing the plaintiffs to produce such evidence within 90 days.

In response to the court's order, the plaintiffs filed six expert reports in support of their claims. The experts provided generalised opinions on the alleged releases of uranium and plutonium from the Apollo and Parks facilities; on the presence of uranium in soil detected in samples taken within 2.5 km of the Apollo facility and one soil sample of plutonium activity consistent with nuclear fuels used at the Parks facility; that the amount of radionuclides released from the Apollo facility exceeded that permitted by federal regulation; that ionising radiation is capable of causing cancer; that highly enriched uranium has significant carcinogenic potential because

7. Magistrate judges are appointed to assist District Court judges in their duties. Although their precise duties can vary, they typically conduct mediations, resolve discovery disputes and decide a wide variety of motions.
8. A "Lone Pine" order, which is widely used in mass tort cases, is a case management tool used by the court to streamline cases by requiring plaintiffs to set forth *prima facie* evidence to support their allegations so that allegations without merit can be eliminated early in the life of cases.

it is an alpha emitter; and that an unspecified level of exposure was sufficient to cause the plaintiffs' cancers.

At a status conference after the plaintiffs issued their expert reports, their counsel advised the court that they had opted not to submit expert evidence for 21 plaintiffs whose claims they would dismiss and that they had decided to abandon many of the claims and theories alleged in their operative complaints. Thereafter, defendants filed a motion arguing that the remaining plaintiffs had failed to comply with the CMO and that they should be barred from presenting evidence beyond the prima facie limits of the CMO. The defendants argued that the plaintiffs failed to produce evidence that any plaintiff was exposed to any radionuclide besides uranium; failed to identify exposure pathways, dates of exposure or provide a numerical dose for any plaintiff; failed to produce any epidemiological evidence demonstrating general or specific causation; and failed to provide plaintiff-specific scientific or medical evidence amounting to a prima facie showing of any individual plaintiff's alleged exposure, dose or causation. In September 2012, Magistrate Judge Mitchell was largely persuaded by the defendants' arguments and granted their motion, in part, significantly narrowing plaintiffs' cases to the release of uranium from the Apollo facility during the period of its operation via an inhalation pathway.[9]

After the completion of expert discovery in 11 cases, the defendants filed Daubert[10] motions urging the court to exclude the opinions of five of the plaintiffs' expert witnesses. The defendants argued that because plaintiffs' experts failed to articulate opinions necessary to meet the plaintiffs' burden of proof on breach of duty owed and exposure and dose required in a public liability action, their opinions did not "fit" and that the opinions of two experts were scientifically or methodologically unreliable.[11] The plaintiffs also filed Daubert motions seeking to exclude the expert opinions of four of the defendants' experts as methodologically unreliable. They also sought to exclude the testimony and studies of a non-retained expert.

In July 2013, after extensive briefing and a two-day Daubert hearing, Magistrate Judge Mitchell adopted the arguments made by the defendants and issued an extensive Report and Recommendation (R&R) in which he recommended that four of the plaintiffs' experts be excluded and that the plaintiffs be given 21 days to show cause why summary judgment should not be entered in the defendants' favour.[12] Magistrate Judge Mitchell concluded that by failing to calculate plaintiff-specific doses, two of the plaintiffs' experts' opinions did not "fit" the breach of duty element because they would not assist the trier of fact in resolving the issue of causation.[13] He recommended excluding plaintiffs' epidemiological expert because he failed to support his opinion that uranium is carcinogenic with any consensus scientific

9. McMunn, et al. v. Babcock & Wilcox Power Generation Group, Inc., et al., 896 F.Supp. 2d 347 (WD PA 2012).
10. Federal courts have an obligation to ensure compliance with federal rules of evidence by assessing the reasoning and methodology of a proffered expert opinion to determine whether the opinion is scientifically competent, reliable and relevant. This gate-keeping function was articulated in the seminal case of Daubert v. Merrell Dow Pharm., Inc., 509 US 579 (1993).
11. Under the Daubert standard, an expert opinion does not have the requisite scientific connection, or does not "fit" the facts of the case where "there is simply too wide an analytical gap between the data and the opinion proffered". General Electric Co. v. Joiner, 522 US 136, 146 (1997).
12. McMunn, et al. v. Babcock & Wilcox Power Generation Group, Inc., et al., 2013 US Dist. LEXIS 100259 (WD PA 2013).
13. *Ibid.*, **60-61.

evidence specific to uranium.[14] He recommended excluding plaintiffs' specific causation expert on the grounds that he had no information as to each plaintiff's dose, no epidemiological evidence to support his conclusions, that he failed to rule out alternative causes for their cancers and his opinions were untestable.[15] Magistrate Judge Mitchell recommended that the plaintiffs' Daubert motions be denied.[16]

The plaintiffs filed objections to the R&R, and in February 2014 District Court Judge David S. Cercone[17] issued an opinion rejecting the R&R with respect to the exclusion of the plaintiffs' experts. In his view, the alleged methodological flaws cited by the defendants went to the weight and not the admissibility of their opinions. He further disagreed with Magistrate Judge Mitchell's view of Third Circuit law arising out of the Three Mile Island litigation.[18] The defendants thereafter asked Judge Cercone to certify a petition for interlocutory appeal to the Third Circuit based upon a substantial ground for a difference of opinion on each question of controlling law. Judge Cercone certified the petition but it was subsequently denied by the Third Circuit without comment.[19]

In October 2014, the defendants filed motions for summary judgment[20] in the 11 cases on the issues of breach of duty owed and exposure and dose common to all plaintiffs. The defendants further moved for judgment on the pleadings[21] with respect to all 15 then-pending cases based on Price Anderson pre-emption of the state law claims asserted. The defendant ARCO also filed a motion for summary judgment on no shareholder liability. In their duty owed motion, the defendants argued that in order to establish that they had breached the duty owed, the plaintiffs were required to establish that there had been a release of uranium at the boundary of the Apollo facility in excess of the applicable federal regulatory limits and that the plaintiffs' experts' opinions regarding concentrations of uranium at the facility's stacks were insufficient to create an issue of fact. As for causation, the defendants argued that Third Circuit law required plaintiffs to produce evidence of specific and

14. *Ibid.*, **87-89.
15. *Ibid.*, *108.
16. *Ibid.*, **119-20, *124, *134 and **138-9.
17. In April 2013, an order was entered reassigning Judge Cercone as the district judge in all of the cases during the pendency and resolution of the Daubert motions and any motions for summary judgment, which eliminated the possibility that the judges to whom the cases were assigned might issue conflicting rulings.
18. Magistrate Judge Mitchell interpreted relevant Third Circuit case law arising out of the TMI litigation as requiring plaintiffs in a pubic liability action to produce epidemiological evidence on the specific radionuclide in issue rather than referencing the general carcinogenicity of ionising radiation and requiring quantifying doses specific to each plaintiff. In re TMI, 67 F.3d 1103 (3rd Cir. 1995); In re TMI, 193 F.3d 613 (3rd Cir. 1999).
19. McMunn, et al. v. Babcock & Wilcox Power Generation Group, Inc., et al., No-14-8074 (3rd Cir. 2014, petition denied 16 June 2014).
20. Motions for summary judgment are filed under Rule 56 of the Federal Rules of Civil Procedure, which states that "A party may move for summary judgment, identifying each claim or defense – or the part of each claim or defense – on which summary judgment is sought. The court shall grant summary judgment if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law".
21. In the United States, this is a motion filed under Rule 12(b)(6) of the Federal Rules of Civil Procedure, which states that "Every defense to a claim for relief in any pleading must be asserted in the responsive pleading if one is required. But a party may assert the following defenses by motion: … (6) failure to state a claim upon which relief can be granted". This is known as a 12(b)(6) motion.

excessive doses of uranium to which they were exposed and that those doses were sufficient to cause their cancers,[22] which they failed to do.

The plaintiffs opposed, arguing both that the releases could be measured at the stacks and the totality of the evidence produced and the inferences a jury could draw from that evidence were sufficient to establish a breach of the duty owed. The plaintiffs opposed the defendants' exposure and dose motion on the grounds that Third Circuit law cited by the defendants did not require them to calculate a specific dose to which any plaintiff was exposed and that their expert opinions were sufficient for a jury to infer that plaintiffs were exposed to excessive amounts of uranium from the Apollo facility. Plaintiffs argued in response to the defendants' 12(b)(6) motion that they had pled cognisable causes of action that were permissible in a public liability action.

In a May 2015 Report and Recommendation, Magistrate Judge Mitchell recommended that the defendants' motions for summary judgment on the issues of breach of duty and exposure be granted, as well as their motion for judgment on the pleadings.[23] With respect to the breach of duty owed motion, Magistrate Judge Mitchell found there were no genuine issues of material fact regarding how and where to measure releases from the Apollo facility and that plaintiffs' experts failed to offer opinions supporting that the releases of uranium had exceeded federal regulatory limits at the facility boundary.[24] With respect to exposure and dose, Magistrate Judge Mitchell construed Third Circuit law as requiring the plaintiffs to produce evidence of their exposure to inhaled uranium from the Apollo facility and an estimate of the dose received sufficient to cause their cancers, which the plaintiffs had not done.[25] Finally, Magistrate Judge Mitchell considered the plaintiffs' state law claims to be inconsistent with liability in a public liability action and therefore pre-empted. In establishing a federal case of action for public liability claims, the PAA provides that state law claims that are inconsistent with the pervasive federal regulation in the field of nuclear safety are pre-empted.[26] The majority of courts that have addressed the issue have found that a "claim growing out of a nuclear incident is compensable under the terms of the Amendments Act or not compensable at all."[27]

The plaintiffs filed objections to the R&R. In a September 2015, opinion Judge Cercone adopted the R&R in full and ordered the dismissal of 11 of the then-pending cases.[28] The defendants thereafter filed a motion to show cause why the court should not dismiss the other four pending cases where discovery had since been concluded. Magistrate Judge Mitchell recommended that the motion to show cause be granted, to which the plaintiffs in those cases filed objections. In December 2015 Judge Cercone adopted Magistrate Judge Mitchell's recommendation and dismissed those four cases.[29] They were consolidated with the other eleven cases for purposes of the plaintiffs' appeal to the Third Circuit along with two other late-filed cases that were the last to be dismissed.

In their appellate court briefs, the plaintiffs contend that summary judgment was improperly granted because there were several material fact questions

22. In re TMI, 193 F.3d 613, 659.
23. McMunn, et al. v. Babcock & Wilcox Power Generation Group, Inc., et al., 131 F. Supp. 3d 352 (WD PA 2015), 2015 US Dist. LEXIS 123519.
24. *Ibid*., pp. 368-390.
25. *Ibid*., pp. 390-404.
26. 42 USC 2014(hh).
27. In re TMI Litigation Cases Consolidated II, 940 F.2d 832, 854 (3rd Cir. 1991).
28. McMunn, et al. v. Babcock & Wilcox Power Generation Group, Inc., et al., 131 F. Supp. 3d 352 (WD PA 2015), 2015 US Dist. LEXIS 122937.
29. *Ibid*., p. 358.

remaining for a jury to resolve and the district court erred in interpreting and applying controlling regulations. Specifically, on the issues of exposure and dose, the plaintiffs assert: 1) that they produced sufficient evidence from which a jury could infer that they were exposed to amounts of radiation in excess of background levels and were not required to quantify their doses in part because the defendants failed to maintain sufficient plant records; 2) that Judge Cercone improperly moved the standard from exposure to specific dosages; and 3) that experts may offer opinions on specific causation without a quantifiable measure of exposure and dose. On the issue of breach of duty owed, the plaintiffs contend that the court misapplied the controlling regulations with respect to where and how to measure releases beyond the site boundary and overlooked facts and reasonable inferences showing persistent breaches of duty. In response, the defendants reasserted the arguments made in their motions for summary judgment.

Oral argument took place on 10 November 2016 before a three judge panel of the Third Circuit Court of Appeals. On the issue of exposure and dose, the panel's questions focused mainly on whether each plaintiff is required to quantify the dose of radiation to which he or she was allegedly exposed and whether it is feasible to do dose reconstructions. Counsel for the appellants (plaintiffs) argued that the TMI cases do not require a quantification of dose; that the defendants had failed to keep the data required to quantify dose; and that plaintiffs need only show they were exposed to some amount of radiation in excess of background levels. Counsel for the appellees (defendants) argued that quantification of dose is required under TMI; that dose reconstructions can and have been done with well-accepted scientific models; and that the plaintiffs' experts had failed to connect any releases from the Apollo facility in excess of background levels to a single plaintiff. On the issues of duty owed, the panel questioned whether a violation of the defendants' operating license requirements was a source of the duty owed and whether there was an outstanding factual question on whether plaintiffs had produced evidence that the Apollo facility had complied with the NRC's regulatory limits for the release of radionuclides. Appellants' counsel argued that the duty owed can be derived from license requirements, but could not cite to any case law supporting that proposition. Counsel for the appellees countered that the sole source of the duty owed was NRC regulatory limits; and that the undisputed evidence established that there was no exceedance of the applicable limits at the Apollo boundary. A decision from the court is expected in 2017.

Case law

France

Conseil d'État decision, 22 February 2016, EDF v. Republic and Canton of Geneva relative to the Bugey nuclear power plant (No. 373516)

Article 160c of the Constitution of the Republic and Canton of Geneva of 14 October 2012, relating to nuclear energy, provides that "the cantonal authorities shall oppose by all the legal and political means at their disposal the installation of nuclear power stations, disposal sites for highly and moderately radioactive wastes and retreatment plants on the territory of the canton and in the vicinity of it."

It is on this basis that the Republic and Canton of Geneva justified having a sufficient interest in challenging the continuing activity of the Bugey nuclear power plant (NPP), which is located around 70 kilometres from Geneva in the *département* of Ain in France and that has been operated by Electricité de France (EDF) since the seventies.

The Republic and Canton of Geneva submitted two applications before the Conseil d'État in France requesting the repeal of the following texts relating to the operation of, on the one hand, basic nuclear installation (INB or *installation nucléaire de base*) No. 78 (Bugey NPP, reactors 2 and 3) and, on the other hand, INB No. 89 (Bugey NPP, reactors 4 and 5):

- three Nuclear Safety Authority (Autorité de sûreté nucléaire) (ASN) resolutions imposing on EDF the implementation of additional safety requirements on the site of the plant following the third safety review of the Bugey-2 and Bugey-4 reactors; and
- the "implicit or disclosed" resolutions of the Ministry of Ecology, Sustainable Development and Energy (MEDDE) and the ASN authorising the continued operation of the Bugey-2 and Bugey-4 reactors.

In its decision of 22 February 2016, the Conseil d'État ruled that the applications submitted by the Republic and Canton of Geneva with a view to repealing the "implicit or disclosed" resolutions of MEDDE and the ASN were inadmissible and rejected the request to repeal the ASN's resolutions with regard to additional safety requirements for the reasons listed below.

On the "implicit or disclosed" resolutions of MEDDE and the ASN

The applicant considered that the ASN resolutions setting additional safety requirements were implicit authorisation decrees for INBs Nos. 78 and 89, and therefore requested that they be repealed. The Conseil d'État ruled that this application was inadmissible. For the record, authorisation decrees for the creation of an INB in France do not set a time period for the operating life of the installation.

Indeed, the Conseil d'État ruled "that for as long as no decree is passed enforcing final shutdown and decommissioning, … a basic nuclear installation is authorised to operate under safety conditions which it is the responsibility of the Nuclear Safety Authority to monitor … ". It therefore considered that new ASN additional safety requirements did not constitute "an implicit ruling authorising the operation of the latter for a further seventeen years".

On the ASN's resolutions with regard to additional safety requirements

The applicant challenged the legality of the ASN's resolutions with regard to additional safety requirements. The Conseil d'État rejected each of the pleas, of different kinds, submitted to this effect.

It should be noted that with regard to a third plea concerning the inadequate knowledge of the stipulations of Article 2 of the Espoo Convention,[1] the Conseil d'État considered that "the contested resolutions, which do not have the purpose or effect of authorising an activity under these stipulations, do not have to be preceded by an environmental impact assessment or require [Switzerland] to be notified". Accordingly, to the extent that the ASN resolutions establishing the additional safety requirements do not constitute operating authorisations, they are not subject to a mandatory environmental impact assessment and do not require a notification as stipulated in the Espoo Convention for the list of activities in Annex I of said Convention.

United States

Brodsky v. US Nuclear Regulatory Commission, 650 Fed.Appx. 804 (2nd Cir. 2016)

The US Court of Appeals for the Second Circuit ruled that the US Nuclear Regulatory Commission (NRC) was not arbitrary and capricious in considering risks from terrorism when granting a nuclear power plant licensee an exemption from a federal fire safety regulation.

Plaintiffs challenged the NRC's exemption in the United States District Court for the Southern District of New York, alleging that the NRC's decision to exempt Indian Point 3, a nuclear power plant operated by Entergy Nuclear Operations, Inc., from certain fire safety regulations[2] violated the Administrative Procedure Act (APA),[3] the Atomic Energy Act (AEA)[4] and the National Environmental Policy Act (NEPA).[5]

The district court granted summary judgment in favour of the NRC, finding that the NRC was entitled to judgment as a matter of law. The plaintiffs appealed the

1. Convention on Environmental Impact Assessment in a Transboundary Context (1991), 1989 UNTS 310, entered into force 10 September 1997 (Espoo Convention).
2. Fire Protection for Nuclear Power Facilities Operating Prior to January 1, 1979, at Title 10 Code of Federal Regulations (CFR) Part 50, App. R. III.G.2.c.
3. The Administrative Procedure Act (APA) governs internal procedures of administrative agencies, including how they interact with the public. The APA is codified at Title 5 United States Code (USC) § 551 et seq. (1946).
4. The Atomic Energy Act is the fundamental US law on both the civilian and the military uses of nuclear materials. On the civilian side, it provides for both the development and the regulation of the uses of nuclear materials and facilities in the United States, declaring the policy that "the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise". The Act requires that civilian uses of nuclear materials and facilities be licensed, and it empowers the NRC to establish by rule or order, and to enforce, such standards to govern these uses as "the Commission may deem necessary or desirable in order to protect health and safety and minimize danger to life or property". Commission action under the Act must conform to the Act's procedural requirements, which provide an opportunity for hearings and Federal judicial review in many instances. The Act is codified at 42 USC §§ 2011-2021, 2022-2286i and 2296a-2297h-13 (1954).
5. The National Environmental Policy Act (NEPA) requires that all federal agencies give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment. The NEPA is codified at 42 USC § 4321 et seq. (1969).

district court's ruling to the US Court of Appeals, Second Circuit. The Court of Appeals affirmed the District Court in part, and remanded in part, to allow the NRC to supplement the administrative record on the NEPA claim, which alleged that the NRC had failed to comply with the public participation provision of NEPA.[6] The NRC opted to reconsider its decision, and after soliciting, receiving and reviewing public comments, the NRC decided to reissue the challenged exemption. On remand, the District Court awarded summary judgment to the NRC, and plaintiffs appealed. On appeal, plaintiffs argued that in reissuing the exemption, the NRC again violated NEPA's public participation requirement by refusing to consider comments regarding the environmental consequences of a terrorist attack.

The Court of Appeals affirmed the lower court's decision, holding that: 1) the "law of the case doctrine" barred plaintiffs' claim that the NRC violated NEPA's public participation requirement by refusing to consider comments regarding the environmental consequences of a terrorist attack; and 2) the NRC was not arbitrary or capricious in considering risks from terrorism when granting the exemption.[7]

Absent cogent and compelling reasons, the "law of the case doctrine" bars an appellate court in a subsequent appeal from reopening issues that were ripe for review and foregone at the initial appeal. In the initial appeal, the plaintiffs failed to challenge the district court's ruling that the NRC did not violate NEPA's public participation requirement by refusing to consider comments regarding the environmental consequences of a terrorist attack, as the environmental effects of a possible terrorist attack fell outside the scope of NRC's NEPA analysis as a matter of law. The Court of Appeals held that the plaintiffs abandoned the claim by failing to raise it on the initial appeal, and therefore the law of the case doctrine foreclosed the challenge in the subsequent appeal.

The Court of Appeals also held that the NRC was not arbitrary or capricious, in violation of the Administrative Procedure Act, in considering risks from terrorism when determining that granting the exemption would have no significant impact on the environment under NEPA. The Court of Appeals relied on the NRC's responses to public comments suggesting that granting the exemption could heighten risks that a terrorist attack would cause severe fire, preventing operation of shutdown equipment. In its responses, the NRC explained that it had already analysed plausible threat scenarios and, as a result, had required plant operators to undertake protective measures to provide high assurance that terrorist attacks would not lead to significant radiological consequences. The NRC also underscored that its independent safety evaluation of the plant's fire-zone configuration provided reasonable assurance that a severe fire was not plausible and that existing fire protection features were adequate.

6. Brodsky v. US Nuclear Regulatory Commission, 507 Fed.Appx. 48 (2nd Cir. 2013).
7. Brodsky v. US Nuclear Regulatory Commission, 650 Fed.Appx. 804 (2nd Cir. 2016).

National legislative and regulatory activities

Argentina

Organisation and structure

Decree of the Executive Power No. 231/2015 of 23 December 2015 reorganised the main institutions of the nuclear sector in Argentina. New sub-offices were created within the Ministry of Energy and Mining to subsume responsibilities previously undertaken by other ministries and offices. Within the Ministry of Energy and Mining, the Secretary of Energy was replaced by the Secretary of Electricity, and within this a new office was created called the Undersecretary of Nuclear Energy.

Previously, Nucleoeléctrica Argentina S.A. (NASA), which operates the three nuclear power plants in Argentina, and the National Atomic Energy Commission (Comisión Nacional de Energía Atómica) (CNEA) reported to the Secretary of Energy, which reported to the Ministry of Energy and Mining. Now, NASA and the CNEA will report to the new Undersecretary of Nuclear Energy, under the administrative jurisdiction of the Secretary of Electricity.

France

Radioactive waste management

Act No. 2016-1015 of 25 July 2016 specifying the procedures for creating a reversible deep geological repository for long-lived medium and high-level radioactive waste[1]

This Act amends in particular Article L. 542-10-1 of the French Environmental Code (Code de l'environnement) relative to the legal status of a deep geological repository of radioactive waste so as to introduce new notions therein:

- reversibility, which is defined as "the capacity, for future generations, either to continue to construct and operate successive storage structures, or to reassess previous choices and develop waste management solutions". This requires the French National Radioactive Waste Management Agency (Agence nationale pour la gestion des déchets radioactifs) (Andra) to integrate technological progress and to adapt to possible changes in the waste inventory, in particular after development of the energy policy. Implementation reviews of the principle of reversibility are carried out at least every five years;
- the pilot industrial phase of the repository: when operations begin, the purpose of this phase is to consolidate both the reversible nature and the safety of the installation, and to carry out recovery tests on waste packages;
- the master plan for disposal operations, issued by Andra and updated every five years, in order to ensure the involvement of civil society throughout the lifetime of the centre.

1. *Journal officiel "Lois et Décrets"* [Official Journal of Laws and Decrees] (J.O.L. et D.), 26 July 2016, text no. 1.

The Act also introduces amendments to the derogation procedure for the authorisation to build this basic nuclear installation (*installation nucléaire de base*) (INB), also provided for under Article L. 542-10-1 of the French Environmental Code. In particular, it is stated that:

- the outcomes of the pilot industrial phase shall be the subject of a report by Andra, an opinion by the commission responsible for assessing research and studies into radioactive waste management, an opinion by the French Nuclear Safety Authority (Autorité de sûreté nucléaire) (ASN), and the opinion of the regional and local authorities located in the vicinity;
- on the basis of these documents, the Parliamentary Office for Scientific and Technological Assessment (Office parlementaire d'évaluation des choix scientifiques et technologiques) (OPECST) delivers an assessment that is submitted to the competent commissions within the French Parliament (National Assembly and Senate) (Assemblée nationale et Sénat);
- the government presents a bill adapting the operating conditions for the reversibility of disposal that takes into account, where appropriate, the recommendations of OPECST; and
- the ASN grants the authorisation for the full commissioning of the repository, guaranteeing reversibility under the terms set out in the law.

Liability and compensation

Decree No. 2016-333 of 21 March 2016 implementing Article L. 597-28 of the French Environmental Code and relating to third party liability in the field of nuclear energy[2]

Ministerial Order of 19 August 2016 listing the sites benefitting from a reduced amount of liability pursuant to decree No. 2016-333 of 21 March 2016 implementing Article L. 597-28 of the French Environmental Code and relating to third party liability in the field of nuclear energy[3]

Article L. 597-28 of the French Environmental Code (Code de l'environnement), as amended by Act No. 2015-992 of 17 August 2015 on Energy Transition for Green Growth, sets the amount for which the operator of a nuclear installation shall be liable for a given nuclear incident at EUR 700 million, which can be reduced to EUR 70 million for the same nuclear incident when only low risk installations are operated on a given site.

The decree of 21 March 2016 sets out the characteristics of low risk installations. In order to be considered as such, the operator of the nuclear installation needs to submit a supporting report to the ministers responsible for energy and nuclear safety that shows that the site only comprises installations demonstrating the aforementioned characteristics.

Pursuant to Article 3 of this decree, the Annex to the Ministerial Order of 19 August 2016 lists the nuclear sites deemed to be low risk and entitling their operators to a reduced amount of liability.

The list includes:

- the Aube waste disposal facility (centre de stockage de l'Aube) (CSA), operated by the French National Radioactive Waste Management Agency (Agence nationale pour la gestion des déchets radioactifs) (Andra);

2. J.O.L. et D., 22 March 2016, text no. 2.
3. J.O.L. et D., 24 August 2016, text no. 3.

- the Manche disposal facility (Centre de stockage de la Manche) (CSM), operated by Andra;
- the industrial facility for grouping, storage and disposal (Centre industriel de regroupement, d'entreposage et de stockage) (CIRES), operated by Andra;
- the facility for the decontamination and repackaging of radioactive materials and substances by means of various processes (Installation de décontamination et de reconditionnement par divers traitements de matériels et de substances radioactives) (TRIADE), operated by the Société des Techniques en Milieu Ionisant (STMI);
- the installation for the maintenance and decontamination of equipment (Centre d'entretien et de décontamination d'outillage) (CEDOS), operated by AREVA NP;
- the equipment servicing centre (Centre de maintenance des outillages) (CEMO), operated by AREVA.

Nuclear facilities

Decree No. 2016-846 of 28 June 2016 related to the modification, final shutdown and decommissioning of basic nuclear installations, and to subcontracting[4]

This decree amends decree No. 2007-1557 of 2 November 2007 concerning basic nuclear installations (*installations nucléaires de base*) (INBs) and the supervision of the transport of radioactive materials with respect to nuclear safety.

It amends the regulations for modifying INBs, which fall, depending on the extent of said modifications, under the scope of a new authorisation according to the form of the initial authorisation, or under an authorisation or declaration regime of the French Nuclear Safety Authority (Autorité de sûreté nucléaire) (ASN).

Moreover, the decree amends the procedure for final shutdown and decommissioning in order to increase the speed at which the installations in question could be decommissioned. Moreover, it contains specific provisions for installations dedicated to storing radioactive waste.

Lastly, the decree introduces a new title to the decree of 2 November 2007, which provides for limiting and controlling use of service providers and subcontractors.

Germany

Nuclear trade (including non-proliferation)

Amendments to the Foreign Trade Act and the Foreign Trade Ordinance (2015)

The 2013 Foreign Trade Act[5] was amended by Article 297 of the Ordinance of 31 August 2015 on Adapting Competences and by Article 6 of the Act of 3 December 2015 on the Re-Organisation of the Customs Administration.[6] The amendments do not directly relate to the use of nuclear energy.

4. J.O.L. et D., 29 June 2016, text no 2.
5. For more information on the 2013 Foreign Trade Act, see NEA (2014), *Nuclear Law Bulletin*, No. 94, OECD, Paris, pp. 124-125.
6. *Bundesgesetzblatt* 2015 I, pp. 1474, 2178. The consolidated version of the Act is available (in German) at: www.gesetze-im-internet.de/awg_2013/BJNR148210013.html.

The Export List is published as Annex AL to the Fourth Ordinance to Amend the Foreign Trade Ordinance of 13 July 2015.[7] The Ordinance is explained by the Circular Foreign Trade No. 2/2015 of 13 July 2015.[8] The Ordinance and the Export List mainly deal with the export of weapons and related material, including dual-use goods.

Radioactive waste management

Act on the Organisational Restructuring in the Field of Radioactive Waste Management (2016)

The 2013 Repository Site Selection Act (RSSA)[9] establishes the procedure for the search for a site for the final disposal of radioactive waste and at the same time specifies the overall responsibilities regarding final disposal.[10] The purpose of the 2016 Act on the Reorganisation of the Organisational Structure in the Field of Final Disposal[11] is to enable companies and authorities to fulfil their functions. Moreover, existing organisational structures will be improved and the attribution of responsibilities will be more clearly structured.

Particularly, the following changes have to be stressed:

- A state-owned company will be established that will be entrusted with the operative tasks of searching for the site, as well as for the construction and the operation of the final disposal installation and of the Asse II mine. The headquarters of the company will be located in the town Peine (Lower-Saxony).
- State supervision and licensing will be centralised at the Federal Office for Nuclear Waste Disposal (Bundesamt für kerntechnische Entsorgungssicherheit), which was established in accordance with section 3 of the RSSA.
- The Federal Office for Radiation Protection (Bundesamt für Strahlenschutz) will be responsible for the governmental functions in the field of radiation protection, e.g. nuclear emergencies and radioactivity monitoring.

The 2016 Organisational Restructuring Act (ORA) amends the following laws and ordinances:

- Atomic Energy Act of 15 July 1985, as last amended by Article 73 of the Act of 8 July 2016:[12] sections 9a, 12, 12b, 19, 21, 23, 23d, 24, 46, 57b and 58.
- Repository Site Selection Act of 23 July 2013, as last amended by Article 309 of the Ordinance of 31 August 2015:[13] sections 6-10, 12-19, 21 and 23-28.

7. *Bundesanzeiger* of 17 July 2015 V 1, p. 1.
8. *Bundesanzeiger* of 17 July 2015 B 2, p. 1.
9. *Gesetz zur Suche und Auswahl eines Standortes für ein Endlager für Wärme entwickelnde radioaktive Abfälle und zur Änderung anderer Gesetze* (*Standortauswahlgesetz – StandAG*) [Act on the Search and Selection of a Site for a Final Repository for Heat-Generating Radioactive Waste and to amend other Acts (Repository Site Selection Act or RSSA)], *Bundesgesetzblatt* 2013 I, p. 2553.
10. More information on the 2013 Repository Site Selection Act (RSSA) can be found in NEA (2013), *Nuclear Law Bulletin*, No. 92, OECD, Paris, pp. 103-105.
11. *Gesetz zur Neuordnung der Organisationsstruktur im Bereich der Endlagerung* (*EndLaNOG*) of 26 July 2016 (*Bundesgesetzblatt* 2016 I, p. 1843).
12. *Bundesgesetzblatt* 1985 I, p. 1565; 2016 I, p. 1594.
13. *Bundesgesetzblatt* 2013 I, p. 2553; 2015 I, p. 1474. For more information on the Repository Site Selection Act of 23 July 2013, please see NEA (2013), *Nuclear Law Bulletin*, No. 92, OECD, Paris, pp. 103-105.

- Act on the Establishment of a Federal Office for Radiation Protection of 9 October 1989, as last amended by Article 4, paragraph 24 of the Act of 18 July 2016:[14] section 2, paragraph 1.
- Act on the Establishment of a Federal Office for Nuclear Waste Disposal of 23 July 2013, as last amended by Article 310 of the Ordinance of 31 August 2015:[15] title of the Act, sections 1-3.
- Act on the Transport of Dangerous Goods of 7 July 2009, as last amended by Article 487 of the Ordinance of 31 August 2015:[16] sections 5 and 7a.
- Ordinance on the Transport of Dangerous Goods by Road, Railway and Inland Waterway of 30 March 2015, as last amended by Article 17 of the Ordinance of 2 June 2016:[17] sections 8 and 11.
- Ordinance concerning Costs under the Atomic Energy Act of 17 December 1981, as last amended by Article 77 of the Act of 8 July 2016[18]: sections 2, 5 and 6.
- Radiation Protection Ordinance of 20 July 2001, as last amended by Article 5 of the Ordinance of 27 April 2016:[19] sections 17, 29, 71 and Annex X.
- Ordinance on Advance Financial Contribution towards Construction of Federal Installations for Safe Containment and Final Disposal of Radioactive Waste of 28 April 1982, as last amended by Article 1 of the Ordinance of 6 July 2004:[20] sections 1, 4 and 6.
- Ordinance on the Verification of Reliability to Protect Against Theft or Release of Radioactive Substances under the Atomic Energy Act (Nuclear Reliability Verification Ordinance) of 1 July 1999, as last amended by Article 10 of the Act of 26 July 2016:[21] sections 1 and 6.
- Act on a Federal Central Criminal Register of 21 September 1984, as last amended by Article 1 of the Act of 20 November 2015:[22] section 41.
- Air Traffic Licensing Order of 10 July 2008, as last amended by Article 2 of the Act of 28 June 2016:[23] section 78.
- Ordinance on the Costs of the Transport of Dangerous Goods of 7 March 2013, as last amended by Article 3 of the Ordinance of 26 February 2015:[24] Annex 2.
- Ordinance on the Transport of Dangerous Goods by Sea of 9 February 2016:[25] sections 12 and 13.

14. *Bundesgesetzblatt* 1989 I, p. 1830; 2016 I, p. 1666.
15. *Bundesgesetzblatt* 2013 I, pp. 2553, 2563; 2015 I, p. 1474.
16. *Bundesgesetzblatt* 2009 I, pp. 1774, 3975; 2015 I, p. 1474.
17. *Bundesgesetzblatt* 2015 I, p. 366; 2016 I p. 1257.
18. *Bundesgesetzblatt* 1981 I, p. 1457; 2016 I, p. 1594.
19. *Bundesgesetzblatt* 2001 I, p. 1714; 2016 I, p. 918.
20. *Bundesgesetzblatt* 1982 I, p. 562; 2004 I, p. 1476.
21. *Bundesgesetzblatt* 1999 I, pp. 1525; 2016 I, p. 1843.
22. *Bundesgesetzblatt* 1984 I, p. 1229; 1985 I, p. 195; 2015 I, p. 2017.
23. *Bundesgesetzblatt* 2008 I, p. 1229; 2016 I, p. 1548.
24. *Bundesgesetzblatt* 2013 I, p. 466; 2015 I, p. 265.
25. *Bundesgesetzblatt* 2016 I, p. 182.

- Traffic Services Act of 23 July 2004, as last amended by Article 16 the Act of 24 May 2016:[26] section 7.

The 2016 Act on the Reorganisation of the Organisational Structure entered into force on 30 July 2016 in accordance with its Article 16.

Final report of the Commission to Review the Financing for the Phase-out of Nuclear Energy

The financing of the consequences of Germany's phasing out nuclear energy used for electricity generation purposes is still a matter of politically controversial discussions in Germany. A main issue is the final disposal of radioactive waste. In order to find a solution, the Cabinet of Federal Ministers on 14 October 2015 established a "Commission to Review the Financing for the Phase-out Nuclear Energy". It was commissioned to develop recommendations on how the financing of decommissioning, of dismantling and of waste disposal could be ensured and organised in a way that the companies remain in a long-term economic position to meet their obligations in the nuclear field. The Committee consisted of 20 renowned personalities of all social groups including representatives of science, industry, administration, churches and trade unions. It was convened for 12 meetings. It heard a great number of experts, and on 27 April 2016 agreed on its Final Report of 48 pages "*Verantwortung und Sicherheit – Ein neuer Entsorgungskonsens*" (Responsibility, Safety and Certainty – A New Consensus on Nuclear Waste Disposal).[27] The Chairpersons of the Committee called their proposal for a long-term financing of the nuclear phase-out a fair compromise for taxpayers and companies. The Committee identified joint responsibility but separated duties to act for the operators and for the state.

The basis of the compromise is a merger of the duties and responsibilities of the state and the operators:

- The costs for dismantling, decommissioning and packaging and bringing back of radioactive waste from foreign reprocessing plants have to be borne by the companies. These costs amount to approximately half of the total costs for disposal.

- An unlimited follow-up liability for dismantling, decommissioning and packaging applies to the companies. In order for companies to easier calculate this risk, it is limited in time until the dismantling is completed.

- The costs for the interim storage of radioactive waste and for its final disposal have to be secured by the state. This is the second half of the total costs for disposal.

- The financial contribution of the companies, which amounts to roughly EUR 23.6 billion, shall be transferred to a newly established fund under public law. The risk of the state will be limited by a risk-adjusted surcharge, to be paid by the companies. But this application of the follow-up liability of the companies may be reduced step-by-step in correspondence to the payment of the surcharge.

26. *Bundesgesetzblatt* 2004 I, p. 1865; 2016 I, p. 1217.
27. The Report is available at: www.bmwi.de/English/Redaktion/Pdf/bericht-der-expertenkommission-kernenergie,property=pdf,bereich=bmwi2012,sprache=en,rwb=true.pdf.

- The consensus has to be implemented in conformity with the requirements of the European law. By limiting the risks, it will increase safety for both companies and the public.

The federal government welcomed the result of the Commission's work. On the basis of the proposed compromise it promptly started deliberations on how to implement the proposal.[28]

Draft Bill of an Act on the Reorganisation of the Responsibility of Nuclear Waste Disposal (2016)

On 19 October 2016, the federal government adopted a Draft Bill of an Act on the Reorganisation of the Responsibility in the Field of Nuclear Waste Disposal (RRA), which was introduced to Parliament on 20 October 2016.[29] The Bill is a legislative package that consists of four new acts (RRA Articles 1, 2, 7 and 8) and amendments to the Atomic Energy Act, to the Repository Site Selection Act, to the Ordinance on Advance Financial Contribution towards Construction of Federal Installations for Safe Containment and Final Disposal of Radioactive Waste and to the Radiation Protection Ordinance (RRA Articles 3, 4, 5 and 6).

The Reorganisation of the Responsibility Act shall enter into force on the day in which the European Commission adopts a positive decision with regard to state aid.

The following new acts shall be introduced by the Reorganisation of the Responsibility Act:

- Act to Establish a Fund for the Financing of Nuclear Waste Disposal (Nuclear Waste Disposal Fund Act). By the Act, a public Fund law shall be established to reimburse the costs incurred by the federal state in connection with nuclear waste management. It is meant to organise the internal structure of the Fund and the obligations of the companies that have to pay their contributions into the Fund. The Act consists of 15 sections and two Annexes.

- Act to Regulate the Transition of the Operators' Financial Obligations and Obligations to Act Regarding Nuclear Waste Disposal (Nuclear Waste Disposal Transition Act). The obligations of the companies to finance the intermediate storage of nuclear waste (Atomic Energy Act, sections 21a and 21b; Repository Site Selection Act, section 21) will be transferred to the Fund if a company has paid the defined basic amount of its total financial obligation or an agreed instalment of it to the Fund (transition of the financial obligations). The duty of the operators to deliver nuclear waste to an intermediate storage facility as defined in the Atomic Energy Act, section 9a, paragraph 2, sentence 1 may be transferred to a third party who is entrusted with the task of intermediate storage of waste by the federal state. The third party will then have the duty to safely dispose of the nuclear waste at an intermediate storage facility and at a final disposal repository (transition of the obligation to act). The companies will transfer the intermediate waste storage facilities,

28. See the article at the website of the German Federal Government "*Atomausstieg: Kommission stellt Abschlussbericht vor*" (Atomic Exit: Commission Presents Final Report), 27 April 2016 at: www.bundesregierung.de/Content/DE/Artikel/2016/04/2016-04-27-finanzierung-kernenergieausstieg.html.
29. *Entwurf eines Gesetzes zur Neuordnung der Verantwortung in der kerntechnischen Entsorgung* (*Bundesrats-Drucksache* 620/16). The Bill is available (in German) at: www.bundesrat.de/SharedDocs/drucksachen/2016/0601-0700/620-16.pdf;jsessionid=5034F4CBDEDA79B63FE9BA4A9E4215C4.2_cid382?__blob=publicationFile&v=1srats-Drucksache%20620/16.

as defined in the Annex to the Act, to that third party free of costs. The costs incurred by the federal state for waste disposal under this act will be reimbursed by the Nuclear Waste Disposal Fund. The act consists of four sections and an Annex.

- Act on Transparency of the Costs of Decommissioning and Dismantling of Nuclear Power Plants Including Packages of Radioactive Waste (Transparency Act). The operators of nuclear power plants situated in Germany shall be obliged to annually inform the Federal Office for Economic Affairs and Export Control (Bundesamt für Wirtschaft und Ausfuhrkontrolle) (BAFA) in detail about their provisions to ensure their financial obligations. The act consists of six sections.

- Act on Continued Liability for Decommissioning and Disposal Costs in the Field of Nuclear Energy (Continued Liability Act). If the operator of a nuclear power plant situated in Germany is not in a position to fulfil its current and future legal obligations to pay the costs connected to decommissioning and dismantling of the plant and to the safe disposal of radioactive waste, the controlling parent company is held jointly liable with the operator. A controlling parent company under this act is an entity that directly or indirectly holds at least half of the corporate shares of the operator or which may hold at least half of the voting rights or which, independently of these cases, may alone or jointly exert a dominant control over the operator. The continued liability does not cease if the controlling parent company position ends after 1 June 2016. The operator shall be released from liability at the latest at the date when all nuclear waste to be disposed of has been delivered to a final disposal repository and the depository has been closed. The act consists of four sections.

Lithuania

Nuclear safety and radiological protection (including nuclear emergency planning)

On 1 May 2016, the amendments to the Law on Radiation Protection came into force.[30] The Law on Radiation Protection establishes the legal basis for the protection of people and the environment from the harmful effects of ionising radiation. It also establishes a licensing system for the use of radioactive materials and radiation sources, and prescribes general rules for their use. The amendment introduced the following changes concerning the responsibility of the State Nuclear Power Safety Inspectorate (VATESI), which is now empowered to:

- set requirements in the nuclear energy area for obligatory radiation protection training, briefing and evaluation of knowledge of workers and persons responsible for radiation protection, and supervise their implementation; and

- set requirements for the certification of persons seeking to obtain the right to train workers and persons responsible for radiation protection, to supervise their implementation and perform the certification.

Subsequently, Nuclear Safety Requirements BSR-1.9.4-2016 "On Procedure of Obligatory Radiation Protection Training, Examination, Briefing of Radiation Workers

30. Law on the Amendment of Articles 2, 6, 7, 71, 8, 83, 84, 10, 11, 15, 21, 23, Supplementing Articles 85, 86, 151 and Repealing Articles 81, 82 of the Law on Radiation Protection, No. XII-2190, 15 December 2015, available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/d2a7a1e0ae3111e5b12fbb7dc920ee2c.

and Radiation Protection Officers Involved in Activities with Sources of Ionising Radiation in Nuclear Energy Area and of Certification of Natural Persons Seeking to Obtain the Right to Teach Radiation Protection",[31] regulating obligatory radiation protection training, briefing of workers and certification of persons seeking to obtain the right to train workers and persons responsible for radiation protection, were approved on 10 June 2016.

Additionally, the amendments to the Law on Radiation Protection clarified provisions on permits to transport radioactive material and permits to transport radioactive waste generated outside of the nuclear fuel cycle. These provisions were further detailed in the amendment of the Rules on Shipment, Import, Transit and Export of Radioactive Material, Radioactive Waste and Spent Nuclear Fuel by extending the list of application documents.[32]

On 21 October 2016, a new version of requirements for radiation safety at nuclear facilities was adopted: Nuclear Safety Requirements BSR-1.9.3-2016 on "Radiation Protection at Nuclear Facilities".[33] The amendment introduced the following main changes:

- requirements are supplemented with quantitative criteria and management requirements for the controlled zone of the nuclear facility;
- requirements for contamination control are improved; contamination limits for people leaving the controlled area and for items that are removed from the controlled area are specified;
- more detailed requirements are set for monitoring the exposure of workers and workplaces to ionising radiation. Accreditation of dosimetry services in accordance with ISO 17025 standard "General requirements for the competence of testing and calibration laboratories" became mandatory; and
- new requirements were set for the use of technical measures for the protection of workers, individual means of protection and the optimisation process.

The amendment comes into force on 1 May 2017.

Nuclear security

Physical security of sources of ionising radiation

The amendments to the Law on Radiation Protection also introduced changes concerning VATESI's responsibility for physical security. VATESI is now empowered

31. Order No. 22.3-73 (2016) of the Head of the State Nuclear Power Safety Inspectorate "On the Approval of Nuclear Safety Requirements BSR-1.9.4-2016 'On Procedure of Obligatory Radiation Protection Training, Examination, Briefing of Radiation Workers and Radiation Protection Officers Involved in Activities with Sources of Ionising Radiation in Nuclear Energy Area and of Certification of Natural Persons Seeking to Obtain the Right to Teach Radiation Protection'", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/8675a1e00dfa11e6bae4eb98746971fa.
32. Order No. V-553/22.1-71 (2016) of the Minister of Health and the Head of the State Nuclear Power Safety Inspectorate "On the Amendment of Order No. V-1271/22.3-139, 24 December 2008, On the Approval of Rules on Shipment, Import, Transit and Export of Radioactive Material, Radioactive Waste and Spent Nuclear Fuel", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/19eaab100dff11e6bae4eb98746971fa.
33. Order No. 22.3-171 (2016) of the Head of the State Nuclear Power Safety Inspectorate "On the Amendment of Order No. 22.3-95, 6 October 2011, On the Approval of Nuclear Safety Requirements BSR-1.9.3-2011 'Radiation Protection at Nuclear Facilities'", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/b93b4230978211e69ad4c8713b612d0f.

to set requirements for the physical security of sources of ionising radiation used in the area of nuclear energy and supervise their implementation. Following that, new Nuclear Safety Requirements BSR-1.6.2-2016 on "Physical Security of Sources of Ionising Radiation used in Activities in the Area of Nuclear Energy involving Sources of Ionising Radiation" were approved on 29 April 2016.[34]

Radioactive waste management

On 22 July 2016, the Head of the State Nuclear Power Safety Inspectorate approved a new version of requirements for the management of spent nuclear fuel: Nuclear Safety Requirements BSR-3.1.1-2016 on "Management of Spent Nuclear Fuel at Storage Facility of the Dry Type".[35] The amendment supplements the requirements with provisions on external and seismic hazards, site assessment, content of the site assessment report and monitoring the site characteristics, content of the commissioning programme and on content of the periodic safety analysis report. Additionally, the definitions were renewed to correlate with latest amendments to the Law on Management of Radioactive Waste and with the Law on Nuclear Safety.

Licensing and regulatory infrastructure

Enforcement measures

A new version of the requirements regulating the procedures to apply VATESI's enforcement measures (Nuclear Safety Requirements BSR-1.1.4-2016 "Rules of Procedure for Applying the Enforcement Measures Set by the State Nuclear Power Safety Inspectorate"[36]) was approved on 31 March 2016 and comes into force on 1 January 2017. The new version of the requirements was adopted in order to:

- implement the provisions of the new Code of Administrative Offences, regulating administrative enforcement measures, applicable for natural persons; and
- describe the actions to be taken in case any violations are detected during activities other than inspections (e.g. during safety assessments).

On 10 October 2016, these Requirements were further amended to introduce a list of criteria, describing which infringements of the legal requirements are

34. Order No. 22.3-109 (2016) of the Head of State Nuclear Power Safety Inspectorate "On the Approval of Nuclear Safety Requirements BSR-1.6.2-2016 'Physical Security of Sources of Ionising Radiation used in Activities in the Area of Nuclear Energy involving Sources of Ionising Radiation'", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/00fb21802ee711e69cf5d89a5fdd27cc.
35. Order No. 22.3-130 (2016) of the Head of State Nuclear Power Safety Inspectorate "On the Amendment of Order No. 22.3-59, 21 July 2010, On the Approval of Nuclear Safety Requirements BSR-3.1.1-2010 'General Requirements for Spent Nuclear Fuel Storage Facility of the Dry Type'", available (in Lithuanian) at: www.e-tar.lt/portal/legalAct.html?documentId=29af9e80522d11e6b72ff16034f7f796.
36. Order No. 22.3-59 (2016) of the Head of State Nuclear Power Safety Inspectorate "On the Amendment of Order No. 22.3-106, 24 October 2011, approved by the Head of State Nuclear Power Safety Inspectorate 'On the Approval of Nuclear Safety Requirements BSR-1.1.4-2011 'Rules of Procedure for Applying the Enforcement Measures Set by the State Nuclear Power Safety Inspectorate'", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/fc460800f73a11e58a059f41f96fc264.

considered insignificant.[37] The amendment implements the nationwide initiative to streamline the procedures of enforcement measures and ensure that enforcement measures applied to economic entities are proportional. According to the regulation in question, generally, insignificant infringements have to be immediately addressed in the presence of an official exercising oversight and the economic entity shall be given an oral remark only. The amendment concerning the insignificant infringements comes into force on 1 May 2017.

Luxembourg

Radioactive waste management

Agreement between the Grand Duchy of Luxembourg and the Kingdom of Belgium on the Management and Final Disposal of the Radioactive Waste of the Grand Duchy of Luxembourg on the Territory of the Kingdom of Belgium, signed on 4 July 2016

As a small non-nuclear country, Luxembourg only generates a very limited quantity of radioactive waste and has a management policy based on the minimisation of such waste. Under the law, disused radioactive substances must preferentially be sent back to their producer or to a recycling facility. Consequently, disposal at a radioactive waste disposal facility is the least favoured option and is possible only when no other solution exists. For those reasons the Government of Luxembourg considers that building a dedicated radioactive waste disposal site would not be a realistic proposition.

Since 1994, the final disposal of the Grand Duchy's radioactive waste has been governed by an exchange of letters constituting a ministerial agreement between the Kingdom of Belgium and the Grand Duchy of Luxembourg. Since that date, several shipments of small quantities of waste from Luxembourg to Belgium have taken place under this agreement.

However, this agreement did not meet the criteria of Directive 2011/70/Euratom.[38] In line with previous agreements, both countries have signed a new bilateral agreement that is awaiting ratification in each country's respective Parliament. Before being finalised, it was submitted to the relevant authorities in order for them to assess its possible environmental impacts.

Under the agreement, Belgium agrees to take over Luxembourg's radioactive waste. The main aspects of the agreement can be summed up as follows:

- Belgium shall import a limited quantity of Luxembourg's radioactive waste over a limited period of time for final storage on its territory;
- Belgium may refuse any waste coming from Luxembourg should it not be in a position to ensure its safe management on its territory;

37. Order No. 22.3-165 (2016) of the Head of State Nuclear Power Safety Inspectorate "On the Amendment of Order No. 22.3-106, 24 October 2011, approved by the Head of State Nuclear Power Safety Inspectorate 'On the Approval of Nuclear Safety Requirements BSR-1.1.4-2016 'Rules of Procedure for Applying the Enforcement Measures Set by the State Nuclear Power Safety Inspectorate'", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/451cac208ec411e6b6098daee0c9a94f.
38. Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, *Official Journal of the European Union* (OJ) L 199 (2 August 2011).

- Luxembourg's conditioned radioactive waste shall be stored in an interim storage facility in Belgium until it is transferred to a final disposal facility according to Belgian law; and
- a retroactivity clause allows for the extension of the agreement to Luxembourg's radioactive waste dating from 1995-2010 that is already stored on Belgium's territory.

The operational details of the waste shipments shall be set by contract between Belgium's National Organisation for Radioactive Waste and Enriched Fissile Material (Organisme national des déchets radioactifs et des matières fissiles enrichies) (ONDRAF) and Luxembourg's relevant administration, which for all intents and purposes, shall be deemed a Belgian producer of waste in strict observance of the framework set by this intergovernmental agreement.

This bilateral agreement that allows for the disposal of the radioactive waste of one country on another country's territory is unique. Once it has been ratified, Belgium and Luxembourg will be the first countries to be parties to such an agreement, demonstrating their determination to contribute to the safe and sustainable management of radioactive waste. This could set an example for many other small countries that are in a position similar to that of Luxembourg.

Poland

Organisation and structure

On 10 September 2016, the latest amendment of the Atomic Law of 6 July 2016 entered into force. The Act changed the rules of dismissal of vice-presidents of the National Atomic Energy Agency (Państwowa Agencja Atomistyki) (PAA) and the rules for appointing and dismissing members of the advisory body of the PAA President. This small volume of legislation has caused changes in the structural position of the PAA President. The law has to some degree limited the PAA President's autonomy and weakened the PAA President's position while strengthening the supervising minister by increasing the ability to influence both the PAA President and the PAA President's office.

The role of the nuclear regulatory body in Poland is exercised by the PAA President. According to "3S" concept developed under the auspices of the International Atomic Energy Agency (IAEA), the PAA President is responsible for regulating nuclear safety and radiation protection, physical protection of nuclear installations and nuclear materials (nuclear security) and safeguarding of nuclear materials. The PAA President supervises approximately 5 500 operations carried out in almost 4 000 entities using over 12 000 radioactive sources. Currently, oversight of radioactive sources is the main area of activity of the PAA President although the PAA President also supervises two research reactors (one in decommissioning), two spent fuel storage facilities and a radioactive waste repository. In 2015, the PAA President issued over 1 500 administrative decisions and conducted over 800 inspections. The PAA President operates with the help of nuclear regulatory inspectors and with the support of the PAA office.

In Poland, the regulatory bodies are in mostly central governmental bodies (around 40) subordinated to individual ministers or directly to the President of the Council of Ministers (the Prime Minister) and few exceptionally report fully or partly to the Parliament. Structural provisions for this group of bodies are similar but not uniform.

According to the new wording of Article 109, paragraph 3 of the Atomic Law, the Vice-President of the PAA is no longer dismissed at the request of the National Atomic Energy Agency (NAEA) President. Although the Minister of the Environment

makes the appointment, as has been done thus far, at the request of the PAA President, the Minister of the Environment has the discretion to dismiss the Vice-President at any time without giving reasons and without a previous request. This situation legitimises the possibility of interfering with the PAA President's management autonomy. First, it prevents the PAA President from formally requesting the Vice-President's dismissal, with whose work the PAA President would be disappointed. Second, the Minister of the Environment may dismiss at any time a Vice-President with whom the PAA President would continue to work.

The current regulation differs from the Polish practice in regulating the structure of central governmental bodies. Although it is not uniform, in most cases, the vice-president can be dismissed only at the request of the president of the respective office.

Pursuant to Article 112, paragraph 2 of the Atomic Law, the PAA President is supported by the permanent advisory and consultative body, the Council for Nuclear Safety and Radiation Protection (the Council). The tasks of the Council include issuing opinions on: 1) licenses for construction, commissioning, operation and decommissioning of nuclear facilities; 2) draft legislation; and 3) organisational and technical recommendations issued by the PAA President. In addition, the Council undertakes initiatives for the improvement of the safety oversight system. To date, members of the Council have been appointed by the PAA President who has the autonomy to shape the composition of the Council limited only by the requirement of the competence of its members. The PAA President also appoints the chairman, vice-chairman and secretary among council members. No other body was empowered to influence decisions of the PAA President in this regard.

According to the new wording of Article 112, paragraph 3 of the Atomic Law, the members of the Council shall be appointed and dismissed by the Minister of Environment. In addition the Minister shall appoint the chairman, deputy chairman and secretary of the council. Both the appointment and the dismissal are made at the discretion of the Minister. Formally, the Minister is obliged to obtain the PAA President's opinion. But, this does not affect the freedom of action of the Minister, who retains decisive dominion in shaping the composition of the board, as this opinion is not binding. The new process not only removes the PAA President's power to select members of the Council, but also does not give the PAA President the ability to block unwanted candidates. From this point of view, the Council can be regarded as practically no longer a PAA President's Council but rather the Minister's giving the Council the possibility to exercise indirect influence on the PAA President's administrative and policy decisions.

Slovak Republic

International co-operation

On 18 November 2015, the Agreement between the Government of the Slovak Republic and the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) on Mutual Cooperation for Training and Exercise Activities of the Commission Related to On-Site Inspection was signed in Vienna. This Agreement shall establish the procedures and arrangements for the co-operation between the parties in the areas of the conduct of on-site inspections-related (OSI) trainings and exercises, testing and evaluation of OSI equipment and OSI procedures, and any other area of co-operation mutually agreed to by the parties. Within this scope, subsequent Implementing Protocols agreed to on a case-by-case basis shall provide the CTBTO with access to sites, infrastructure, equipment, personnel and/or experts of the Slovak Republic in order to fulfil its assigned role. This Agreement was ratified by the President of the Slovak Republic

on 8 June 2016, notified in the Collection of Laws by the Ministry of Foreign and European Affairs of the Slovak Republic on 5 August 2016[39] and entered into force on 12 August 2016.

Nuclear security

Entry into force of the Amendment to the Convention on the Physical Protection of Nuclear Material

With regard to the entry into force of the Amendment to the Convention on the Physical Protection of Nuclear Material on 8 May 2016, the Ministry of Foreign and European Affairs of the Slovak Republic notified in the Collection of Laws that this Amendment entered into force[40] and the Slovak Republic shall be bound by its provisions since this date. The current domestic legislation of the Slovak Republic already fully implements the obligations articulated by this international legal instrument.

Act No. 91/2016 Coll. on Criminal Responsibility of Legal Persons

Act No. 91/2016 Coll. on Criminal Responsibility of Legal Persons replaced the indirect criminal responsibility of such persons with the concept of their direct accountability. Hence, a legal person may be held criminally responsible for the crime of illicit manufacturing and possession of nuclear materials and radioactive substances as defined by sections 298 and 299 of the Criminal Code and the crime of terrorism and some forms of participation in terrorism (including various activities directly connected to the acts of nuclear terrorism) defined in section 419 of the Criminal Code. The possible punishments for a legal person range from the sole publication of a verdict of guilty up to the possibility of legally dissolving such entity by the criminal court. The new Act on Criminal Responsibility of Legal Persons incorporated minor amendments adjusting the statutory terminology in the Act No. 541/2004 Coll. on Peaceful Use of Nuclear Energy (the Atomic Act).

Liability and compensation

Newly adopted Civil Procedural Code

The newly adopted Civil Procedural Code, which entered into force on 1 July 2016, introduced the causal jurisdiction of the District Court in Nitra (and the Regional Court in Nitra as an appellate court) in disputes on civil liability for nuclear damage. This approach is fully in line with the relevant principles embodied in international instruments on civil liability for nuclear damage, namely the principle of exclusive domestic jurisdiction and the principle of channelling of jurisdiction. The Civil Procedure Code also incorporated minor amendments adjusting the statutory terminology in the Atomic Act.

39. Notification of the Ministry of Foreign and European Affairs of the Slovak Republic No. 227/2016 Coll.
40. Notification of the Ministry of Foreign and European Affairs of the Slovak Republic No. 170/2016 Coll.

Slovenia

Nuclear safety and radiological protection (including nuclear emergency planning)

Decree on the programme of the systematic monitoring of working and living environments and raising awareness about measures to reduce public exposure to natural radiation sources[41]

This Decree establishes the programme that is intended to provide protection against increased exposure to workers and members of the public due to natural sources of ionising radiation in areas and activities where there is an increased risk due to radiation of these sources. This Decree shall determine the scope and frequency of monitoring of the working and living environments, measures to reduce exposure and the criteria for the adoption of measures.

The areas or activities referred to in the preceding paragraph include:

- handling of materials or waste that have an increased content of natural radionuclides because of their characteristics (hereinafter referred to as NORM) or as a result of technological processing (hereinafter TENORM), storage or disposal of such material and waste in activities listed in the Annex of this Decree, and other activities that lead to exposure to NORM and TENORM;
- karstic and other caves;
- mines;
- spas, pools and other water sources of radon;
- air transport; and
- other areas or activities where workers and members of the public are exposed to radon or thoron and their descendants, gamma radiation or any other exposure from natural sources in the living environment and workplaces.

Implementation of this Decree is provided by the Slovenian Nuclear Safety Administration (SNSA) and the Slovenian Radiation Protection Administration (SRPA). Both the SNSA and SRPA ensure awareness of workers and members of the public by the organisation of seminars, technical meetings and workshops and issuing publications on exposure to natural radiation sources.

This Decree entered into force on the day following its publication in the Official Gazette of the Republic of Slovenia.

Rules on authorised experts for radiation and nuclear safety[42]

These rules were adopted based on the fourth and fifth paragraphs of Article 59 of the Ionising Radiation Protection and Nuclear Safety Act, which was amended last year.[43] The Act provides that the operator of nuclear and radiation facilities have to obtain the opinion of an authorised expert for radiation and nuclear safety on specific issues with regards to radiation protection and nuclear safety. Authorised experts for radiation and nuclear safety are legal persons who have obtained authorisation from the authority responsible for nuclear safety (SNSA).

41. Official Gazette of the Republic of Slovenia (RS), No. 19/2016.
42. Official Gazette of the RS, No. 50/2016.
43. Official Gazette of the RS, No. 74/2015.

These rules stipulate the process of obtaining an authorisation for an authorised expert for radiation and nuclear safety and provides:

- a programme for checking the authorised expert's compliance with conditions;
- requirements for data and record keeping by the SNSA about authorised experts;
- the manner and extent of the periodic reporting;
- the form and content of the expert opinion; and
- other conditions that must be met by the authorised experts.

These rules entered into force on the 15th day following its publication in the Official Gazette of the Republic of Slovenia. Upon entry into force of these Rules, the previous Rules on authorised experts for radiation and nuclear safety[44] cease to apply.

United States

General legislation, regulations and instruments

Nuclear Regulatory Commission approved a final rule amending licensing, inspection and annual fee regulations to establish a variable annual fee structure for light-water small modular reactors

The US Nuclear Regulatory Commission's (NRC) fee regulations are governed by the Independent Offices Appropriation Act of 1952 (IOAA) and the Omnibus Budget Reconciliation Act, as amended (OBRA-90).[45] OBRA-90 requires the NRC to "establish, by rule, a schedule of charges fairly and equitably allocating" various generic agency regulatory costs "among licensees". OBRA-90 also states that, "to the maximum extent practicable, the charges shall have a reasonable relationship to the cost of providing regulatory services and may be based on the allocation of the Commission's resources among licensees or classes of licensees".

Due to the significant anticipated differences between light-water small modular reactors (SMR) and the existing reactor fleet, US NRC staff determined that applying the current fee structure to SMRs could be contrary to OBRA-90's aforementioned requirements of fairness and equity. The significant anticipated differences include modular design, factory component fabrication, thermal power capacities, and safety and security design features that could ultimately result in lower regulatory oversight burden.

In anticipating the submission of license applications for SMRs, NRC staff amended the annual fee structure for 10 CFR 171 to address anticipated design characteristics of SMRs. The final rule provides a variable annual fee structure for SMRs. Under the variable annual fee structure, an SMR's annual fee will be calculated as a function of its licensed thermal power rating.

Specifically, the fee structure computes SMR annual fees on a site basis, considering all SMRs on the site up to a total licensed thermal power rating of 4 500 MWt to be a single "bundled unit" that would pay the same annual fee as the current operating reactor fleet. Bundled units with a total licensed thermal power

44. Official Gazette of the RS, No. 51/2006.
45. Variable Annual Fee Structure for Small Modular Reactors, 81 Fed. Reg. 32 617 (24 May 2016) (to be codified at Title 10 Code of Federal Regulations (CFR) Parts 170-171).

rating at or below 250 MWt would only pay a minimum fee. Fees for bundled units with a total licensed thermal power rating greater than 250 MWt and less than or equal to 2 000 MWt would be computed as the minimum fee plus a variable fee based on the bundled unit's cumulative licensed thermal power rating. For a bundled unit with a licensed thermal power rating comparable to a typical large light-water reactor (greater than 2 000 MWt and less than or equal to 4 500 MWt), the annual fee assessed to that bundled unit would be the same annual flat fee that is paid by a power reactor licensee in the current operating fleet. For an SMR site with a licensed thermal power rating that exceeds 4 500 MWt, the licensee would be assessed the maximum fee for the first bundled unit, plus a variable annual fee for the portion of the thermal rating above 4 500 MWt and less than or equal to 6 500 MWt for the second bundled unit. Lastly, if a site rating exceeds 6 500 MWt and also is less than or equal to 9 000 MWt, then a second maximum fee would be assessed for the second bundled unit.

Intergovernmental organisation activities

European Atomic Energy Community

Non-legally binding instruments

Commission Recommendation on the application of Article 103 of the Euratom Treaty

Pursuant to Article 103 of the Euratom Treaty,[1] member states are required to communicate to the Commission draft agreements or contracts with a third state, an international organisation or a national of a third state to the extent that such agreements or contracts concern matters within the purview of the Euratom Treaty. If a draft agreement or contract contains clauses that impede the application of the Treaty, the Commission is to make its comments known to the member state concerned within one-month of receipt of such communication. A member state is not to conclude the proposed agreement or contract until it has satisfied the objections of the Commission or complied with a ruling of the Court of Justice adjudicating urgently on the compatibility of the proposed clauses with the provisions of the Treaty.

Until recently, Article 103 was deemed to be self-executing. Nevertheless, over the past decade, the Euratom Community *acquis* has developed substantially. New secondary law covers areas such as nuclear safety of nuclear installations, safe and responsible management of spent fuel and radioactive waste. Besides, the requirements on radiation protection have been enhanced. Therefore, member states have had to take into account an increasing amount of Euratom law requirements when negotiating bilateral agreements with third countries in the nuclear field. This increase in the number of acts of secondary law has been accompanied in recent years by renewed interest in security of supply aspects.

For these reasons, the European Commission was of the view that more specific guidance was warranted as regards the exact scope of Article 103. Therefore, it adopted on 4 April 2016 a Recommendation on the application of Article 103 of the Euratom Treaty.[2]

The Recommendation aims to provide member states with more legal certainty regarding the aspects that will be subject to particular scrutiny by the Commission in its assessment of draft agreements. This should reduce the need for objections by the Commission, and thereby reduce the risk of delay in the conclusion of member states' bilateral agreements. Such agreements often form the basis of co-operation with third countries for the launch of civilian nuclear programmes, co-operation in the exchange of staff and technical information or even the implementation of specific projects, and are thus of considerable importance from the point of view of nuclear safety, energy policy and external trade.

1. Treaty Establishing the European Atomic Energy Community (1957), 298 UNTS 167, entered into force 1 January 1958 (Euratom Treaty) (consolidated version *Official Journal of the European Union* (OJ) C 203 (7 June 2016)).
2. Commission Recommendation (Euratom) 2016/538 of 4 April 2016 on the application of Article 103 of the Euratom Treaty (notified under document C(2016) 1168), OJ L 89 (6 April 2016), pp. 20-24.

In terms of procedure, the Recommendation provides guidelines on the timing and content of Article 103 notifications as well as on the follow-up to be given to the Commission's assessments. It also establishes a mechanism for assistance to be provided to member states by the Commission throughout the phase of negotiations with third countries for the purpose of ensuring the compatibility of the agreement with the Euratom Treaty.

In terms of substantive content, the Recommendation outlines those aspects of the Euratom *acquis* which, based on the Commission's past experience of the application of the procedure, are of particular relevance in the context of member states' bilateral relations with third states and that are sometimes overlooked by member states when negotiating their bilateral agreements. In particular, these concern the application of the principle of ultimate responsibility of the state that generates radioactive waste for the management of that waste, the Community ownership of special fissile materials produced in the Community, the principles of the nuclear common market and the prohibition of any requirement of prior authorisation for the transfer of the relevant materials and products within the Community.

Communication from the Commission on a Nuclear Illustrative Programme[3]

On 4 April 2016, the Commission presented a draft Communication on a Nuclear Illustrative Programme (PINC) for the opinion of the European Economic and Social Committee (EESC). The PINC is a requirement under Article 40 of the Euratom Treaty. It builds on the analysis of:

1. the effects of recently adopted policy and legislative initiatives (e.g. the Spent Fuel and Radioactive Waste Directive,[4] the revised Basic Safety Standards Directive[5] and the amended Nuclear Safety Directive[6]);
2. publicly available data (e.g. documents published by the OECD Nuclear Energy Agency, the International Energy Agency, the International Atomic Energy Agency and the World Nuclear Association); as well as
3. information received from member states and stakeholders (meetings and questionnaires).

As part of the Energy Union Strategy implementation, the new PINC aims to present transparent and forward-looking information regarding nuclear investments in the EU to help member states and all stakeholders gain a better understanding of the overall situation, and give them tools to make informed decisions for the future.

While previous PINCs adopted by the Commission focussed mainly on investments in new generating capacity, this new PINC presents the whole nuclear lifecycle and includes the post-Fukushima safety upgrades, the safe long-term operation of existing facilities, their decommissioning, and the management of

3. Communication from the Commission, Nuclear Illustrative Programme presented under Article 40 of the Euratom Treaty for the opinion of the European Economic and Social Committee, COM(2016) 177 final (4 April 2016).
4. Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, OJ L 199 (2 August 2011).
5. 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, OJ L 13 (17 January 2014).
6. Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, OJ L 219 (25 July 2014).

radioactive waste and spent fuel, including the construction of deep geological disposal facilities.

The PINC thus provides a basis to all stakeholders to discuss the role of nuclear energy in the current context of the setting up of the Energy Union, in particular under its dimensions of security of supply and decarbonisation of the economy. It contributes to the implementation of the Energy Union strategy by looking into relevant member states' investments from the perspective of safety, security of supply, diversification, technology and appropriate funding mechanisms.

In addition, with the EU nuclear industry moving into a new phase characterised by increased activities in the back-end of the nuclear fuel cycle, it provides a timely opportunity to open the debate on investment needs and appropriate funding mechanisms.

The EESC gave its opinion on the draft on 22 September 2016. The Commission is now reviewing this opinion with a view to adopting the final version of the PINC.

Report from the Commission to the European Parliament and the Council on the implementation of the work under the nuclear decommissioning assistance programme to Bulgaria, Lithuania and Slovakia in 2015 and previous years[7]

On 20 June 2016, the European Commission adopted its Report to the European Parliament and to the Council on the implementation of the work under the nuclear decommissioning assistance programme to Bulgaria, Lithuania and the Slovak Republic in 2015 and previous years.

The report reviews the progress in 2015 and previous years under the European Union nuclear decommissioning assistance programmes in Bulgaria, Lithuania and the Slovak Republic.

Upon their accession to the EU, Bulgaria, Lithuania and the Slovak Republic committed to close down eight Soviet-designed nuclear power plants (NPPs) before the end of their scheduled lifetime. In exchange, the EU committed to provide financial assistance to the three member states for decommissioning the designated power plants, namely:

- Kozloduy NPP units 1 to 4 in Bulgaria;
- Ignalina NPP in Lithuania; and
- Bohunice V1 NPP in the Slovak Republic.

Since 2014, the scope of the nuclear decommissioning assistance programme focuses on assistance to the relevant member states in implementing the steady process towards the decommissioning end-state while ensuring that the highest safety standards are applied.

In all three cases, the end-state is defined as brownfield: the nuclear reactor buildings will be dismantled as well as those auxiliary buildings that are not intended for re-use; near-surface repositories will be built or upgraded to dispose of low and intermediate level radioactive waste from decommissioning; finally, interim storage facilities will be commissioned for spent fuel and radioactive waste that cannot be disposed of in near-surface repositories. Beyond decommissioning, the disposal of spent fuel and radioactive waste in a deep geological repository is

7. COM(2016) 405 final (20 June 2016).

described by each member states in its national programme for the management of spent fuel and radioactive waste, as required by Council Directive 2011/70/Euratom.[8]

The report concludes that the definition and endorsement of their respective decommissioning plans showed that Bulgaria, Lithuania and the Slovak Republic are committed to assuming ultimate responsibility to decommission the NPPs in question. Significant progress has been made, not only in preparatory work and organisational changes, but also in the actual removal of buildings and equipment and processing of radioactive waste.

International Atomic Energy Agency (IAEA)

Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

As requested by the contracting parties to the Joint Convention[9] at their Fifth Review Meeting, a Topical Meeting on the challenges and responsibilities relating to multinational radioactive waste disposal facilities took place from 5 to 7 September 2016, at IAEA Headquarters in Vienna and was attended by 29 contracting parties and the Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA), as an observer. The meeting addressed, *inter alia*, the current status of international approaches and initiatives for multinational disposal, the safety aspects of construction, operation and surveillance of disposal facilities, the roles and responsibilities in case of multinational disposal and their transfer, and the liability and financial issues of multinational waste disposal facilities. The documents from the Topical Meeting are available on the IAEA website at: https://gnssn.iaea.org/meetings/JCTopical2016/Shared%20Documents/Forms/AllItems.aspx.

60th Regular Session of the IAEA General Conference

The 60th regular session of the IAEA General Conference was held in Vienna, Austria, from 26 to 30 September 2016.

Resolutions of the Conference

A number of resolutions where adopted by the General Conference. As in previous years, resolution GC(60)/RES/9 on Measures to Strengthen International Cooperation in nuclear, radiation, transport and waste safety, as well as resolution GC(60)/RES/10 on Nuclear Security, include sections that are of legal relevance. All resolutions adopted during the 60th regular session of the General Conference are available on the IAEA website at: www.iaea.org/About/Policy/GC/GC60/Resolutions/index.html.

Measures to strengthen international cooperation in nuclear, radiation, transport and waste safety (GC(60)/RES/9): conventions, regulatory frameworks and supporting non-legally-binding instruments for safety

The Conference urged all member states that have not yet done so, especially those planning, constructing, commissioning or operating nuclear power plants, or considering a nuclear power programme, to become contracting parties to the Convention on Nuclear Safety (CNS).[10] It also stressed the importance of the

8. Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, OJ L 199 (2 August 2011), p. 48.
9. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997) (Joint Convention), IAEA Doc. INFCIRC/546, 2153 UNTS 357.
10. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293.

CNS contracting parties fulfilling the obligations of the Convention and actively participating in peer reviews for the 7th CNS Review Meeting in 2017.

Further, the Conference urged all member states that have not yet done so, including those managing radioactive waste from the use of radioactive sources and nuclear energy, to become contracting parties to the Joint Convention. It also urged all member states that have not yet done so to become contracting parties to the Convention on Early Notification of a Nuclear Accident (the Early Notification Convention)[11] and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (the Assistance Convention),[12] thereby contributing to a broader and stronger international emergency response capability, to the benefit of all member states.

In this context, the Conference requested the Secretariat to continue its activities to promote the importance of relevant conventions concluded under its auspices or in co-ordination with the NEA where appropriate, and to assist member states, upon request, with adherence and participation.

With respect to the Code of Conduct on the Safety and Security of Radioactive Sources (the Code), the Conference called on all member states that have not yet done so to make a political commitment to implement the Code and its supplementary Guidance on the Import and Export of Radioactive Sources, to act in accordance with the Code and the Guidance, and requested the Secretariat to continue supporting member states in this regard.

The Conference urged member states with research reactors under construction, in operation, being decommissioned or in extended shutdown to apply the guidance of the Code of Conduct on the Safety of Research Reactors.

As regards regulatory bodies, the Conference urged member states that have not yet done so to establish and sustain a regulatory body that is effectively independent in its regulatory decision-making, competent, and has the legal authority, and the appropriate human, financial and technical resources organised as necessary for fulfilling its responsibilities, and encouraged member states to take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organisation concerned with the promotion or utilisation of nuclear energy.

In the area of nuclear liability, the Conference encouraged member states to work towards establishing a global nuclear liability regime and, as appropriate, to give due consideration to the possibility of joining the international nuclear liability instruments. It also requested the Secretariat, in co-ordination with the NEA when appropriate, to assist member states, upon request, in their efforts to adhere to any international nuclear liability instruments concluded under the auspices of the IAEA and the NEA, taking into account the recommendations of the International Expert Group on Nuclear Liability (INLEX) in response to the IAEA Action Plan on Nuclear Safety.

The Conference took note of the INLEX recommendations and best practices on establishing a global nuclear liability regime, including through the identification of actions to address gaps in and enhance the existing nuclear liability regimes, encouraged the continuation of INLEX, especially for its support for the

11. Convention on Early Notification of a Nuclear Accident (1986), IAEA Doc. INFCIRC/335, 1439 UNTS 276, entered into force 27 October 1986.
12. 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 February 1987.

IAEA's outreach activities to facilitate the achievement of a global nuclear liability regime, and requested the Secretariat to report on the continuing work of INLEX.

Nuclear installation safety

The Conference recalled the outcome of the 6th Review Meeting of the Contracting Parties to the CNS, including actions taken to strengthen the effectiveness and transparency of the Convention particularly when preparing for the 7th Review Meeting, to be held in 2017. It also welcomed the adoption by consensus of the Vienna Declaration on Nuclear Safety[13] at the CNS Diplomatic Conference on February 2015, and encouraged all member states to contribute to the realisation of its principles.

The Conference encouraged the active participation of contracting parties to the CNS in the 7th Review Meeting, including by fully engaging in the peer review process and the development of questions and comments, looked forward to all contracting parties reporting as decided by the Diplomatic Conference, and requested the Secretariat to provide full support for the dissemination and follow-up of the outcomes of the 7th CNS Review Meeting, and to address these in the Agency's current activities, as appropriate.

Finally, the Conference requested the Secretariat, in consultation with all member states, to identify issues of particular relevance for civilian nuclear reactors not covered by the scope of the CNS, using the safety issues highlighted in the summary report of the CNS 6th Review Meeting.

Safe management of radioactive sources

The Conference called upon all member states to ensure that their legislative and regulatory framework includes specific provisions for the safe management of radioactive sources through all stages of the life cycle.

The Conference also requested the Secretariat to take note and consider as appropriate, the report of the Chairman from the 2016 Open-ended Meeting of Legal and Technical Experts to Develop Internationally Harmonized Guidance for Implementing the Recommendations of the Code of Conduct on the Safety and Security of Radioactive Sources in Relation to the Management of Disused Radioactive Sources, which contains a draft supplementary Guidance on the Management of Disused Radioactive Sources. Finally, it requested the Secretariat to continue to foster information exchange on implementation of the Code of Conduct and its supplementary Guidance on the Import and Export of Radioactive Sources.

Nuclear Security (GC(60)/RES/10)

The Conference affirmed the central role of the Agency in strengthening the nuclear security framework globally and in co-ordinating international activities in the field of nuclear security, while avoiding duplication and overlap.

It reaffirmed the importance of the Convention on the Physical Protection of Nuclear Material (CPPNM)[14] and its 2005 Amendment[15] extending its scope; welcomed the entry into force of the 2005 Amendment; recognised the importance

13. 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.
14. Convention on the Physical Protection of Nuclear Material, (1980), IAEA Doc. INFCIRC/274 Rev. 1, 1456 UNTS 125, entered into force 8 February 1987.
15. Amendment to the Convention on the Physical Protection of Nuclear Material (2005), IAEA Doc. INFIRC/274/Rev.1/Mod.1, entered into force 8 May 2016 (2005 Amendment).

of acceptance, approval or ratification by further states; and noted the importance of its full implementation and universalisation.

In this respect, the Conference encouraged all parties to the CPPNM and its 2005 Amendment to fully implement their obligations thereunder, encouraged states that have not yet done so to become party to the CPPNM and its 2005 Amendment. It further encouraged the Agency to continue efforts to promote further adherence to the 2005 Amendment with the aim of its universalisation, welcomed the organisation by the Secretariat of CPPNM meetings and encouraged all states parties to the CPPNM to participate in relevant meetings.

Also, the Conference encouraged the Secretariat, in consultation with member states, to consider ways of further promoting and facilitating the exchange, on a voluntary basis, of information on the implementation of the international legal instruments relevant to nuclear security.

The Conference reaffirmed the importance and the value of the non-legally-binding Code of Conduct on the Safety and Security of Radioactive Sources (the Code) and underlined the important role of the revised supplementary Guidance on the Import and Export of Radioactive Sources. It invited states that have not yet done so to make political commitments to implement the Code and the revised supplementary Guidance, and encouraged all states to further implement these instruments to maintain effective security of radioactive sources throughout their life cycle.

The Conference further noted the discussion on the development of supplementary guidance of the Code regarding the management of disused sealed sources.

Finally, the Conference called upon all member states to ensure that there is adequate provision for safe and secure storage and disposition pathways for disused radioactive sealed sources so that such sources within their territories remain under regulatory control, and further encouraged all member states to develop arrangements, as practicable, to permit the return of disused sources to the supplier states or consider other options including the reuse or recycling of sources whenever possible.

IAEA Treaty Event

The yearly IAEA Treaty Event took place during the 60th regular session of the IAEA General Conference. During the event, Denmark withdrew territorial declarations previously made with respect to the CNS and the Assistance Convention, regarding the non-application of such treaties to Greenland: as a result, the two treaties will now also apply to Greenland.

In addition, Kyrgyzstan deposited an instrument of ratification of the 2005 Amendment to the CPPNM and Lesotho deposited an instrument of accession to the Joint Convention.

The second day of the treaty event focused on the 2005 Amendment to the CPPNM and its effective implementation.

Legislative assistance activities

In addition to the regular ongoing legislative assistance activities carried out by the IAEA Office of Legal Affairs, the sixth session of the Nuclear Law Institute (NLI) was held in Baden, Austria from 10 to 21 October 2016. The NLI provides in-depth training in all aspects of nuclear law and in drafting corresponding national legislation.

OECD Nuclear Energy Agency (NEA)

New member of the Generation IV International Forum

Following unanimous acceptance by the Generation IV International Forum (GIF) members, Australia became the 14th member of the Forum on 22 June 2016. The GIF Charter was signed by the CEO of the Australian Nuclear Science and Technology Organisation (ANSTO).

The GIF is a co-operative international endeavour that was established to carry out the research and development (R&D) needed to establish the feasibility and performance capabilities of the next generation of nuclear energy systems. More information on GIF is available at: www.gen-4.org.

New signatories to the extension of the GIF Framework Agreement

On 23 June 2016, the People's Republic of China signed the ten-year extension of the Framework Agreement for International Collaboration on Research and Development of Generation IV Nuclear Energy Systems (extension of the GIF Framework Agreement). A signing ceremony was held at the Organisation for Economic Co-operation and Development (OECD) in the presence of the Ambassador of the People's Republic of China to France and the Director-General of the Nuclear Energy Agency (NEA)

On 21 October 2016, Canada signed and deposited its instrument of acceptance for the extension of the GIF Framework Agreement. A ceremony was held at the OECD that included the Ambassador and Permanent Representative of Canada to the OECD and the Director-General of the NEA.

On 10 November 2016, Euratom signed the ten-year extension of the GIF Framework Agreement. The Commissioner for Education, Culture Youth and Sport of the European Commission (EC) signed on behalf of Euratom during a signing ceremony in Brussels, Belgium. The Director-General of the EC Joint Research Centre (JRC), the Head of the JRC Euratom Coordination Unit and NEA representatives were also present.

The extension of the GIF Framework Agreement, which has now been signed by all signatories of the agreement, enables continued collaboration among participating countries in this important area of Generation IV research and development.

International Framework for Nuclear Energy Cooperation (IFNEC) "Latin American Nuclear Energy Stakeholders Conference", 25-26 October 2016, Buenos Aires, Argentina

Over 200 participants from a broad array of government and industry stakeholders came together from 25-26 October 2016 in Buenos Aires, Argentina to exchange information; understand the challenges facing Latin America with respect to the safe, secure and sustainable use of nuclear energy; and to identify opportunities and solutions to such challenges. The conference, titled "Latin American Nuclear Energy Stakeholders Conference", was organised by the International Framework for Nuclear Energy Cooperation (IFNEC) with the support of the NEA and focused on the challenges and opportunities facing countries within Latin America that are either considering or planning to deploy new nuclear power generation capacity.

IFNEC membership includes 34 participating countries, 31 observer countries and 4 international observer organisations (the NEA, the International Atomic Energy Agency (IAEA), the GIF and Euratom). There are currently two IFNEC working groups: the Infrastructure Development Working Group (IDWG) and the Reliable Nuclear

Fuel Services Working Group (RNFSWG). The NEA provides technical secretariat services to IFNEC. Further information is available at: www.ifnec.org.

10th national workshop of the NEA Forum on Stakeholder Confidence (FSC)

The 10th national workshop of the NEA FSC, "Bridging Gaps – Developing Sustainable Intergenerational Decision Making in Radioactive Waste Management", took place from 7-9 September 2016 in Bern, Switzerland. Participants came from 14 countries and represented a wide range of stakeholders, including representatives from the Swiss government, as well as representatives of local communities and members of the public concerned, including ten young people between the ages of 16 and 25. The workshop provided a forum for the participants from around the world to learn from each other's experiences and to discuss what can be done today to make sustainable decisions in radioactive waste management that can be understood and accepted by future generations.

Symposium on the Fukushima Nuclear Power Plant Accident and Law and Policy, 24-25 September 2016, Tokyo, Japan

On 24-25 September 2016, Hitotsubashi University, in co-operation with the NEA, hosted a Symposium on the Fukushima Nuclear Power Plant Accident and Law and Policy in Tokyo, Japan. Legal experts from Asia and Europe (including the NEA), gave presentations on and participated in panel discussions on a wide range of topics related to legal and policy lessons learnt from the Fukushima Daiichi nuclear power plant accident, including on compensation for nuclear damage, the structure and function of regulatory bodies, radioactive waste management and stakeholder involvement in selecting high-level radioactive waste disposal sites.

Nuclear Law Committee meeting

The NEA Nuclear Law Committee (NLC) met on 16-17 November 2016, bringing together over 60 experts from member countries and international organisations, including the European Commission (EC) and the IAEA, as well as representatives from non-member countries (the People's Republic of China, Hong Kong, India, Romania and the United Arab Emirates). Participants at the meeting exchanged information on the latest national developments in nuclear law and discussed the current activities conducted under NLC auspices. The meeting also included discussions on nuclear liability, more particularly, on the Paris Convention on Third Party Liability in the Field of Nuclear Energy and the related Brussels Supplementary Convention and on alternative dispute resolution mechanisms for nuclear damage related claims, among other topics. Of note, the NLC approved three new working parties under the auspices of the NLC:

- Working Party on Deep Geologic Repositories and Nuclear Liability;
- Working Party on Nuclear Liability and Transport; and
- Working Party on the Legal Aspects of Nuclear Safety.

NEA publications of interest

Since *Nuclear Law Bulletin,* No. 97, the NEA has published a number of reports, booklets and reviews. The report *Small Modular Reactors: Nuclear Energy Market Potential for Near-term Deployment* assesses the size of the market for small modular reactors (SMRs) that are currently being developed and that have the potential to broaden the ways of deploying nuclear power in different parts of the world. The study focuses on light water SMRs that are expected to be constructed in the coming decades and that strongly rely on serial, factory-based production of reactor modules. In a high-case scenario, up to 21 GWe of SMRs could be added globally by 2035, representing approximately 3% of total installed nuclear capacity.

Two other publications relate specifically to the back end of the fuel cycle. In May 2016, the NEA carried out an independent peer review of Japan's siting process and criteria for the geological disposal of high-level radioactive waste. In a report published following this review, the NEA determined in *Japan's Siting Process for the Geological Disposal of High-level Radioactive Waste* that Japan's site screening process is generally in accordance with international practices. In a booklet entitled *Financing the Decommissioning of Nuclear Facilities*, the NEA offers a useful overview of the relevant aspects of financing the decommissioning of nuclear facilities, providing information on cost estimation for decommissioning, as well as details about funding mechanisms and the management of funds based on current practice in NEA member countries.

These reports are available for free online at: www.oecd-nea.org/pub/.

Regulatory and Institutional Framework for Nuclear Activities

The NEA has updated, in co-ordination with the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, the report on the Regulatory and Institutional Framework for Nuclear Activities in Austria. These country reports provide comprehensive information on the regulatory and institutional framework governing nuclear activities in OECD and NEA member countries. Each country profile provides a detailed review of a full range of nuclear law topics, including: mining regime; radioactive substances; nuclear installations; trade in nuclear materials and equipment; radiological protection; radioactive waste management; non-proliferation and physical protection; transport; and nuclear third party liability. These country reports are available at: www.oecd-nea.org/law/legislation/.

16th session of the International School of Nuclear Law (ISNL)

The 16th session of the ISNL was held from 22 August to 2 September 2016 in Montpellier, France, and was attended by 57 participants from 34 NEA member and non-member countries. This year's session brought together a diverse international group of graduate students and professionals from across the globe to learn more about the legal framework and major issues affecting the peaceful uses of nuclear energy. Organised by the NEA and the University of Montpellier, with support from the International Atomic Energy Agency (IAEA), the ISNL has since 2001 attracted over 800 participants worldwide from an increasingly diverse range of countries, many of whom are now experts in the nuclear law field.

2017 session of the International Nuclear Law Essentials (INLE)

The next session of the INLE will take place on 20-24 February 2017 at the OECD Conference Centre in Paris, France. The five-day INLE course has been designed to provide participants with a comprehensive understanding of the various interrelated legal issues relating to the safe, efficient and secure use of nuclear energy. This intensive course has been designed to accommodate the needs and interests of lawyers working in either the public or the private sectors but will also be of interest to scientists, engineers, policymakers, managers and other professionals working in the nuclear field. More information on the course and how to apply is available at: www.oecd-nea.org/law/inle/.

Table on Nuclear Operator Liability Amounts and Financial Security Limits

The Table on Nuclear Operator Liability Amounts and Financial Security Limits was updated in November 2016. This table attempts to provide information on the nuclear liability and amounts and financial security limits provided in countries with nuclear energy programmes and which are parties to at least one international nuclear liability convention.

News briefs

22nd Nuclear Inter Jura Congress in New Delhi, 2016

The 2016 Nuclear Inter Jura Congress was held in New Delhi, India, between 7-11 November at The Imperial Hotel. This was the first time the bi-annual series was held in South Asia, and the Congress was hosted by the Nuclear Law Association, India (NLA). The overarching theme of the 22nd Nuclear Inter Jura Congress was "The Future of Nuclear Law: Addressing Societal, Environmental and Business Expectations" to exchange views on the convergence of these three key areas – society, environment, and business – the interlinkages of which will redefine the future of nuclear energy. Hence, "new topics" such as climate change policies and their impact on the nuclear energy sector were duly incorporated in the program.

The tone of the conference was set during the Inaugural Session, where insightful reflections were shared by the Chairman of the Atomic Energy Regulatory Board (AERB); the Additional Solicitor General of India; the Homi Bhabha Chair, Department Atomic Energy; the Legal Advisor and Director of the International Atomic Energy Agency (IAEA) Office of Legal Affairs; and the Chairman of the US Nuclear Regulatory Commission.

The 5-day conference counted 17 sessions, with about 70 speakers from over 30 countries, including law professors, PhD students, researchers, corporate lawyers, public interest litigators, representatives from operators, regulatory boards, research institutes, diplomats, government officials, insurance companies, as well as the IAEA, the Nuclear Energy Agency (NEA), the ITER Organisation and the European Commission (EC), leading to stimulating and thought-provoking discussions throughout the event. NLA also ensured that each session duly reflected perspectives from India, so that all participants would be able to place the Indian civil nuclear energy programme in perspective.

The sessions addressed the latest domestic and international developments pertaining to civil liability for nuclear damage; the challenges and various approaches to financing nuclear projects; the experience with joint ventures in the nuclear energy sector; various models for industry deployment and licensing of small modular reactors (SMRs); stocktaking of nuclear energy developments and public perceptions in Africa, Japan, Turkey and "Global South" countries; the involvement of civil society in nuclear energy projects and related litigation; radioactive waste management policies as well as the presentation of the comparative study prepared by the International Nuclear Law Association's (INLA) working group; transport of nuclear material including case studies and reflections on related insurance; international developments relating to nuclear security and a legal/regulatory gap assessment pertaining to transportable nuclear power plants; a panel discussion on the Iran Nuclear Deal; nuclear safety and whistleblower legislation; a model for the international regulation of nuclear fusion; radiation protection and diverging scientific views on low-dose radiation; and a comparative discussion on the protection of patients against ionising radiation.

There were no parallel sessions during the Congress to ensure that the conference participants could attend all sessions, which is why the conference was structured as a five-day instead of a four-day conference, with some respite offered

during the half-day social outing. The NLA also ensured that there was a five-day programme put together for the accompanying partners.

The NLA, India, was most excited about issuing the following five awards:

- NLA President's SN Bose Prize: Awardee: Peri Lynne Johnson, Legal Adviser and Director, IAEA Office of Legal Affairs.
- NLA, India Prize for Best Paper: Awardee: Kimberly Sexton Nick, Lawyer, Office of Legal Counsel, NEA, for her paper on "Employee Protection and Regulations: Strengthening Nuclear Safety Culture through the Legal System".
- NLA, India's Global South Award: Awardees: Aakanksha Joshi, Partner, Economics Law Practice (ELP), and Pooja Chatterjee, Associate Manager, ELP, for their paper on: "Wading Through the Pool: Will the India Nuclear Insurance Pool be an Effective Risk Transfer and Management Mechanism?".
- Mukesh Arora Memorial NLA Prize for Best Presenter: Awardee: Karoly Tamas Olajos, Legal Officer, ITER, for his presentation on "International Regulation of Nuclear Fusion".
- NLA Young Scholar Award (with special thanks to Oxford University Press): Awardee: Anne Wilson, Director, Comline Wilson Attorneys, South Africa, for her paper on "The future of Nuclear Energy in Africa with an Overview on South Africa and its Nuclear Energy Expansion Programme: the Expectations of Society, the Environment and Business".

The final papers submitted and presentations made at the Congress can be consulted at: http://2016inlacongress.in/. The final proceedings as published can be downloaded from: http://aidn-inla.be/proceedings/.

Importantly, the INLA General Assembly held during the New Delhi Congress elected a new INLA President, Mr Jacques Lavoie, General Counsel, Emirates Nuclear Energy Corporation (ENEC), United Arab Emirates. The next INLA Congress will be held in 2018 in Abu Dhabi, the details of which will follow in due course.

NLA course on "Nuclear Energy and Law"

The NLA's 2017 Course on "Nuclear Energy and Law" will be held during 6-11 March 2017 in Jaipur, Rajasthan, India. The week-long course, in association with TERI University, will have a one-day site visit to Rajasthan Atomic Power Station, Rawatbhata. More information on the course, scholarships from South Asian students, logistics is available at: https://nuclearlaw.wordpress.com/.

India national moot court on nuclear liability law

Lloyd Law College, Noida, India has organised the Second Prof N. R. Madhava Menon South Asian Association for Regional Cooperation (SAARC) National Mooting Competition 2016-17 during 3-4 December 2016. The competition will see participation from over 30 teams from universities across India. The SAARC moot court India national round is on nuclear liability law. More information is available at: http://lloydlawcollege.com/second-prof-n-r-madhva-menon-saarc-mooting-competition-2016-17.html.

Recent publications

News from the Front Lines of Nuclear Law: Proceedings of the AIDN/INLA Regional Conference 2015 in Nuremberg (2016), edited by Christian Raetzke, Ulrike Feldmann and Akos Frank

The German Regional Conferences are well-established events within the framework of the Association Internationale du Droit Nucléaire (AIDN)/International Nuclear Law Association (INLA) and in the worldwide nuclear law community. They are regularly organised by the German Branch of the AIDN/INLA in the years between the biannual Nuclear Inter Jura congresses. The 14th Regional Conference of the German Branch of the AIDN/INLA took place in Nuremberg in September 2015. It was chaired by Christian Raetzke, the current chairman of the German Branch, who also edited this volume together with Ulrike Feldmann (Board member both of the German Branch of the AIDN/INLA and of the AIDN/INLA itself) and Akos Frank.

In five topical sessions, German and international experts analysed key issues and current developments in nuclear law, sharing their experience from acting "at the front lines" of this challenging area of law.

The first session (entirely in English) dealt with the issue of turnkey contracts in the nuclear business. The three speakers highlighted challenges and advantages of such contracts both in general and with a specific focus on nuclear, where implementation of turnkey contracts may encounter particular obstacles, necessitating intelligent solutions.

The second session (in German) was devoted to nuclear-related court claims and dispute settlements. Two speakers analysed new developments under European Union (EU) environmental law, highlighting, as one example, the changed legal position of non-governmental organisations (NGOs), which has recently triggered important changes in German law. Another speaker discussed the ongoing International Centre for Settlement of Investment Disputes (ICSID) arbitration filed by a non-German utility against the Federal Republic of Germany.

Legal requirements for the disposal of nuclear waste were the focus of the third session. Whereas the first two presentations (in German) covered the developments in Germany concerning a repository for high-level waste, which are quite remarkable, the following speakers (all in English) widened the scope to look at different countries and regions, particularly in the United States (with the Yucca Mountain case), the EU (with the Waste Directive)[1], Canada, Hungary and Mexico.

The fourth session dealt with nuclear liability and included presentations on the situation in India, particularly the new insurance pooling (in English), and on an interesting element of German nuclear liability law, namely the reciprocity principle applied to cross-boundary damage (in German).

The final session (in English) was devoted to issues of nuclear safety. Speakers developed a vision for a new EU regulatory structure and analysed the importance of the Convention on Nuclear Safety in the light of the Vienna Declaration.

1. Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, *Official Journal of the European Union* (OJ) L 199 (2 August 2011).

The volume contains the proceedings of the conference and offers to the reader a colourful and varied journey through many interesting aspects "at the front lines" of current nuclear law.

The volume features papers and discussion reports by: Graham Alty, Florian Cahn, Hans-Georg Dederer, Ulrike Feldmann, Alexandra van Kalleveen, Ingmar Kohl, Jay Kraemer, Sara Maciel Sánchez, Łukasz Młynarkiewicz, Hanns Näser, Karoly Tamas Olajos, Nuria Prieto Serrano, Christian Raetzke, Michaela Rexhäuser, Els Reynaers Kini, Christof Sangenstedt, Sabine Schlacke, Judit Silye, Hubert Steinkemper, Carlton Stoiber, Lisa Thiele, Lisa Kristin Trapp and Julius Weitzdörfer. Additional charm is lent to the volume by the inclusion of a selection of cartoons drawn by Carlton Stoiber during the conference.

Nuclear Non-Proliferation in International Law: Vol. I, with Foreword by Mohamed ElBaradei (2014); Vol. II, Verification and Compliance (2015); Vol. III, Legal Aspects of the Use of Nuclear Energy for Peaceful Purposes (2016), edited by Jonathan L. Black-Branch and Dieter Fleck

This book series discusses the legal interpretation and implementation of the three pillars of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT): the legal regime to ensure non-proliferation of nuclear weapons; the right to develop research in as well as the production and use of nuclear energy for peaceful purposes; and legal issues relating to nuclear disarmament. The various authors provide an in-depth examination of the status of international law regarding nuclear capacity. They consider competing legal approaches to the security and safety of nuclear technology; compliance with and verification of nuclear non-proliferation obligations; and prospects of disarmament and regulation of nuclear weaponry within a contemporary international context. With scholarly research articles and critical commentaries on state practice to implement relevant treaty law and custom, supplemented by legal assessments on case developments, this peer-reviewed publication offers an academic analysis and information on practical legal and diplomatic efforts on both a global and regional scale. It sets a basis for a further constructive discourse on the topic in international public law.

Various studies are devoted to the legal interpretation and implementation of the NPT, the Comprehensive Nuclear Test-Ban Treaty (CTBT), the Treaty establishing the European Atomic Energy Community (EURATOM), and obligations on nuclear security and safety. After setting the scene in Volume I, in which also the influences on the law of nuclear non-proliferation by other branches of law such as environmental law, international humanitarian law and European law are shown, Volume II focuses on the question, contested in recent academic writings, whether the International Atomic Energy Agency (IAEA) is competent to verify not only the correctness, but also the completeness of national declarations. After careful clarification, an affirmative answer is provided. Topical legal issues of verification and its technical and political limits as well as legal elements for countermeasures and peaceful settlement of disputes are discussed in this context. Volume III provides an assessment of the development and use of nuclear energy for peaceful purposes within the contemporary global context, considering the role of nation states as well as international organisations such as the IAEA in implementing and monitoring implementation of the NPT. Issues of emergency preparedness and reparation are specifically assessed. The 2015 Nuclear Accord with Iran and its implementation is discussed from practical diplomatic and academic viewpoints, highlighting relevant developments in this evolving area.

The volumes explore relevant issues of *lex lata* and proposals *de lege ferenda*, ultimately presenting a number of suggestions for international co-operation in this sensitive field where political discussion often dominates over legal analysis. The important tasks of limiting the proliferation of nuclear weapons, ensuring the safety

and security of the peaceful uses of nuclear energy, and achieving nuclear disarmament under strict and effective international control, calls for the interpretation and application of international legal principles and rules in their relevant context. This book series endeavours to facilitate this task while presenting new information and evaluating current developments in this area of international law.

The editors, the Chairman and Rapporteur of the Committee on Nuclear Weapons, Non-Proliferation and Contemporary International Law established by the International Law Association (ILA), have gathered renowned experts of international law and international relations, co-operating to support the larger project of the ILA: an ILA Declaration on Legal Issues of Nuclear Weapons, Non-Proliferation and Peaceful Uses of Nuclear Energy, with commentary. With this book series they have reached out far beyond the ILA Committee's membership and invite readers to participate in a transparent discussion, to exchange arguments and proposals for reaffirming and further developing the law of nuclear non-proliferation.

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Feature articles in this issue include "Strengthening the international legal framework for nuclear security: Better sooner rather than later"; "Brexit, Euratom and nuclear proliferation"; and "McMunn et al. v Babcock and Wilcox Power Generation Group, Inc., et al.: The long road to dismissal".

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