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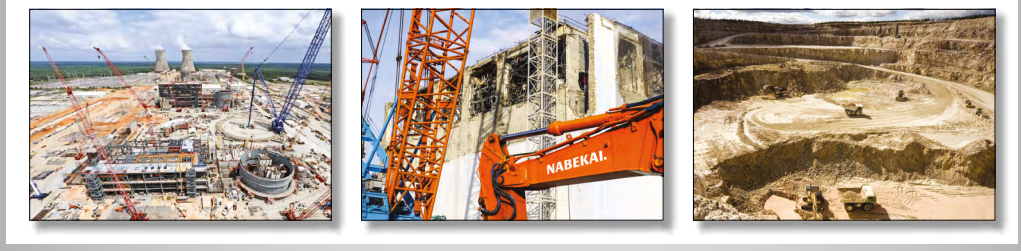

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Cover photos: Vogtle units 3 and 4, United States (Georgia Power Company); Unit 4, Fukushima Daiichi Nuclear Power Plant, Japan (Gill Tudor/IAEA); McClean Lake Uranium Mine, Canada (Areva).

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The information submitted to the NEA by these individuals represents the opinions of the authors alone and does not purport to represent the official views or the policies of their governments or any other entity.

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Reformed and reforming: Adapting the licensing process to meet new challenges

by Stephen G. Burns[*]

Nearly ten years ago, I published an article in the *Nuclear Law Bulletin* to address changes in the process being applied to licence new reactors in the United States (US).[1] At the time, the US Nuclear Regulatory Commission (NRC) was faced with the prospect of handling a substantial workload of new reactor applications. The applications were to be considered largely through the licensing procedures established in the NRC's regulations in 10 CFR Part 52,[2] a set of regulations that had been adopted in the late 1980s, but which were largely implemented for the first time in the late 1990s and early 2000s. In contrast to the two-phase process of issuing separate construction permits and operating licences used in licensing the first generation of over 100 commercial operating plants, the new procedures focused primarily on the issuance of generic certifications of reactor designs that could be referenced in individual site applications for combined licences (COL) authorising both construction and operation of a nuclear installation.[3] The approach under Part 52 was intended to promote broader plant standardisation as well as to inject greater certainty and stability into the licensing process.

I wrote at a time of great optimism in the nuclear industry in the United States, and one might argue that my piece was infected to some degree by the enthusiasm for potential nuclear new build in the US. Since 2008, the prospects for nuclear new build in the United States – and even the continued operation of the existing fleet of reactors – have been tempered by a number of factors. The financial crisis that rattled the world in 2008, the depressed demand for electricity even after the recovery, the abundance of natural gas at a low price point, market distortions and

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1. Burns, S. (2008), "Looking Backward, Moving Forward: Licensing New Reactors in the United States", *Nuclear Law Bulletin*, No. 81, OECD, Paris, pp. 7-29.
2. CFR refers to the Code of Federal Regulations, the official compilation of regulations issued by federal governmental agencies in the United States. The NRC's regulations are published in Title 10 of the CFR, ranging from Parts 1 through 199.
3. See Burns, *supra* note 1, pp. 7-11; see also Cyr, K., S. Burns and S. Crockett (2006), "Licensing the next generation of reactors in the USA: Recent experience, key issues and challenges", *International Journal of Nuclear Law*, Vol. 1, No. 3, Inderscience Publishers, Olney, United Kingdom, pp. 239-46.

subsidies for wind and solar generation are among the reasons given for the diminished nuclear renaissance. Others point to the impact of the Fukushima Daiichi nuclear power plant (NPP) accident on public confidence or to the cost of nuclear plant construction, in part due to the impact of regulation, as causal factors.

Notwithstanding the uncertainties in the current environment for nuclear generation in the US, the NRC has issued a number of design certifications and COLs for new reactors over the last decade, and in 2015 the NRC issued an operating licence under 10 CFR Part 50 for the Tennessee Valley Authority's (TVA) Watts Bar Unit 2. The NRC issued an amended design certification for Westinghouse's AP1000 design in December 2011, which superseded the initial design certification issued in 2006, and issued a design certification in October 2014 for the Economic Simplified Boiling Water Reactor (ESBWR) in response to the application submitted by GE-Hitachi Nuclear Energy.[4] Combined licences under 10 CFR Part 52 have been issued for twelve new units.[5] Only four of those units – those at the Vogtle and VC Summer sites – proceeded to active construction, with decisions deferred on the others.[6] Early site permits (ESP) were issued in 2007 for additional units at the Clinton, Grand Gulf and North Anna sites; in 2009 for the Vogtle site; and in 2016 to PSEG for the site in southern New Jersey where the Hope Creek and Salem plants are operating. One combined licence application is under active consideration for Turkey Point Units 6 and 7 in Florida, and TVA has applied for an ESP at its Clinch River site in Oak Ridge, Tennessee. In addition to the renewal of the US Advanced Boiling Water Reactor design certification, the NRC has design certification applications under review for the Korean Advanced Power Reactor 1400 (APR1400) and NuScale Power's integral pressurised water reactor, a small modular reactor (SMR).[7]

Although the current volume of new reactor licensing work is relatively modest compared to the expectations of a decade or so ago, circumstances suggest that we are at yet another inflection point in the history of nuclear generation in the United States. Interest has increased over the past few years in the potential for advanced non-light water – or "Generation IV" – reactor designs, though none have to date been put before the NRC for licensing review. While one might expect with its long experience in nuclear licensing, the NRC would be considered capable of undertaking the review and licensing of these advanced designs, many who are pressing for advanced reactors are suggesting otherwise. In most colourful terms, the NRC has been described as "sclerotic" and "pusillanimous", a bureaucratic

4. The AP1000 and ESBWR design certifications are published respectively at 10 CFR Part 52, Appendices D and E.
5. Eight plants reference the Westinghouse AP1000 design, 10 CFR Part 52, Appendix D, in their license: Levy Nuclear Plant Units 1 and 2, VC Summer Units 2 and 3, Vogtle Units 3 and 4, and William States Lee III Nuclear Station Units 1 and 2. Two plants reference GE-Hitachi Nuclear Energy's ESBWR, 10 CFR Part 52, Appendix E: Fermi Unit 3 and North Anna Unit 3. The combined licences for the South Texas Project Units 3 and 4 reference General Electric's US Advanced Boiling Water Reactor, 10 CFR Part 52, Appendix A.
6. The prospects for completion of the VC Summer and Vogtle units have been affected significantly by Westinghouse Electric Company's declaration of bankruptcy in early 2017. Although construction is proceeding on the Vogtle units as of the writing of this article, the VC Summer's owners have abandoned the project. See Mufson, S., "S.C. utilities halt work on new nuclear reactors, dimming the prospects for a nuclear energy revival", *Washington Post* (1 Aug. 2017); Swartz, K. (2017), "Waiting game resumes over Southern's Vogtle takeover", *EnergyWire*, E&E News, Washington, DC.
7. Two other designs, Mitsubishi's US APWR and Areva's US EPR, are still on the docket but review has been deferred or suspended. Information on the status of NRC reviews and major documents related to the reviews, including applications, NRC safety evaluations and environmental statements, can be accessed through the NRC's public website at: www.nrc.gov/reactors/new-reactors.html.

quagmire averse to innovation and slow to decision.[8] Despite the NRC having adjusted its processes to address earlier criticisms of the licensing framework, the design certification process is criticised because it requires all major design features to be part of the application in order to gain regulatory approval. Thus, it is argued, the regulatory expectation of design completeness presents an enormous barrier to developers who need a more step-wise approach to gain funding for their projects while demonstrating technical adequacy. Moreover, it is said, the NRC lacks the necessary technical acceptance criteria for these advanced designs because its existing regulations are largely directed to the adequacy of light water reactor (LWR) technologies when developers may put high-temperature gas, molten salt and other non-LWRs on the NRC's plate. Congress has shown increased interest as well, as reflected in hearings held and proposed legislation submitted in the last few years.

So what's a regulator to do? The NRC has engaged in a steady, albeit modest, examination of its preparedness for advanced designs over the past few years. These efforts have included examination of its own guidance and processes as well as co-operation with the US Department of Energy (USDOE) in identifying key issues and potential strategies. But the NRC is constrained in some respects from devoting substantial resources to the development of new or revised regulatory approaches due to statutory requirements that the NRC recover most of its appropriated funds through user fees imposed on the industry.[9] Unless designers are prepared to put up the funds necessary to cover the fees for review of the new designs, the NRC is not able to review them, and licensees of operating facilities paying annual fees may not all be supportive of the NRC expending resources to develop infrastructure for the review of advanced reactor designs. Given the current context, this article will attempt to reflect on the NRC's current framework for licensing, the lessons from Part 52 and strategies for adapting to the new demands that may be made on the agency.

I. Evolution of the licensing process

Before reflecting on where the NRC might need to adjust or change its approaches, it is worth taking stock of the processes the agency has put in place to address the licensing of nuclear power reactors. The framework for licensing is rooted in the agency's organic statute, the Atomic Energy Act of 1954, as amended (AEA).[10] How the NRC, or its predecessor, the Atomic Energy Commission (AEC), licences under the Act has been the subject of periodic examination and modification over the years. In simplest terms, the original scheme for nuclear power plant licensing

8. King, L. (2016), "The Carbon Solution Obama Won't Take to Paris", blog post, *Huffpost*, available at: www.huffingtonpost.com/llewellyn-king/the-carbon-solution-obama_b_8623740.html. See Mintz, S. (2017), "Lively Debate Likely as Trump Team Assesses Ailing Industry", *Greenwire*, E&E News, Washington, DC; Faison, J. (2016), "Nuclear Innovation Isn't Welcome Here", blog post, ClearPath, available at: https://clearpath.org/jays-take/nuclear-innovation-isnt-welcome-here.
9. Omnibus Budget Reconciliation Act of 1990, as amended, Public Law (Pub. L.) 101-508, 104 Stat. 1388, Sec. 6101, 42 USC 2214. NRC regulations on fees are contained in 10 CFR Parts 170 (fees for service) and 171 (annual fees).
10. Pub. L. No. 83-703, 68 Stat. 919 (original text of the 1954 act). The AEA, as amended, is codified at 42 USC 2011–2021, 2022–2286i, 2296a–2297h-13.

followed a two-step approach provided under the AEA.[11] This process, which was followed by the AEC and later the NRC in the licensing of every commercial reactor until implementation of the COL approach under 10 CFR Part 52 in the 2000s, required that the applicant obtain first a *construction permit* and then an *operating licence*.

Issuance of the construction permit was based on the NRC's evaluation of preliminary safety and design information sufficient to allow the construction of the plant; the operating licence was issued upon completion of construction based on an evaluation of the final design, conformance to the terms of the construction permit and other operational considerations.[12] As a result of the enactment of the National Environmental Policy Act (NEPA) of 1969,[13] the AEC and later the NRC incorporated an environmental review as part of the consideration of a proposed construction permit or operating licence.[14] Public hearings, whether or not licence issuance is contested, are mandated for issuance of a construction permit; hearings must be held only in contested cases at the operating licence phase.[15]

Although the two-phase process has been used to licence well over 100 commercial operating reactors in the United States – and remains a viable path

11. The scheme reflected in significant respects the licensing process provided under the Communications Act of 1934, Pub. L. No. 73-416, 48 Stat. 1064. At the time of the passage of the 1954 AEA, all nuclear fuel was owned by the federal government, just as the broadcast airwaves were under governmental control. Thus, "there were significant analogies between the issuance of construction permits for radio stations and nuclear reactors: both involved the allocation of a scarce resource in the sole possession of the federal government". Texas Utilities Electric Co. (Comanche Peak Steam Electric Station, Unit 1), CLI-86-4, 23 NRC 113, 117 (1986), aff'd, Citizens Ass'n for Sound Energy v. NRC, 821 F.2d 725 (DC Cir. 1988). In an early case, the Supreme Court affirmed the AEC's implementation of the two-step approach to licensing as a permissible construct under the AEA. Power Reactor Development Co. v. Electricians, 367 US 396 (1961).
12. The requirement for a licence for a "production or utilization facility", which includes nuclear reactors used for power production as well as other purposes, stems from AEA Sections 101, 103 and 104, 42 USC 2131, 2133 and 2134. The significant statutory provisions framing the licensing process are found in AEA Sections 182, 185 and 189, 42 USC 2232, 2235 and 2239. Until 2005, licensing of commercial reactors also required an antitrust review under AEA Section 105(c). See Pub. L. 109-58, 119 Stat. 784, amending 42 USC 2135(c). For a more detailed discussion of the process, see Burns, *supra* note 1, pp. 9-13.
13. 42 USC 4321-4347.
14. The AEC initially resisted the application of NEPA to its licensing activities but ultimately conceded its application in the face of an adverse court decision in Calvert Cliffs Coordinating Comm. v. AEC, 449 F.2d 1109 (DC Cir. 1971). The construction permit is considered a "major federal action" requiring preparation of a full environmental impact statement (EIS); an operating licence also requires a supplemental EIS to consider the impacts of issuing the operating licence, but the supplemental EIS needs only to address changes that may have occurred since the original EIS for the construction permit occurred. Regulations applicable to the environmental review are found in 10 CFR Part 51.
15. AEA Section189a.(1)(A), 42 USC 2239(a)(1)(A). The mandatory hearing requirement, even in uncontested proceedings, derives from a 1957 amendment to the AEA that required hearings at both stages; a 1962 amendment pulled back this requirement to mandate such hearings only at the construction permit stage. See Pub. L. 85-256, Sec. 7, 71 Stat. 579, amended by Pub. L. 87-615, Sec. 2, 76 Stat. 409. For a brief overview of the legislative history related to mandatory hearings, see Exelon Generation Co. LLC et al., CLI-05-17, 62 NRC 5, pp. 27-28 (2005). At the operating licence phase, a hearing is required only if an "interested person" establishes standing to contest the license and raises one or more litigable "contentions". See 10 CFR 2.309(a) and (f).

to licensing today[16] – dissatisfaction with aspects of the process ultimately led to the NRC's adoption in 1989 of its licensing approach embodied in 10 CFR Part 52. The major complaints about the two-step process under Part 50 centred on lack of standardisation and a "design as you go" approach to construction of plants, deferred resolution of important safety issues until construction was well underway, changing regulatory requirements and duplicative reviews (and potentially hearings) at both phases.[17] Efforts begun under the AEC to improve the licensing process gained some traction in the early 1970s, but largely diminished by the end of the decade after the Three Mile Island accident and the subsequent pulling back from planned new nuclear capacity.[18]

The revived focus on improvement of the licensing process following the Three Mile Island accident stemmed in part from critiques of the licensing process and the lack of standardisation in the US fleet, which the major inquiries into the accident and other sources laid out.[19] After several failed attempts at legislative reform, the NRC eventually took matters into its own hands and initiated an effort to reform the licensing process within the existing statutory context.[20] As noted, the AEC had chosen the two-step path of construction permit and operating licence, but the seed for a different approach already existed in the AEA and did not require new legislation. AEA Section 161h, 42 USC 2201(h), allows the consideration "in a single application one or more activities for which a licence is required under this Act" and to "combine in a single licence one or more of such activities".[21] The NRC's efforts

16. Indeed, the most recently licensed operating reactor in the United States, TVA's Watts Bar Unit 2, received an operating licence in October 2015 under 10 CFR Part 50. Construction at Watts Bar Unit 2 had been suspended in the mid-1980s until a decision to resume construction and licensing activities in 2007. In 2016, the NRC also issued a Part 50 construction licence to SHINE Medical Technologies for a medical isotope production facility, and an investor group may acquire and complete TVA's suspended Bellefonte Units 1 and 2.
17. Burns, *supra* note 1, pp. 8-10. For data on licensing of reactors from the 1950s to 1980, see Quirk, J. and K. Terasawa (1981), "Nuclear Regulation: An Historical Perspective", *Natural Resources Journal*, Vol. 21, Issue 4, University of New Mexico, Albuquerque, pp. 833-855. The authors note important factors other than the cost or scope of regulation that had a significant impact on the length of the licensing review.
18. Burns, *supra* note 1, pp. 16-17. For example, rules were established providing for manufacturing licences, duplicate plant and reference system concepts in 1973 and 1975, and these concepts are largely reflected in the current rules in 10 CFR Part 52. *Ibid*., p. 16, n. 42.
19. See President's Commission on the Accident at Three Mile Island (1979), *Report of the President's Commission on the Accident at Three Mile Island – The Need for Change: The Legacy of TMI*, GPO Document Number 1979 0-303-300, Washington, DC, pp. 52 and 65 (commonly referenced as the Kemeny Commission Report); NRC Special Inquiry Group (1980), *Three Mile Island: A Report to the Commissioners and to the Public*, Vol. 1, pp. 139-41; US Congressional Office of Technology Assessment (1981), *Nuclear Power Plant Standardization: Light Water Reactors*, Washington, DC, p. 6.
20. The NRC announced that it would pursue rulemaking to re-shape the licensing process in a policy statement, Nuclear Power Plant Standardization, 52 Federal Register (Fed. Reg.) 34884 (15 Sept. 1987). For references to the legislative proposals then under consideration, see Burns, *supra* note 1, pp. 17-18.
21. See also 10 CFR 50.31.

culminated in the adoption of 10 CFR Part 52 in 1989, which was endorsed in large part by subsequent legislation.[22]

II. Licensing under 10 CFR Part 52

The key features of 10 CFR Part 52 centre on three primary vehicles towards approval or licensing of designs, sites, construction and operation of facilities. These are: design certifications (Subpart B), early site permits (Subpart A) and combined licences (Subpart C). The rules also provide for standard design approvals (Subpart E) that may be referenced in a combined licence application, but such approvals do not include the same finality provisions as does a design certification. Manufacturing licences (Subpart F) authorise the manufacture of reactors at a facility that may then be installed at approved sites. The concepts embodied in Part 52 were not first thought of in the context of the efforts that led to the adoption of the rule in 1989. Indeed, we can see the origins of the concepts embodied in design certification and site approvals in earlier efforts of the AEC to improve the licensing process and enhance standardisation.[23] These efforts led to some regulatory changes, and the NRC took up the mantle of regulatory reform when it came into being in 1975, but efforts had largely come to a halt in the late 1970s given the reduced market for nuclear new build and the uncertainties for further development in the wake of the 1979 Three Mile Island accident.[24]

A. Early Site Permits (10 CFR Part 52, Subpart A)

An early site permit (ESP) is, in effect, a partial construction permit that allows an applicant to resolve radiological safety and security issues bearing on-site suitability, environmental issues (including the evaluation of alternative sites) and emergency preparedness issues. The applicant does not need to specify the particular design being used, but may use a "plant parameter envelope", i.e. a set of values of plant design parameters that the applicant believes bounds the actual design

22. Final Rule, Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Reactors, 54 Fed. Reg. 15372 (18 Apr. 1989). The final rule was challenged but ultimately sustained *en banc* by the full panel of the District of Columbia Circuit of the US Court of Appeals. Nuclear Information and Resource Service v. NRC, 969 F.2d 1169 (DC Cir. 1992), reversing in part 918 F.2d 189 (1990). The legislation largely endorsing the 1989 rule is contained in the Energy Policy Act of 1992, Pub. L. 102-486, 106 Stat. 2776, and the NRC adopted conforming changes to the 1989 Part 52 rule in Combined Construction Permits and Operating Licenses; Conforming Amendments, 57 Fed. Reg. 60975 (23 Dec. 1992).
23. See e.g. AEC (1972), "Commission Policy Statement on Standardization of Nuclear Power Plants", Washington, DC and AEC (1973), "Statement on Methods for Achieving Standardization of Nuclear Power Plants", Washington, DC; AEC Task Force for the Study of the Reactor Licensing Process (1973), *Study of the Reactor Licensing Process: Task Force Report to the Director of Regulation*, pp. 9-1 and 17-30. Commentary by AEC counsel on these efforts can be found in Hennessey, J.F. (1974), "Licensing of Nuclear Power Plants by the Atomic Energy Commission", *William & Mary Law Review*, Vol. 15, Issue 3, College of William and Mary, Williamsburg, VA, p. 487; Shapar, H. and M. Malsch (1974), "Proposed Changes in the Nuclear Power Plant Licensing Process: the Choice of Putting a Finger in the Dike or Building a New Dike", *William & Mary Law Review*, Vol. 15, Issue 3, College of William and Mary, Williamsburg, VA, p. 539.
24. See Burns, *supra* note 1, pp. 16-17.

characteristics of a plant that it might build at the site.[25] Issuance of an ESP does require a hearing because the ESP is considered a partial construction permit.[26] If granted, an ESP may be referenced in later applications for a construction permit and operating licence under Part 50 or a combined licence under Part 52.[27] An ESP may be granted for a period of 10 to 20 years and may be renewed for a similar period.[28]

The ESP will identify site characteristics, design parameters and other terms of the permit, including inspections, tests, analyses and acceptance criteria (ITAAC) that the holder must meet. Under the finality provisions of 10 CFR 52.39(a), the NRC may not change these conditions except as necessary to bring the facility into compliance with NRC requirements existing at the time that the ESP is issued, or as necessary to meet the fundamental "adequate protection" standard under the AEA, or to account for updated emergency preparedness information supplied by an applicant that references the ESP in a construction permit, operating licence or COL application. In any subsequent proceeding on an application for a construction permit or operating licence under Part 50 or for a combined licence under Part 52 that references an ESP, those matters resolved in the ESP proceeding are deemed resolved and are not re-visited in subsequent hearings.[29] Nonetheless, applicants for a COL that references an ESP must identify any new and significant environmental information for issues resolved in the ESP proceeding and a description of the methodology for identifying such information.[30]

B. Standard design certifications (10 CFR Part 52, Subpart B)

Design certification by rulemaking was the cornerstone of Part 52's objective of encouraging standardisation in a new generation of nuclear power plants. Design certifications were first issued in the 1990s. Part 52 allows any person to seek a certification of evolutionary LWR or advanced reactor designs, although advanced designs may require prototype testing.[31] The certification may be issued for a term of 15 years and may be renewed.[32] A certified design may be referenced in applications for construction permits or operating licences issued under Part 50 or in a COL application under Part 52. Issues concerning the adequacy of a design that were resolved during the course of the design certification rulemaking are not reconsidered in a COL proceeding.[33] The contents of the application are specified in 10 CFR 52.47 and must provide the essential information necessary to demonstrate that the design will comply with the NRC's radiological safety, environmental and

25. Recent experience illustrates the flexibility that may be allowed under an ESP. Dominion Resources recently received a COL for the North Anna 3 facility and had referenced its earlier ESP for the site located north of Richmond, Virginia, as well as the certified design for the ESBWR. Dominion Virginia Power (North Anna Power Station, Unit 3), CLI-17-08, 85 NRC (*slip op*. at 3-4). Dominion had initially selected the ESBWR design for its COL, then switched to the Mitsubishi Advanced Pressurized Water Reactor, before returning to the ESBWR. Patel, S. (2013), "Dominion to Revert to ESBWR as Preferred Nuclear Reactor Technology for North Anna Unit 3", Power, available at: www.powermag.com/dominion-to-revert-to-esbwr-as-preferred-nuclear-reactor-technology-for-north-anna-unit-3/. The choice of technology was not critical for the ESP, though necessary for the COL.
26. 10 CFR 52.21.
27. See 10 CFR 52.13 and 52.73(a).
28. 10 CFR 52.26 and 52.33.
29. See 10 CFR 52.39(c).
30. 10 CFR 51.50(c)(1); see Licenses, Certifications, and Approvals for Nuclear Power Plants; Final Rule, 72 Fed. Reg. 49352, 49431 (28 Aug. 2007).
31. 10 CFR 52.41 and 52.47(c)(2) (referencing 10 CFR 50.43(e)).
32. 10 CFR 52.55 and 52.57.
33. 10 CFR 52.63 and 52.98.

security standards.[34] The applicant must also provide a probabilistic risk assessment and identify the necessary ITAAC to verify proper installation of key design features.

Procedurally, design certifications are adopted through notice and comment rulemaking; however, the Commission, at its discretion, may hold a legislative-style hearing on comments received on the proposed certification.[35] Although applicants were originally required to obtain a final design approval under the former Appendix O to Part 52 as a prerequisite to a design certification, the requirement to do so was abolished in the 2007 update of the rule.[36] After resolution of public comment and consideration of the report by the NRC's independent Advisory Committee on Reactor Safeguards (ACRS), the NRC will adopt a final design certification rule and publish it in the Code of Federal Regulations as an appendix to Part 52. The rule incorporates by reference the design certification applicant's detailed Design Control Document (DCD).

Once a design certification is approved, any person — not only the original design sponsor — may request changes that would reduce unnecessary regulatory burden; provide necessary design detail; correct errors; substantially increase on a cost-benefit basis overall safety, reliability or security; or contribute to increased standardisation.[37] Changes adopted through an amendment to the certification are imposed on all plants referencing the design.[38]

C. Combined licences (10 CFR Part 52, Subpart C)

A COL under Part 52 provides an authorisation to construct a nuclear power plant and a conditional operating licence. A COL application may, but is not required to, reference an ESP, a design certification, design approval or a manufacturing licence.[39] If the application does reference an ESP, a manufacturing licence or a design certification, then prior determinations are not re-opened when reviewing the COL application. The applicant must show, for example, that the proposed installation meets the site characteristics and design parameters specified in the ESP and the design characteristics specified in the referenced design certification. The COL applicant must provide all of the information necessary to support the findings that (1) there is reasonable assurance that the facility will be constructed and will operate in conformity with the licence, the provisions of the AEA and the Commission's regulations and (2) issuance of the licence will not be inimical to the common defense and security or to the health and safety of the public.[40] The applicant must also provide proposed ITAAC in accordance with 10 CFR 52.80(a) to verify the facility has been constructed in accordance with its design. Emergency plans must also be submitted.[41]

An environmental report is required and must include information to address environmental issues not considered in a previous proceeding on the site or design, as well as significant new information pertaining to previously considered

34. 10 CFR 52.48.
35. 10 CFR 52.51.
36. See 72 Fed. Reg. at 49442. Standard Design Approvals remain an option under Subpart E to Part 52. See 72 Fed. Reg. at 49391. A Standard Design Approval does not have the same binding effect as a design certification rule. 10 CFR 52.145.
37. 10 CFR 52.63. The original 1989 rule allowed no changes to a certification during its term unless the changes were necessary for compliance with NRC requirements in effect at the time the certification was issued or to meet the statutory adequate protection standard. See 54 Fed. Reg. at 15392 (former 10 CFR 52.68).
38. 10 CFR 52.63(a)(3).
39. 10 CFR 52.73.
40. 10 CFR 52.79.
41. 10 CFR 52.79(a)(21) and (22).

environmental impacts.[42] The NRC must prepare a draft Environmental Impact Statement (EIS) for public comment that addresses both construction and operational impacts and evaluates alternatives to the facility and thereafter issue a final EIS that addresses the comments received. Prior to issuing a licence, the NRC must also consult with the US Department of Homeland Security to identify vulnerabilities of the proposed location of the facility to a terrorist attack.[43] A hearing is required on the COL, even if it is not contested, because the COL, like an ESP, is in part a construction authorisation for which Section 189 of the AEA mandates a hearing.

Once the COL is issued and construction proceeds on the installation, the licence holder must demonstrate compliance with the ITAAC contained in the COL (and which may derive from a referenced ESP or design certification) before operation may commence. Two important aspects of the COL process have been shaped by specific legislation: the specification of acceptance criteria (ITAAC) in the COL and the procedural steps necessary for operation to commence under the COL. Previous discussion of ESPs and design certifications has alluded to the incorporation of ITAAC as acceptance criteria in those regulatory approvals. For the COL, a favourable decision on compliance with ITAAC is critical for the plant to begin operation. The ITAAC developed as part of the COL review as well as those derived from a referenced ESP or design certification are also incorporated into the COL. ITAAC were intended, as described in the original 1989 rule, to provide greater stability and predictability in the ultimate decision as to whether the plant conformed to the accepted design and could commence operation.

A hearing focused on conformance with the ITAAC is offered near the completion of the installation's construction.[44] The Commission may allow interim operation pending the outcome of such a hearing if it determines that there is "reasonable assurance of adequate protection of the public health and safety".[45] For COLs, the NRC has yet to reach a finding under 10 CFR 52.103(g) on ITAAC completion nor has it held an ITAAC hearing, because the only facilities being constructed under COLs have yet to reach the stage of completion that would trigger those actions. In anticipation of the potential for holding ITAAC hearings, the NRC issued final procedures for conducting ITAAC hearings in 2016.[46]

42. 10 CFR 52.80(b).
43. Energy Policy Act of 2005, Sec. 657, Pub. L. 109-58, 119 Stat 814; Memorandum of Understanding between the Nuclear Regulatory Commission and the Department of Homeland Security Regarding Consultation Concerning Potential Vulnerabilities of the Location of Proposed New Utilization Facilities, 72 Fed. Reg. 9959 (6 Mar. 2007).
44. 10 CFR 52.103, implementing 42 USC 2239(a)(1)(B). The NRC is required, at least 180 days prior to anticipated fuel-loading of the reactor, to publish a notice of opportunity for hearing "on whether the facility as constructed complies, or on completion will comply, with the acceptance criteria of the license". 42 USC 2239(a)(1)(B)(i). To obtain a hearing, a petitioner must "show, prima facie, that one or more of the acceptance criteria in the combined license have not been, or will not be met, and the specific operational consequences of non-conformance that would be contrary to providing reasonable assurance of adequate protection of the public health and safety". *Ibid.* The hearing on ITAAC provided under the NRC's original 1989 rule was at the centre of the judicial challenge to Part 52. See Burns, *supra* note 1, pp. 26-27. Congress specifically addressed ITAAC in the Energy Policy Act of 1992, Sec. 2801, 106 Stat. 3120, which shapes the current process for requiring ITAAC and later resolving challenges to satisfactory ITAAC completion.
45. 42 USC 2239(a)(1)(B).
46. Final Procedures for Conducting Hearings on Conformance With the Acceptance Criteria in Combined Licenses, 81 Fed. Reg. 43266 (1 July 2016).

The term of operation under the COL is 40 years from the time the NRC determines the acceptance criteria have been met or the period of interim operation begins in the event that an ITAAC hearing is commenced.[47]

III. Lessons from Part 52 implementation

Although the Commission embarked 30 years ago on the institution of the licensing process now reflected in 10 CFR Part 52, the relative experience under Part 52 is slim when compared to licensing under the original two-part scheme provided under Part 50. COLs have been issued for 12 units (only 4 of which proceeded to construction), in contrast to construction permits and operating licences issued by either the AEC or the NRC under Part 50 for nearly 130 units.[48] The early experience with Part 52 in the 1990s focused on initial design certifications before the nuclear industry and the NRC applied more substantial effort to ESPs, COLs and additional design certifications in the early 2000s.

One can reasonably expect that the implementation of any new process may not always go exactly as envisioned – that adjustments may need to be made to shake out unanticipated conundrums when theory meets practice. And, again, it is worth recalling that the Part 52 process was adopted at a time in which renewed interest in licensing new facilities was on the distant horizon, when the practical application of the new rules to site reviews and new facility licences was nearly 15 years in the future. Nonetheless, since its inception, continuing efforts have been made to draw lessons from the experience gained from the implementation of Part 52's licensing structures. For example, the question of the appropriate level of design detail dominated interactions in the 1990s between the NRC staff and the industry during consideration of the early design certifications.[49] From the agency's review of experience across Part 52, the Commission approved changes to the original 1989 rule in 2007 to clarify requirements, particularly the applicability of technical and other requirements throughout the NRC's regulations to the licensing processes under Part 52 and to allow some process changes in the implementation of the rule.[50]

With the significant uptick in new plant licensing activity in the early 2000s, the NRC was faced with the simultaneous processing of both design certifications, ESPs and COLs, a phenomenon somewhat at odds with the step-wise review system envisioned under Part 52, whereby a COL applicant would reference a certified design and, optionally, an approved site.[51] As one NRC commissioner noted in 2009, only one completed design certification was referenced in a COL application and

47. 10 CFR 52.104.
48. Some 29 plants that were licensed to operate have ceased operation. For a listing of commercial nuclear power plants licensed by the AEC or NRC, see NRC (2016), *Information Digest 2016-2017*, NUREG-1350, Vol. 28, App. A and C, NRC, Washington, DC, pp. 90-104, 107-110.
49. Burns, *supra* note 1, p. 22 and notes 79-82.
50. Licenses, Certifications, and Approvals for Nuclear Power Plants; Final Rule, 72 Fed. Reg. 49352 (28 Aug. 2007).
51. See Blanton, M.S., W.A. Graham, Jr. and M.W. Ronnlund (2010) "The NRC's Improved Licensing Process for Commercial Nuclear Power Plants – In Theory and Practice", *Infrastructure*, Vol. 49, No. 4, American Bar Association Section of Public Utility, Communications and Transportation Law, Chicago, IL, pp. 8-11.

none of the then-active COL applications referenced an approved ESP.[52] Nonetheless, the hurdles posed by the simultaneous consideration of various licensing and certification applications were not viewed as fundamental flaws necessitating changes in Part 52.[53] In addition to actions taken by the NRC licensing staff to accommodate the review process, the Commission itself issued a policy statement to negotiate the challenges faced in resolving issues in ongoing design and COL reviews.[54] The policy statement encouraged consolidated consideration of crosscutting generic issues in licence proceedings, the so-called "design centered approach".[55] The Commission also provided guidance on integrating COL hearings for applications that relied on a standardised design that was still undergoing review.[56]

The NRC staff has issued several reports on lessons learnt from the implementation of Part 52. On the whole, these reports do not find fault in the regulatory framework for licensing itself, but rather focus on areas for improved communication with applicants, greater precision in regulatory guidance and acceptance criteria, and discipline in the review process. A 2013 report conducted after the issuance of the first COLs for the Vogtle and VC Summer plants, for example, concluded that the "review revealed no significant problems or impediments associated with the Part 52 licensing process itself".[57] The report identified a number of areas for improvement to be undertaken by both staff and the industry, including focus on the quality of applications and the acceptance criteria to begin the review process; updated guidance on the content of applications and the staff's standard review plans; guidance on resolution of technical issues; and improvement in the staff's management of requests for additional information (RAIs) during the review process.[58]

Another report issued in 2013 focused on the initial experience with licensing and inspection oversight of COLs.[59] Although the report acknowledges the limited time since the issuance of the first COLs from which to draw experience, the staff saw potentially beneficial enhancements in a number of regulatory activities and interactions with licence holders. The recommendations including increased communication and timely decision making on construction inspection findings and

52. Svinicki, K.L. (2009), "The Nuclear Renaissance in America", Remarks of Commissioner Kristine L. Svinicki to the French Institute for International Relations, NRC News Release No. S-09-011, p. 4 (ADAMS No. ML091240277). See also Jaczko, G.B. (2009), "New Opportunities to Invest in Nuclear Safety", Prepared Remarks for Gregory B. Jaczko, Commissioner, at the 5th Annual Platts Nuclear Energy Conference, NRC News Release S-09-001, p. 2 (ADAMS No. ML090430301): "But almost no one is following that ideal process. Instead, we are once again doing everything in parallel". Documents referenced in this article with an ADAMS document number can be retrieved by a search using the ML number on the NRC's website, at: https://adams.nrc.gov/wba/.
53. This view is reflected in a report of a review of the licensing process conducted by former Senator Pete Domenici and former NRC Chairman Richard Meserve on behalf of the Bipartisan Policy Center at the request of the then NRC Chairman Gregory Jackzo. Letter to NRC Chairman G.B. Jaczko from P.V. Domenici and Dr R. Meserve (6 April 2010) (ADAMS No. ML101060212).
54. Conduct of New Reactor Licensing Proceedings; Final Policy Statement, 73 Fed. Reg. 20963 (17 Apr. 2008).
55. *Ibid.*, p. 20971.
56. *Ibid.*, p. 20973.
57. NRC (2013), "New Reactor Licensing Process Lessons Learned Review: 10 CFR Part 52", p. 19 (ADAMS No. ML13059A239).
58. *Ibid.*, pp. 19-21.
59. Memorandum to G.M. Tracy from J. Luehman (22 July 2013), transmitting "Title 10 of the Code of Federal Regulations Part 52 Implementation Self-Assessment Review: 1 Year Post-Combined License Issuance" (ADAMS No. ML13196A403).

integration of vendor (i.e. supplier) inspection findings into construction oversight, as well as improving the clarity in certain design information in the licensee's DCD and enhancing the common understanding of the level of detail needed in notifications to the NRC of completed ITAAC.[60]

Of particular significance was a recommendation to continue to improve implementation of the process for changes to the licensing basis reflected in the COL and its incorporated DCD.[61] Although post-licensing changes arise in virtually any licensing context, the issue has particular significance for construction under COLs. As noted previously, the Part 52 process for design certification and COLs was intended to provide greater certainty as well as to enhance standardisation in plant designs. Because COLs provide greater definition of the design parameters for the plant, particularly where the licence references a certified design, the COL allows less flexibility than a Part 50 construction permit in permitting design or other changes without regulatory approval during construction. Subject to the evaluation criteria in the subject design certification rule, a COL holder "who references a design certification rule may make departures from the design of the nuclear power facility, without prior Commission approval, unless the proposed departure involves a change to the design as described in the rule certifying the design".[62]

To accommodate the industry's concern over unnecessary construction delays while the regulatory review of changes was underway, the NRC implemented a "preliminary amendment request" (PAR) procedure to preserve "design control mechanisms while avoiding unnecessary construction delays by creating a process whereby a licensee can opt to submit a request to the NRC seeking a determination on whether the NRC objects to the licensee proceeding with construction changes, subject to strict conditions, before the NRC's review of the LAR [licence amendment request] is complete".[63] The PAR process provides the advantage of allowing construction to continue based on a preliminary evaluation of the necessary change to the COL while ensuring adequate controls to preserve the original design requirements should the change be rejected or withdrawn. However, the licensee proceeds at its own risk if the NRC issues a PAR, meaning that if the final licence amendment request is denied or is approved with additional conditions, the licensee may have to undo work that was done during the pendency of the review.

The NRC staff also issued in 2016 an evaluation of experience with the design certification process.[64] The report reviews experience with the design certifications to date, noting particularly the variability of review times that could be attributed to a number of factors.[65] From the staff's perspective, improvements in the conduct of design certification reviews could be achieved through enhanced quality and completeness of applicants' submittals for design certifications to initiate the review, appropriate commitment of resources by the staff and applicant to the review process, early identification and resolution of complex technical and policy

60. *Ibid*., pp. 6-10, 14-15, and Appendix B.
61. *Ibid*., pp. 11-13 and 15.
62. See also 10 CFR 52.98. Changes to the plant-specific portion of the Final Safety Analysis Report would be governed by the procedures in 10 CFR 50.59.
63. NRC (2015), "Combined License COL-ISG-025 on Changes during Construction under 10 CFR Part 52", Interim Staff Guidance, Doc. COL-ISG-025, p. 2 (ADAMS No. ML15058A377).
64. Memorandum to Chairman S. Burns et al. from J. Uhle, Director, Office of New Reactors (NRO) (18 March 2016), "Response to Staff Requirements Memorandum M140910 – Staff Report: 10 CFR Part 52 Application Reviews – Efficiency Opportunities and Review Timelines" (ADAMS Nos. ML15117A206 and ML15117A466).
65. *Ibid*., p. 22 (Table 1).

issues, and better management of the process for issuing and responding to requests for information during the review period.[66]

The staff established timeliness goals for completion of its reviews: (1) 2 months for completion of the acceptance review of the application; (2) 42 months to complete the safety review for large LWRs; and (3) 39 months to complete an SMR design certification.[67] These objectives are largely reflected in the current schedules to review the APR1400 and NuScale's SMR.[68]

IV. Preparing for advanced reactors

The dialogue between the NRC and its stakeholders on the licensing process continues, and the NRC has ongoing efforts to propose or revise guidance documents for implementation of Part 52. The NRC recently issued, for example, a draft regulatory guide on plant applications for public comment and plans other guidance documents in the near term.[69] Whether such efforts are sufficient and even whether the licensing process is viable as it exists have become the focus of current debate, particularly when it comes to the NRC's readiness to license advanced non-light water, Generation IV, reactors.

To put this debate in context, it is worth noting that the NRC has had some, if fairly modest, engagement over its history with advanced non-LWR concepts and has undertaken activities that would strengthen its capability and framework for dealing with advanced reactors. Historically, the AEC had reviewed and licensed non-LWR designs, and the NRC had also conducted some conceptual design or pre-application reviews in the 1980s and into the 2000s.[70] Under the Energy Policy Act of 2005, the USDOE and NRC co-operated on research and pre-application activities related to the Next Generation Nuclear Plant (NGNP) project, an effort focused on a reactor employing high-temperature gas technology.[71]

66. *Ibid*., pp. 22-28.
67. *Ibid*., p. 31. Some additional time is required to complete the rulemaking process, which includes a period for public comment, to approve the design certification. For example, the staff estimated that it would take another eight months to complete the rulemaking after issuing its final safety evaluation report for a large LWR design. *Ibid*., p. 6.
68. See Letter to Dr H.-G. Kim, Korea Hydro and Nuclear Power Co., Ltd. from F. Akstulewicz, NRC (17 March 2017) (ADAMS No. ML17058A100); Letter to T. Bergman, NuScale Power, LLC from F. Akstulewicz, NRC (22 May 2017) (ADAMS No. ML17103A380).
69. NRC, Office of Nuclear Regulatory Research (NRR) (2017), "Draft Regulatory Guide DG-1325: Applications for Nuclear Power Plants" (ADAMS No. ML15233A056). See Bradford, A. (2017), "Addressing Lessons from Part 52 Licensing Experience", Presentation at the 2017 NRC Regulatory Information Conference, slide 8, available at: http://ric.nrc-gateway.gov/docs/abstracts/bradforda-th26-hv.pdf.
70. See NRC (2016), *NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness*, pp. 5-6 (ADAMS No. ML16356A670); NRC (2012), *Report to Congress: Advanced Reactor Licensing*, pp. 10-11 (ADAMS No. ML12153A014); NRC, NRR (June 1988), *Development and Utilization of the NRC Policy Statement on the Regulation of Advanced Nuclear Power Plants*, NUREG-1226, pp. 2-4, Table 2.1 (ADAMS No. ML13253A431).
71. Energy Policy Act of 2005, Pub. L. 109-58, Title VI, Secs. 641-645, 119 Stat. 598, 42 USC 16021-16025. See *Report to Congress: Advanced Reactor Licensing*, *supra* note 70, pp.11-12. Pursuant to Section 644 of the Energy Policy Act, the USDOE and NRC filed a joint report with the Congress describing strategies for licensing a next generation plant by 2021. USDOE and NRC (2008), *Next Generation Nuclear Plant Licensing Strategy*, pp. 5-19 (ADAMS No. ML082290017). According to the NRC's website, the pre-application effort under the NGNP was suspended in 2013: www.nrc.gov/reactors/new-reactors/advanced/ngnp.html (accessed 4 August 2017).

The NRC had issued a policy statement in 1985 on advanced reactor licensing that was revised most recently in 2008.[72] In the statement, the NRC outlined its expectation that advanced reactor designs would provide "at least the same degree of protection of the environment and public health and safety and the common defense and security that is required for current [i.e. pre-1997] generation light water reactors (LWRs)" and "that advanced reactors will provide enhanced margins of safety and/or use simplified, inherent, passive, or other innovative means to accomplish their safety and security functions".[73] Through the policy statement, the NRC encourages early interaction by designers, vendors and potential licensees with the agency to identify unique safety and regulatory issues and to enhance the stability and predictability on licensing and regulation of advanced reactors.[74]

More recently, in response to direction in the 2012 appropriations act, the NRC submitted a report to Congress on advanced reactor licensing, addressing the agency's strategy and approach to preparing for the licensing of advanced reactors.[75] That report outlines steps the NRC was undertaking to prepare itself to manage a potentially new workload of advanced reactor reviews. Building off this report and engagement with stakeholders, in late 2016 the NRC issued a vision and strategy statement with supplements to address near-term as well as medium- and long-term implementation plans to achieve its objectives.[76] The perceived need to further reform the regulatory process and pave the way for a new generation of reactors has gained traction in the Congress. Several bills were introduced in both houses in the 114th Congress and progressed through the legislative process, though none were enacted.[77] Similar bills have been re-introduced in the current 115th Congress and, variably, would compel the NRC to examine its licensing review process, modify existing fee requirements, and provide USDOE support to advanced reactors through cost-sharing initiatives and access to the national laboratories and other department resources.[78]

72. Regulation of Advanced Nuclear Power Plants; Statement of Policy, 51 Fed. Reg. 24643 (8 July 1986), as revised, 59 Fed. Reg. 35461 (12 July 1994) and 73 Fed. Reg. 60612 (14 Oct. 2008).
73. 73 Fed. Reg. at 60615.
74. *Ibid.*, p. 60616.
75. *Report to Congress: Advanced Reactor Licensing*, *supra* note 70. The report was prepared in response to a request made in H.R. Rep. No. 112-118 (24 June 2011), p. 192, related to the NRC's appropriation under the Consolidated Appropriations Act, 2012, Pub. L. 112-74, 125 Stat. 786, 881 (23 Dec. 2011).
76. *NRC Vision and Strategy*, *supra* note 70; NRC (2017), *NRC Non-Light Water Reactor Near-Term Implementation Action Plans* (ADAMS No. ML17165A069); NRC (2017), *NRC Non-Light Water Reactor Mid-Term and Long-Term Implementation Action Plans* (ADAMS No. ML17164A173).
77. See e.g. H.R. 4084, Nuclear Energy Innovation Capabilities Act, reported in H.R. Rep. 114-438 (29 Feb. 2016) and passed by the House, 162 Cong. Rec. H1023-1028 (29 Feb. 2016); H.R. 4979, Advanced Nuclear Technology Development Act of 2016, reported in H.R. Rep. 114-737, Part 1 (12 Sept. 2016), and passed by the House, 162 Cong. Rec. H5305-5308 (12 Sept. 2016); S. 2795, Nuclear Energy Innovation and Modernization Act, reported in S. Rep. 114-285 (23 June 2016).
78. See e.g. H.R. 431, Nuclear Energy Innovation Capabilities Act (introduced 11 Jan. 2017); H.R. 590, Advanced Nuclear Technology Development Act of 2017, passed the House, 163 Cong. Rec. H569-571 (23 Jan. 2017); H.R. 590, Advanced Nuclear Technology Development Act of 2017 (introduced 20 Jan. 2017), passed the House, 163 Cong. Rec. H569-571 (23 Jan. 2017); S. 512, Nuclear Energy Innovation and Modernization Act, reported in S. Rep. 115-86 (25 May 2017); S. 97, Nuclear Energy Innovation and Capabilities Act of 2017, reported in S. Rep. 115-115 (21 June 2017). The status of introduced legislation can be obtained through the website for the US Congress, www.congress.gov.

V. Focusing on potential reforms

Advocates for new reactor technologies argue for various actions to facilitate the development and deployment of advanced reactor technology. These actions include measures beyond the scope of the NRC's regulatory authority and responsibility: e.g. by supporting developers in testing, research and development, or by changing export control procedures.[79] Two areas squarely focus on the NRC's role: the regulatory standards for making licensing determinations and the licensing process itself.[80] The following excerpt from a recent Senate report on a pending bill summarises the argument for "reforming" or "modernising" the NRC's approaches:

> The NRC's current regulatory framework has evolved to oversee light water reactor technologies and may not be suitable for advanced technologies with unique characteristics that may warrant different safety requirements with regard to emergency planning zone sizes, emergency core cooling infrastructure, and fuelling needs. The NRC's current design certification and license approval processes require significant upfront investment without adequate predictability or transparency with regard to a schedule. The legislation addresses these two issues by directing the NRC to develop a new regulatory process with a staged structure to provide applicants with clear, early feedback consistent with a mutually agreed upon schedule. This process will allow advanced reactor companies to seek investment as a design successfully completes each stage rather than attempting to raise $1 to $2 billion dollars at the start of the process without a predictable schedule.
>
> S. 512 also directs the NRC to use more risk-informed, performance-based licensing strategies, where appropriate, as a more comprehensive and holistic approach to regulation. This approach incorporates both modern methods of evaluating risks and consequences with traditional deterministic methods for a more exhaustive analysis of safety. Use of risk-informed, performance-based approaches will also allow the NRC to develop processes

79. The US General Accountability Office (GAO) prepared an assessment that provides a broad overview of the issues that may affect the development of new reactor technologies. GAO (2015), *Nuclear Reactors: Status and Challenges in Development and Deployment of New Commercial Concepts*, GAO-15-652, pp. 23-30. For the views of organisations advocating greater support in the advanced reactor arena, see Nordhaus, T., M. Shellenberger and J. Lovering (2013), *How to Make Nuclear Cheap*, Breakthrough Institute, Oakland, CA, available at: https://thebreakthrough.org/index.php/programs/energy-and-climate/how-to-make-nuclear-cheap; Nuclear Energy Institute (NEI) (2016), *Strategic Plan for Advanced Non-Light Water Reactor Development and Commercialization*, available at: www.nei.org/CorporateSite/media/filefolder/Policy/Papers/AR-Strategic-Plan.pdf?ext=.pdf; Global Nexus Initiative (2016), *A Framework for Advanced Nuclear Reactor Deployment*, available at: http://globalnexusinitiative.org/wp-content/uploads/2016/10/GNI_Policy_Memo_2.pdf; Clean Air Task Force (2017), *Advanced Nuclear Energy – Need, Characteristics, Projected Costs and Opportunities*, available at: www.catf.us/resources/publications/files/Advanced_Nuclear_Energy.pdf.

80. See NEI *Strategic Plan*, *supra* note 79, pp. 3, 9-11; Letter to D. Jackson, NRC NRO from A. Finan, Policy Director, Nuclear Innovation Alliance (11 Apr. 2016), forwarding *Report on Strategies for Advanced Reactor Licensing* (ADAMS No. ML16104A147); Goldberg, M. (2016), *Unleashing Innovation: A Comparison of Regulatory Approval Processes*, Third Way, Washington, DC, available at: www.thirdway.org/report/unleashing-innovation-a-comparison-of-regulatory-approval-processes; Merrifield, J. (2016), *Issue Brief on The Framework for Advanced Reactor Licensing Modernization*, US Nuclear Infrastructure Council, Washington, DC, available at: https://docs.wixstatic.com/ugd/760734_804492aec73c4284b0577281d5b3a5a7.pdf (accessed 4 Aug. 2017).

that are more flexible and applicable to the unique aspects of diverse technologies.[81]

The NRC has the existing statutory authority to adjust its processes and adapt its regulatory framework, should that have merit, to address the perceived gaps and hurdles posed by the existing licensing system. This is not to say that legislation is objectionable.[82] It might well aid the NRC's ability to meet the new demands for review of innovative designs, but the passage of legislation is far from certain. Indeed, the NRC's experience with Part 52 provides a cautionary tale, because it was ultimately the NRC's own initiative – and not legislation – that led to the adoption in the late 1980s of the revised licensing process.

The NRC should itself take the steps that prepare the way for the timely consideration of new technologies. In fact, the NRC has been doing just that. The following discussion provides an overview of the arguments for further improving the NRC's preparedness for advanced reactor licensing and the NRC's actions in response. Although the NRC has identified a number of areas that require its attention, including improving its technical capacity to review non-LWRs, acquiring computer codes and leveraging research by the USDOE and others, the focus in this article will be on adapting the licensing process as well as the regulatory criteria for decision making.[83]

A. *Adjusting the licensing process*

The current licensing regime, in particular the design certification process, is viewed as an impediment because it "calls for enormous front-loaded investment during a protracted development and licensing phase—without a staged structure to provide applicants with clear, early feedback on an agreed schedule and with appropriate finality".[84] A more staged structure, proponents say, would better accommodate the funding strategies that new design developers must integrate into their planning by providing "incremental assurance of the licensability" of a design.[85] A staged review process would also reflect milestones to complete the review.

Advocates point to other regulatory regimes – both domestic and international – as potential models for adapting the NRC's licensing process to accommodate a more staged approach to regulatory determinations. For example, both the US Federal Aviation Administration (FAA) and the Food and Drug Administration (FDA) have phased regulatory review processes to evaluate introduction of new aircraft technologies or new drugs.[86] In nuclear regulation, the Canadian Nuclear Safety

81. S. Rep. 115-86 (25 May 2017), "Nuclear Energy Innovation and Modernization Act" (S. 512), p. 5.
82. Indeed, in one respect, legislation would be essential, as some advocate, to modify the fee system that the NRC is required to apply to its review of license applications and design certifications. See 2016 Nuclear Innovation Alliance report, *supra* note 80, p. 58; Merrifield, J., *supra* note 80, p. 4. The NRC did receive USD 5 million off its fee base in fiscal year 2017 for "development of regulatory infrastructure for advanced nuclear reactor technologies". Consolidated Appropriations Act, 2017, Pub. L. 115-31, Division D, Title IV. In arguing for changes to the NRC's fee structure, advocates note that the US Food and Drug Administration, which is responsible for approving new drugs, derives only 50% of its budget from fees, compared to the NRC's ninety percent. Lovering, J., L. King and T. Nordhaus (2017), *How to Make Nuclear Innovative*, Breakthrough Institute, Oakland, CA, p. 24; 2016 Nuclear Innovation Alliance report, *supra* note 80, p. 30.
83. See *NRC Vision and Strategy*, *supra* note 70.
84. 2016 Nuclear Innovation Alliance report, *supra* note 80, p. 3.
85. See Global Nexus Initiative, *supra* note 79, pp. 5-6; Merrifield, *supra* note 80, pp. 2, 5.
86. The 2016 Nuclear Innovation Alliance report, *supra* note 80, pp. 26-31, describes the two agencies' phased approaches and describes how a similar approach could be adopted by the NRC.

Commission's (CNSC) Vendor Design Review (VDR) and the United Kingdom (UK) Office for Nuclear Regulation's (ONR) Generic Design Assessment (GDA) are held up as models.[87] Given the different technologies being licensed as well as the mixed regulatory and promotional responsibilities of the FAA and FDA, the processes applied by NRC's regulatory counterparts in Canada and the UK may provide more direct insight into potential improvements in NRC's processes.

The VDR is an optional process offered by the CNSC for vendors to obtain an assessment of the overall acceptability of a reactor design; it does not constitute a design certification, nor does constitute a licence, nor is it binding on the CNSC.[88] Nonetheless, the outcome of the review may be considered persuasive, and the CNSC views a VDR as contributing to regulatory certainty by:

- providing clear and early feedback to the vendor on Canadian regulatory requirements and how well the design meets these requirements
- identifying potential licensing and technical (safety) issues early on, thereby providing the vendor with time to resolve issues before they become barriers to licensing; this is particularly important for issues that could result in significant changes to the design or safety analysis
- enabling CNSC staff to become familiar with the design prior to the receipt of a licence application, thereby reducing the amount of time needed to assess the design during the review of the applications for the licences to construct and operate.[89]

The VDR includes three phases. The first phase assesses whether the design generally conforms to CNSC's requirements and related regulatory requirements; Phase 2 is a closer review to determine whether there are any fundamental barriers to licensing in Canada; and Phase 3 is intended to be used at the point at which the vendor has a more detailed engineering effort under way, particularly at the point of a supporting applicant for a licence to construct a facility.[90] The CNSC establishes a "service agreement" with the vendor that includes a design review project plan. CNSC estimates 8 months to a year to complete a Phase 1 review with a staff effort of 4 000 hours and 12 to 18 months to complete Phase 2 and 9 500 hours (depending on the scope of review and the extent to which novel aspects of the design are supported by the vendor).[91] The review time is determined on a case-by-case basis, but can be a multi-year undertaking.[92]

Since 2007, the UK ONR has carried out a similar process through its GDA, which also includes participation from the UK Environment Agency.[93] The process is optional, has no legal status and does not guarantee ONR's permission to begin construction of an installation using that design. Nonetheless, it does give an early

87. *Ibid.*, pp. 19-25. See also Merrifield, *supra* note 80, p. 5.
88. CNSC (May 2012), *Pre-licensing Review of a Vendor's Reactor Design*, Guidance Doc. GD-385, pp. 2-3, available at: http://nuclearsafety.gc.ca/pubs_catalogue/uploads/May-2012-GD-385-Pre-licensing-Review-of-a-Vendors-Reactor-Design_e.pdf.
89. *Ibid.*, p. 4.
90. *Ibid.*, pp. 7, 9 and 11. The CNSC specifies 19 focus areas to be addressed in the Phase 1 and 2 assessments. *Ibid.*, pp. 13-22.
91. *Ibid.*, pp. 8 and 10.
92. *Ibid.*, p. 11.
93. For a description of the process and its objectives, see ONR (2016), New nuclear reactors: Generic Design Assessment Guidance to Requesting Parties, ONR-GDA-GD-00, Rev. 3, available at: www.onr.org.uk/new-reactors/ngn03.pdf. Information on the licensing process for nuclear installations can also be found in ONR (2015), Licensing Nuclear Installations, 4th ed., available at: www.onr.org.uk/licensing-nuclear-installations.pdf.

indication whether a design would meet regulatory requirements prior to the receipt of an application for a licence to construct a power plant at a particular site using that design. The GDA uses a step-wise process that examines the design at increasing levels of scrutiny. After the preparation of the requesting party's (i.e. the design vendor, potentially in partnership with a prospective site licensee) submissions addressing the design, safety case, and security case (Step 1), ONR estimates an approximate time schedule of about 48 months for the next 3 steps in the review.[94]

Prior to engaging in the review, ONR establishes a cost recovery agreement with the requesting party for the government's costs in conducting the GDA, which ONR indicates "may run into tens of millions of pounds".[95] The three additional stages of the review after the requesting party's submission begin with an overview (Step 2) of the acceptability of the design's fundamentals under the UK's regulatory regime, which is followed by a closer analysis (Step 3) of the design at the system level to determine whether any significant design or safety case changes may be needed, and then concludes with an in-depth assessment (Step 4) of the safety- and security-cases and the generic site envelope.[96] At the conclusion of the GDA review, ONR may issue either a Design Acceptance Confirmation (DAC) that indicates that the design could be built and operated safely and securely subject to the specific site assessment and licensing; an interim DAC that indicates that ONR is "largely content" that the design is capable of being built and operated subject to the resolution of certain identified issues; or no DAC if it is determined that there is a "significant, unacceptable shortfall in the design, safety or security submissions".[97] The DAC is deemed valid for a period of ten years, consistent with the requirement for nuclear installation licensees to conduct periodic safety reviews every ten years.[98]

The NRC's processes for reviewing designs achieve similar objectives in terms of determining the licensability of a reactor design with the additional potential outcome of issuing a design certification that has binding legal status when referenced in a site specific application for a licence. Nonetheless, the up-front negotiation of a review plan including its estimated cost as well as step-wise approach used by Canada and the UK that begins with a broad review at the safety fundamentals of a design before proceeding down the path to a more detailed assessment of design specifics may provide some insights that could enhance the NRC's engagement with new reactor designs.[99] In fact, the NRC has been responsive to the calls for such adaptations in structuring its review process. Such adaptations do not require changes to the NRC's rules themselves for approving designs through

94. *Generic Design Assessment Guidance*, *supra* note 93, p. 8. The request for ONR and the Environment Agency to undertake a GDA is made through the Department for Business, Energy & Industrial Strategy (formerly the Department of Energy and Climate Change), which is responsible for government policy on nuclear power. *Ibid.*, p. 6.
95. *Ibid.*, p. 10.
96. *Ibid.*, pp. 11-20.
97. *Ibid.*, pp. 21-22. For example, ONR recently issued a DAC for the Westinghouse AP1000 design that built upon an interim DAC for the design issued in 2011. ONR (2017), *Summary of the GDA issue close-out assessment of the Westinghouse Electric Company AP1000® Nuclear Reactor*, p. 23, available at: www.onr.org.uk/new-reactors/ap1000/reports/ap1000-close-out-assessment-summary.pdf.
98. *Licensing Nuclear Installations*, *supra* note 93, p. 32. In September 2013, ONR issued a brief *Summary of Lessons Learnt during Generic Design Assessment (2007 – 2013)*, ONR-GDA-SR-13-001, Rev. 0, available at: www.onr.org.uk/new-reactors/reports/onr-gda-sr-13-001.pdf. In addition to positive outcomes of the process, the report noted areas for improvement, such as enhancing the timely delivery of necessary documentation and improved interactions on technical issues with the requesting party. *Ibid.*, p. 4.
99. See 2016 Nuclear Innovation Alliance report, *supra* note 80, p. 20.

design certification under 10 CFR Part 52 or the inherent approval of a design that is reflected in a construction permit or operating licence under 10 CFR Part 50.

In its near-term implementation plan, the NRC notes as an objective the development of "guidance for a flexible non-LWR regulatory review process within the bounds of existing regulations, including the use of conceptual design reviews and staged-review processes", which would "accommodate potential applicants having a range of financial, technical, and regulatory maturity, and a range of application readiness".[100] The NRC is prepared to engage in pre-application interactions with potential applicants at various levels of development of a design or a proposal to construct a design at a particular site. In a draft regulatory review roadmap issued in October 2016, the NRC illustrates how early interactions can align with the current licensing process. The roadmap identifies milestones that provide NRC views on the licensability of a design at various phases of development; eventually, these efforts can lead to approval of a design as ready for referencing through a design certification or in a construction permit or COL application.[101]

The NRC indicates that it will work with developers on design-specific licensing project plans to "define desired outcomes from various interactions between the designer and NRC considering factors such as the resources available to the designer and NRC and the coordination of the regulatory issues with other aspects of the overall program for developing and deploying non-LWR designs".[102] The roadmap identifies various mechanisms for engagement at different levels of development in the design process, from early consideration of fundamental design aspects and basic safety features through a "conceptual design approval" or "preliminary design approval", to the more developed and conclusive determinations reflected in a topical report or standard design approval.[103]

The scope and process for a standard design approval is spelled out in 10 CFR Part 52, Subpart E.[104] A standard design approval may cover the entire final design or "major portions" thereof.[105] This latter category has attracted attention as a possible tool for moving advanced design reviews forward by focusing on aspects of plant design without necessitating submission of the entire design. Although a standard design approval provides conclusive NRC staff findings on the reviewed design or its identified portions, it is not binding in the same sense as a design certification. Nonetheless, the outcome is persuasive and can be referenced in other licensing applications for a specific site as well as ultimately in a generic design certification.[106] In this respect, the NRC's standard design approval is comparable to Canada's VDR or the UK's GDA. Although the potential value of the SDR is recognised as a valuable tool in a staged licensing approach, some stakeholders believe that the NRC needs to clarify the intent and scope of the early phases of engagement, such as the conceptual design review phase, to ensure that the process provides meaningful feedback, and does not result in protracting the overall review

100. *NRC Non-Light Water Reactor Near-Term Implementation Action Plans*, *supra* note 76, p. 11.
101. NRC NRO (2016), *Regulatory Review Roadmap for Non-Light Water Reactors*, Draft, p. 7, Fig. 4 (ADAMS No. ML16291A248). The NRC plans to update this document in autumn 2017.
102. *NRC Non-Light Water Reactor Near-Term Implementation Action Plans*, *supra* note 76, p. 11. See *Regulatory Review Roadmap for Non-Light Water Reactors*, *supra* note 101, pp. 20-28.
103. *Regulatory Review Roadmap for Non-Light Water Reactors*, *supra* note 101, pp. 11-18.
104. As noted previously, the standard design approval is a concept that has been embodied in the NRC's regulations since 1975, but was not used until the initial experience with Part 52 when it was a necessary step towards design certification, a requirement that was removed in the 2007 amendments to Part 52. Licenses, Certifications, and Approvals for Nuclear Power Plants; Final Rule, 72 Fed. Reg. 49352, 49390 (28 Aug. 2007). See also Burns, *supra* note 1, p. 16, n. 42.
105. 10 CFR 52.131.
106. 10 CFR 52.145; see Burns, *supra* note 1, p. 18.

that can lead ultimately to a standard design approval or design certification.[107] The NRC is continuing interaction with stakeholders on the utility of the standard design approval in staging the design review process.[108]

The NRC has been responsive to calls to examine its licensing processes to make it more flexible and to adapt step-wise approaches into its review system. These efforts will not require changes to the agency's regulations for licensing, but can be incorporated within the established regulatory framework to achieve decisions on the viability of designs and their ultimate application to particular site licences. We may well see varied choices of the procedural path to proceed with review and licensing – design certification under Part 52 or introducing a design through the two-phased licensing scheme under Part 50.

B. Regulatory standards

The appropriateness of current regulatory standards and the need to make appropriate changes to address advanced reactor technologies is also an important issue and one that, in the long run, may warrant regulatory changes. In simplest terms, the technical standards applicable to plant licensing have been drawn largely from the review and experience with LWR technology. For example, the NRC's general design criteria "establish minimum requirements for the principal design criteria for water-cooled nuclear power plants", but they "are also considered to be generally applicable to other types of nuclear power units and are intended to provide guidance in establishing the principal design criteria for such other units".[109] Although the existing licensing process can adapt to the differences in technologies, some express concern that proceeding with case-by-case exemptions from requirements can involve greater costs and more protracted review times and even carries the negative perception that an applicant is trying to avoid robust safety standards.[110] Nonetheless, at least in the near term, case-by-case assessment of the particular relevance of generic technical standards and requirements to the technology being put forward in an application will be necessary. The NRC has recently developed supplemental guidance for review, for example, in granting a

107. Letter to C. Bladey, NRC Office of Administration from L. Dewan, Transatomic Power Corp. (19 Sept. 2016), attachment, pp. 2-4 (ADAMS No. ML16265A563); Letter to C. Bladey, NRC Office of Administration from R. Bell, NEI (19 Sept. 2016), attachment, p. 4 (ADAMS No. ML16265A538).

108. See e.g. Letter to M. Mayfield, NRC NRO from M. Tschiltz, NEI (24 Apr. 2017) (ADAMS No. ML17128A496), transmitting report by Nuclear Innovation Alliance (2017), *Clarifying "Major Portions" of a Reactor Design in Support of a Standard Design Approval* (ADAMS No. ML17128A507). One other area in which the NRC is engaging stakeholders is the potential use of prototype plants to address testing needs for advanced reactor designs, which could support licensing reviews under either 10 CFR Part 50 or 52. See 10 CFR 50.43(e). The NRC has issued a draft discussion paper. NRC NRO (2017), *Nuclear Power Reactor Testing Needs and Prototype Plants for Advanced Reactor Designs*, Preliminary Draft (ADAMS No. ML17025A353).

109. 10 CFR Part 50, Appendix A, Introduction.

110. See 2016 Nuclear Innovation Alliance report, *supra* note 80, pp. 52, 56.

construction permit for a medical isotopes facility under 10 CFR Part 50 and in preparing for the design certification application for an SMR.[111]

Beyond the adaptation of the existing regulatory framework to accommodate reviews of SMRs and non-LWR technologies, the NRC is being called on to update its framework to be more technology-neutral and inclusive, risk-informed and performance-based.[112] NRC indicates that it will undertake such efforts in its vision and strategy for non-LWRs and the related implementation plans.[113] Although significant efforts are underway to improve or establish guidance to address the new technologies, the NRC notes that a determination whether to develop a new non-LWR regulatory framework would be made based on the interactions with industry and experience in the next few years in undertaking reviews of particular technologies as well as broader lessons from research as well as industry code and standards development.[114] In the meantime, significant steps have been taken or are underway to look at the regulatory framework as it would apply to SMRs and non-LWR technologies.

In 2010, the NRC staff informed the Commission of a number of policy, licensing, and technical issues that might warrant further Commission engagement as the staff prepared for reviews of SMR designs.[115] The staff's paper, which is also relevant to advanced non-LWR technologies, generally discussed such issues as accident source terms, which are used in the assessment of the effectiveness of the containment and mitigation features, site suitability, and emergency planning; security and safeguards requirements; and the application of defence-in depth. Further steps have been taken to address these issues, as well as other matters.[116] For example, NRC recently solicited comments on its regulatory basis for emergency preparedness for SMRs and non-LWRs, a first step towards publication of a proposed rule, currently expected in September 2018.[117] In particular, this effort could result in

111. For the medical isotope facility, the staff issued an amendment to NRC's regulations to include the proposed facility within the definition of a production facility under Part 50 and also issued interim guidance to supplement its standard review plan to aid in the review of the unique features of the facility. See SHINE Medical Technologies, Inc. (Medical Radioisotope Production Facility), CLI-16-04, 83 NRC 58, 74-77 (2016). Preparation for the design certification review of the NuScale SMR involved development of design specific review standards for the design itself; the NRC staff has also supplemented the standard review plan to address SMRs. NRC (2014), *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: Small Modular Reactor Edition*, NUREG-0800, Rev. 0 (ADAMS No. ML13207A315); *ibid.*, Appendix 1, *NuScale Design-Specific Review Standard Scope and Safety Review Matrix*, Rev. 0 (ADAMS No. ML17102A698).
112. See 2016 Nuclear Innovation Alliance report, *supra* note 80, pp. 3-5, 49-52; NEI *Strategic Plan*, *supra* note 79, pp. 3, 9-10. But for a caution against an overenthusiastic embrace of risk-informed regulation, see Lyman, E., Testimony on "Enabling Advanced Reactors and a Legislative Hearing on S. 2795, The Nuclear Energy Innovation and Modernization Act", Subcommittee on Clean Air and Nuclear Safety, Senate Committee on Environment and Public Works (21 Apr. 2016), available at: www.epw.senate.gov/public/_cache/files/49c19c65-0886-46fc-afc7-b944ca7e2e7c/lyman-testimony.pdf.
113. The NRC documents are referenced in *supra* notes 70 and 76.
114. *NRC Non-Light Water Reactor Near-Term Implementation Action Plans*, *supra* note 76, pp. 11-12; *NRC Non-Light Water Reactor Mid-Term and Long-Term Implementation Action Plans*, *supra* note 76, pp. 10-11.
115. Memorandum to Commissioners from R.W. Borchardt, Executive Director for Operations (EDO) (28 Mar. 2010), "Potential Policy, Licensing, and Key Technical Issues for Small Modular Nuclear Reactor Designs", SECY-10-0034 (ADAMS No. ML093290268).
116. The NRC maintains a webpage on "Policy Issues Associated with Licensing Advanced Reactor Designs" that links to relevant staff memoranda provided to the Commission since 2001: www.nrc.gov/reactors/new-reactors/advanced/policy-issues.html.
117. Emergency Preparedness for Small Modular Reactors and Other New Technologies, 82 Fed. Reg. 17768 (13 Apr. 2017).

a smaller size of the current emergency planning zones required for LWRs due to the smaller source term, which would result in smaller potential accident releases and off-site radiation dose consequences.[118] Other efforts are underway to address security considerations.[119] Another significant step is the NRC's recent publication of a draft regulatory guide for developing principal design criteria for non-LWRs.[120] The NRC had initiated with the USDOE in 2013 a joint initiative to address the licensing framework for advanced non-LWR technologies. The NRC and the USDOE agreed to focus on the general design criteria in the Appendix to 10 CFR Part 50 in relation to advanced designs. The efforts resulted in a USDOE report, based on work by the Idaho National Laboratory, being submitted to the NRC in late 2014, which ultimately led to the NRC's issuance in 2017 of its draft regulatory guidance.[121] The proposed criteria are intended to be technology neutral. During the review, it was determined that the safety objectives for some of the current GDC were not applicable to some advanced designs, and new design criteria were developed to address unique design features in some technologies.[122] The NRC is reviewing the comments it has received and plans to engage the ACRS before issuing a final version of the Regulatory Guide.

The industry has also initiated an effort, led by Southern Company, called the Licensing Technical Requirements Modernization Project, to identify changes that the industry believes will facilitate appropriate adjustments to the regulatory process.[123] Initial submittals to the NRC through this project involve the selection of licensing bases and the approach to probabilistic risk assessment.[124] The NRC is engaging with the industry on these reports. Other efforts may contribute to the evolution of the regulatory framework to support SMRs and advanced non-LWR licensing. Although the NRC decided not to pursue a broad policy statement on risk management, it intends to make risk-informed regulatory improvements through its

118. *Ibid.*, p. 17769. The staff provided the Commission an assessment of issues related to accident source terms for newer designs in Memorandum to Commissioners from V.M. McCree, EDO (7 Feb. 2016), "Accident Source Terms and Siting for Small Modular Reactors and Non-Light Water Reactors", SECY-16-0012 (ADAMS No. ML15309A319).
119. Comments were solicited on a draft guidance document. Non-Light Water Reactor Security Design Considerations, 82 Fed. Reg. 13511 (13 Mar. 2017). The draft document is available at: ADAMS No. ML16305A328.
120. Guidance for Developing Principal Design Criteria for Non-Light Water Reactors, 82 Fed. Reg. 9246 (3 Feb. 2017). The draft regulatory guide, No. DG-1330, is available at: ADAMS No. ML16301A307.
121. Letter to G. Tracy, NRC NRO from Dr J. Kelly, USDOE (Idaho National Laboratory (Dec. 2014) (ADAMS No. ML14353A245), enclosing *Guidance for Developing Principal Design Criteria for Advanced (Non-Light Water) Reactors*, INL/EXT-14-31179, Rev. 1 (ADAMS Nos. ML14353A246 and ML14353A248).
122. 82 Fed. Reg. at 9247.
123. Letter to V. Ordaz, NRC NRO from P. Cowan, NEI (11 Jan. 2017), p. 2 (ADAMS Nos. ML17013A139 and ML17013A140).
124. USDOE, Office of Nuclear Energy (2017), *Modernization of Technical Requirements for Licensing of Advanced Non-Light Water Reactors: Selection of Licensing Basis Events Draft Report*, Revision 0 (ADAMS No. ML17104A254); USDOE, Office of Nuclear Energy (2017), *Modernization of Technical Requirements for Licensing of Advanced Non-Light Water Reactors: Probabilistic Risk Assessment Approach*, Draft Report Revision A, Document Number SC-29980-101 Rev A (ADAMS No. ML17158B543).

existing management framework.[125] The Commission has also approved undertaking revisions in the next few years to Part 50 regulations for new power reactor applications to more closely align with Part 52 and also to revise Part 52 and supporting regulations, including Part 50, to implement further lessons learnt from experience from new licensing activities.[126]

From this high-level overview of the work being done to address the technical requirements and framework for advanced reactors, I think it evident that the NRC is responsive to the calls to prepare for new technology and is pivoting towards adjustment of its processes and framework to effectively determine the licensability of such designs. Although we should not expect unanimous agreement on the conclusions or timing of such efforts, the NRC has laid out a strategy and has taken concrete steps in moving forward.

VI. Conclusion

Reformed and reforming. Although this phrase is generally used in an ecclesiastical context,[127] it underscores my view of the historic and ongoing approach that the NRC has taken in meeting the challenges put before it: the NRC continues to examine itself, its processes and approaches, to adapt them, and to reflect on experience and reform again to meet new challenges. Of necessity, the overview presented in this article can only provide a snapshot in time of current NRC initiatives to prepare for potential applications for advanced non-LWRs. As the NRC interacts with designers and those interested in siting new installations, one can expect further refinements in the approaches to bringing designs through the licensing process and to updating the licensing standards that will apply to such technologies. Continued engagement in the international community will also benefit the development and refinement of regulatory approaches and standards applicable to newer technologies. Co-operative efforts have been established through the two major international organisations focused on nuclear energy, the Organisation for Economic Co-operation and

125. Memorandum to Commissioners from V. McCree, EDO (18 Dec. 2015), "Recommendations on Issues Related to Implementation of a Risk Management Regulatory Framework", SECY-15-0168, p. 2 (ADAMS No. ML15265A488); Memorandum to V. McCree, EDO from A. Vietti-Cook, Secretary (9 Mar. 2016), "Recommendations on Issues Related to Implementation of a Risk Management Regulatory Framework", Staff Requirements – SECY-15-0168, (ADAMS No. ML16069A370). These memoranda bear on the NRC's consideration of the report of a task force led by former Commissioner George Apostolakis on risk management that covered the breadth of NRC's regulatory responsibilities, including licensing of advanced reactors. Apostolakis, G., et al. (2012), *A Proposed Risk Management Regulatory Framework*, NUREG-2150, p. 4.2-19-21 (ADAMS No. ML12109A277).

126. Memorandum to Commissioners from M. Sartorius, EDO (8 Jan. 2015), "Proposed Updates Of Licensing Policies, Rules, and Guidance for Future New Reactor Applications", SECY-15-0002, p. 7 (ADAMS No. ML13281A382); Memorandum to V. McCree, EDO from A. Vietti-Cook, Secretary (22 Sept. 2016), "Proposed Updates Of Licensing Policies, Rules, and Guidance for Future New Reactor Applications", Staff Requirements – SECY-15-0002 (ADAMS No. ML15266A023).

127. *Ecclesia reformata, semper reformanda* – "The reformed church is always to be reformed" – reflects a viewpoint on the institution of the church expressed particularly by Protestant reformers and theologians. See Klän, W. (2016), "Reformation Then and Now: Ecclesia Semper Reformanda", Journal of Lutheran Mission, Vol.3, No. 2, Lutheran Church – Missouri Synod, St. Louis, Mo., p. 14, available at: https://blogs.lcms.org/2016/ournal-of-lutheran-mission-september-2016 (accessed 4 Aug. 2017).

Development (OECD) Nuclear Energy Agency (NEA) and the International Atomic Energy Agency (IAEA).[128]

The nuclear industry, unlike many, was born regulated. From the very beginning, as the vision of the peaceful atom was realised, a strong regulator was deemed essential to ensuring public health and safety through rigorous licensing and oversight. Whatever benefits nuclear technology may offer, the international paradigm for peaceful uses, as expressed in the Convention on Nuclear Safety[129] emphasises not only the operator's ultimate responsibility for safety but also the importance of an independent, technically competent regulator. The fact of the matter is that the push and pull over the efficacy and appropriateness of the licensing process and the focus of the safety review has been with us since the dawn of civilian nuclear energy licensing in the late 1950s, to the AEC's 1970s effort to improve the licensing process, to the creation of Part 52 in the late 1980s, to the dialogue we are having today.

128. For example, the IAEA has established an SMR regulators' forum. See www-ns.iaea.org/tech-areas/safety-infrastructure/smr.asp. In addition to work done through its Committees on the Safety of Nuclear Installations (CSNI) and on Nuclear Regulatory Activities (CNRA), a working group on the regulation of new reactors and an ad hoc group on the safety of advanced reactors, the NEA provides the secretariat for the Generation IV International Forum (GIF) as well as the Multinational Design Evaluation Programme (MDEP). See www.oecd-nea.org/nsd/ and www.gen-4.org/gif/jcms/c_9260/public (accessed 4 Aug. 2017).

129. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293, entered into force 24 October 1996 (CNS).

Reflections on the development of international nuclear law

by Vanda Lamm[*]

1. Introduction

Over the course of more than seven decades, treaty norms on the production and utilisation of nuclear energy have been developed, which together form a special section within international law. These norms are the consequence of the unique nature of the field, namely that on the one hand some aspects of the uses of nuclear energy should be covered by totally new and special norms (e.g. in the field of disarmament, seeking to eliminate or at least to control the spread of nuclear weapons, and nuclear weapons tests) and on the other hand that several traditional legal solutions were not suitable for the problems that emerged in connection with other uses of nuclear energy (like liability).

In the following article, three aspects of the development of that special section of international law will be explored, namely: the close connections between the regulation of peaceful and military uses of nuclear energy; the effects of nuclear catastrophes on the development of international nuclear legislation; and the interaction between soft law norms and binding norms in the area of nuclear law.

2. Two-tier approach in nuclear energy regulation

Since atomic bombs were dropped on Hiroshima and Nagasaki at the end of World War II (on 6 and 9 August 1945),[1] nuclear disarmament has been a primary concern for humankind. Several nuclear disarmament treaties have been signed in the 70 or so years that have elapsed since then,[2] yet the complete elimination of nuclear

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1. The bombings caused the death of over 130 000 people in the space of a few seconds and many others were killed by radiation.
2. The most important are the:
   - Treaty Banning Nuclear Weapon Test in the Atmosphere, in Outer Space and Under Water (1963), 480 UNTS 43, entered into force 10 October 1963;
   - Treaty on the Non-Proliferation of Nuclear Weapons (1968), IAEA Doc. INFCIRC/140, 729 UNTS 169, entered into force 5 March 1970 (NPT);
   - Comprehensive Nuclear-Test-Ban Treaty (1996) (not yet entered into force), available at: www.ctbto.org/fileadmin/content/treaty/treaty_text.pdf (Nuclear Test Ban Treaty);
   - Interim Agreement between the United States of America and the Union of Soviet Socialist Republics on Certain Measures with respect to the Limitation of Strategic Offensive Arms (1972), entered into force 3 October 1972 (SALT I);
   - Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms, Together with Agreed Statements and Common Understandings regarding the Treaty (1979), did not enter into force (SALT II);
   - Treaty between the United States of America and the Union of Socialist Soviet Republics on Further Reduction and Limitation of Strategic Offensive Arms (1991), entered into force 5 December 1994 (START I);

weapons remains a distant goal. This was acknowledged by the International Court of Justice (ICJ) in its Advisory Opinion on the "Legality of the threat or use of nuclear weapons", when it stated that "There is in neither customary nor conventional international law any comprehensive and universal prohibition of the threat or use of nuclear weapons as such".[3] With respect to the use of nuclear weapons in an armed conflict, the Court ruled "[b]y seven votes to seven, by the President's casting vote", that "in view of the current state of international law, and of the elements of fact at its disposal, the Court cannot conclude definitively whether the threat or use of nuclear weapons would be lawful or unlawful in an extreme circumstance of self-defence, in which the very survival of a State would be at stake".[4]

Nuclear weapons cast a shadow over opportunities for the peaceful use of nuclear energy, and their regulations are very often grouped together. This two-tier approach is a feature of national and international legislation on the peaceful use of nuclear energy and of the activities of international organisations that oversee this area. In this respect, Pierre Strohl, referring to domestic law provisions and to international law on the use of nuclear energy, states that nuclear law essentially has the purpose of addressing a specific hazard and takes its originality from that purpose.[5] The close links between regulations on the peaceful use of nuclear energy and the prevention of its destructive use arise out of its dual nature, since in technical terms, peaceful uses of nuclear energy can be diverted for military purposes.

The Atomic Energy Commission is an example of the close links referred to above. This body was established after the Second World War by the United Nations (UN) General Assembly in 1946 with a mandate to present specific proposals on the control of atomic energy to ensure its application exclusively for peaceful purposes, and on the exclusion of any national use of an atomic weapon or any other weapon of mass destruction.[6] This two-tier approach is also characteristic of the activities of other international nuclear organisations.

The International Atomic Energy Agency (IAEA), established in 1957 to encourage and facilitate the development and use of nuclear energy for peaceful purposes throughout the world as well as research into this field, is also responsible for introducing and applying safeguards to ensure "that assistance provided by it or at its request or under its supervision or control is not used in such a way as to further any military purpose".[7] The application of the IAEA safeguards was broadened considerably by Article III of the NPT, which provides for the Agency's safeguards to

- Treaty between the United States of America and the Russian Federation on Further Reduction and Limitation of Strategic Offensive Arms (1993) (not yet entered into force) (START II); and
- nuclear weapons free zone treaties.

3. "Legality of the threat or use of nuclear weapons", Advisory Opinion of 8 July 1996, ICJ Reports 1996, para. 2(B), p. 266.
4. *Ibid.*, at para. 105(2)(E). For more information on the Advisory Opinion, see Boisson de Chazournes, B. and P. Sands (eds.) (1999), *International Law, the International Court of Justice and Nuclear Weapons*, Cambridge University Press, Cambridge, UK.
5. Strohl, P. (1993), *The Hazards Arising Out of the Peaceful Use of Nuclear Energy*, Academy of International Law, The Hague, Centre for Studies and Research in International Law and International Relations, Martinus Nijhoff Publishers, Dordrecht, Netherlands, p. 23.
6. See on this subject in particular Aron, A. (1946), "*Le contrôle international de l'énergie atomique*" [International control of atomic energy], *Politique étrangère* [Foreign politic], 1946, Vol. 11, No. 5, pp. 465-488.
7. See Statute of the International Atomic Energy Agency (1956), 276 UNTS 3, entered into force 29 July 1957, Article XII.

be applied in non-nuclear-weapon states parties.[8] The Agency thus ensures that material, facilities and technology in such states are used for peaceful purposes and are not diverted for military use. Through the NPT, the Agency has become the leading verification body for the commitments arising out of one of the most important disarmament treaties of modern times. In the event of a state's failure to respect the safeguards, the IAEA, or more precisely its Board of Governors, can and must refer the matter to the Security Council, the primary UN body with particular responsibility for maintaining international peace and security, and to the UN General Assembly for decisions to be taken on sanctions against a state that does not respect its obligations under the NPT.[9]

Security control systems are also found under the auspices of other international nuclear organisations. The predecessor of the Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA), the European Nuclear Energy Agency (ENEA), established in 1957 to further the development of the production and uses of nuclear energy for peaceful purposes, initially operated a security control mechanism that sought to "ensure that the operation of joint undertakings established by two or more Governments … on the initiative or with the assistance of the Agency and [that] materials, equipment and services made available by the Agency or under its supervision … shall not further any military purpose".[10] Subsequently, with the creation of similar systems by other international nuclear organisations (IAEA and Euratom), the application of the ENEA's security control system was suspended.[11] Euratom, the main objective of which is to favour the development of nuclear energy, has had a safeguards system since 1957, and according to Article 77 of the Euratom Treaty,[12] Euratom safeguards must ensure that nuclear materials are not diverted to the possible production of nuclear weapons. In 1973, Euratom non-nuclear-weapon member states and the European Commission (EC) entered into an agreement with the IAEA on the application of safeguards under the NPT, and according to that agreement, Euratom, as a regional body, contributes to the implementation of the IAEA safeguarding system.[13]

8. States with nuclear weapons can accept the application of the Agency's safeguards on a voluntary basis. On the safeguards system, see Rockwood, L. (2010), "The IAEA Safeguards System", in NEA (ed.) (2010), *International Nuclear Law: History, Evolution and Outlook*, OECD, Paris, pp. 243-269. Over the years, the scope of the Agency's safeguards system has been broadened on the basis of safeguard agreements entered into under the nuclear-weapon-free zone treaties (see the Treaties of Tlatelolco, Rarotonga, Pelindaba and Bangkok).
9. Between 2006 and the adoption in 2015 of the Joint Comprehensive Plan of Action (2015), effective 18 October 2015, between the Islamic Republic of Iran and the E3/EU+3 group (China, the European Union, France, Germany, the Russian Federation, the United Kingdom and the United States), the UN Security Council adopted a series of sanctions against Iran on seven occasions, though they were lifted because Iran fulfilled its commitments under the Action Plan. Sanctions were also imposed on the Democratic People's Republic of Korea because of the nuclear tests carried out by the Pyongyang Government.
10. Convention on the Establishment of a Security Control in the Field of Nuclear Energy (1957), entered into force 22 July 1959, Article 1(a).
11. See Schwartz, J. (2010), "The OECD Nuclear Energy Agency", in NEA (ed.) (2010), *International Nuclear Law: History, Evolution and Outlook*, OECD, Paris, pp. 32-33.
12. 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)).
13. See Kobia, R. (2008), "The EU and Non-Proliferation: Need for a Quantum Leap?", *Nuclear Law Bulletin*, No. 81, OECD, Paris, pp. 42-43, and Schleicher, H.W. (1980), "Nuclear safeguards in the European Community: A Regional Approach", *IAEA Bulletin*, Vol. 22, No. 3, pp. 45-50.

The two-tier approach referred to above is also found in the NPT. It is well known that the latter distinguishes nuclear-weapon states from non-nuclear-weapon states.[14] In this Treaty, nuclear-weapon states undertake not to transfer nuclear weapons or to assist any non-nuclear-weapon state to acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices, while non-nuclear-weapon states undertake not to receive the transfer of and not to manufacture nuclear weapons and thus decline to acquire them.[15]

The NPT, however, also contains a clause (Article IV) on the use of nuclear energy that recognises the inalienable right of all the parties to the Treaty to develop research, production and uses of nuclear energy for peaceful purposes. This clause highlights the commitment of states to facilitate the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy.[16]

The close links between the peaceful use of nuclear energy and the non-proliferation of nuclear weapons in regulations concerning nuclear exports are evident. Since 1974, the Nuclear Suppliers Group (NSG),[17] an international collection of countries supplying nuclear material, equipment and technologies, has drawn up guidelines on nuclear trade for peaceful purposes to ensure that such trade does not contribute to the proliferation of nuclear weapons.[18]

Links between disarmament and the peaceful use of nuclear energy are evident in the treaties establishing nuclear-weapon-free zones.[19] The Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean[20] thus provides not only for a prohibition on the testing, use, manufacture, production or acquisition of any nuclear weapons or participation in such activities, and on the storage, deployment or possession of nuclear weapons, but also states that nuclear material and facilities should be used exclusively for peaceful purposes. Similarly, the Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean

14. Nuclear-weapon states are those that detonated a nuclear weapon or another nuclear explosive device prior to 1 January 1967, notably China, France, the Soviet Union (now Russia), the United Kingdom and the United States.
15. See NPT, Articles I and II.
16. See Grae, S. (1995), "The Nuclear Non-Proliferation Treaty's Obligation to Transfer Peaceful Nuclear Energy Technology: One Proposal of a Technology", *Fordham International Law Journal*, Vol. 19, Issue 5, pp. 1985-1998; Lamm, V. (2007), "The Content and Extent of the Inalienable Right of States to develop Research, Production and Uses of Nuclear Energy for Peaceful Purposes (Article IV NPT)" in Pelzer, N. (2007), *Bausteine eines globalen Atomrechtsregimes* / Elements of a Global Nuclear Law Regime: *Tagungsbericht der AIDN/INLA-Regionaltagung in Goslar 2006* [Proceedings of the AIDN / INLA Regional Conference in Goslar 2006], Nomos, Baden-Baden, pp. 55-67; Fleck, D. (2016), "The Right to Develop Research, Production and Use of Nuclear Energy for Peaceful Purposes: Shortcomings and Loopholes in Legal Regulation", in Black-Branch, J.L. and D. Fleck (eds.) (2016), *Nuclear Non-Proliferation in International Law – Volume III: Legal Aspects of the Use of Nuclear Energy for Peaceful Purposes*, Asser Press, The Hague, pp. 525-551.
17. On the role and activities of the NSG, see IAEA (2015), "The Nuclear Suppliers Group: Its Origins, Role and Activities", IAEA Doc. INFCIRC/539/Revision 6.
18. See IAEA (2016), "Guidelines for Transfers of Nuclear-Related Dual-Use Equipment, Materials, Software, and Related Technology", IAEA Doc. INFCIRC/254/Rev.10/Part2. The NSG Guidelines are implemented by each participating government in accordance with their national laws and practices. Decisions concerning exports are taken at national level, in accordance with national export control rules.
19. On denuclearised zones, see Tabassi, L. (2009), "National Implementation and Enforcement of Nuclear-Weapon-Free Zone Treaties", *Nuclear Law Bulletin*, No. 83, OECD, Paris, pp. 29-57.
20. Treaty for the Prohibition of Nuclear Weapons in Latin America (1967), 634 UNTS 326, entered into force 22 April 1968 (Treaty of Tlatelolco).

(Organismo para la Proscripción de las Armas Nucleares en la América Latina y el Caribe) (OPANAL) was created to ensure respect for the provisions of the Treaty of Tlatelolco, "has never forgotten that its major future task is to promote access to nuclear technology for exclusively peaceful purposes".[21] It should be added that the other treaties establishing nuclear-weapon-free zones also refer to the peaceful use of nuclear energy.

3. The influence of nuclear accidents on international nuclear legislation

The nuclear accidents that have occurred in recent times have highlighted not only the technical shortcomings but also the gaps and incoherence in legal regulations on the peaceful use of nuclear energy and have shown how important it is to have clear and effective rules at both national and international levels.

The first major accident in a nuclear power plant (NPP) occurred on 28 March 1979 at the Three Mile Island facility near Harrisburg, Pennsylvania in the United States.[22] Despite the extremely serious nature of the accident, which released a rather small amount of radioactive material into the environment, there were no victims among personnel or the population.[23] The event, however, led to changes in and helped to strengthen safety rules.

The most serious nuclear accident, at Chernobyl in the former Union of Soviet Socialist Republics (USSR or Soviet Union) on 26 April 1986, was classified at the highest level, 7, on the INES scale. This catastrophe "was in fact a wake-up call for the 'international nuclear community'"[24] and clearly demonstrated the gravity of a major accident and its consequences for human health and the natural environment. It also led to the realisation that a nuclear accident could cause huge damage not only in the installation state but also thousands of kilometres away. From a legal point of view, the Chernobyl tragedy helped to: (i) strengthen and broaden international co-operation in the case of a nuclear accident; (ii) ensure the adoption of international conventions in areas that had previously been regulated by soft law standards; and (iii) bring international conventions on civil liability for nuclear damage up to date.[25]

The first lesson of the catastrophe was that inter-state co-operation had to be increased and facilitated in cases of nuclear accidents where one of the states was

21. See Román-Morey, E. (1995), "Latin America's Treaty of Tlatelolco: Instrument for peace and development", *IAEA Bulletin*, Vol. 37, No. 1, p. 35.
22. The accident was classified at level 5 on the INES Scale (International Nuclear and Radiological Event Scale).
23. See Perrow, C. (1981), "Normal Accident at Three Mile Island", *Society*, July/August, Vol. 18, No. 5, pp. 17-26.
24. Rautenbach, J., W. Tonhauser and A. Wetherall (2006), "Overview of the International Legal Framework Governing the Safe and Peaceful Uses of Nuclear Energy – Some Practical Steps" in NEA and IAEA (eds.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, p. 7.
25. See on this subject Kiss, A. (1986), "*L'accident de Tchernobyl et ses conséquences au point de vue du droit international*" [The Chernobyl accident and its consequences from the point of view of international law], *Annuaire français de droit international* [French Yearbook of International Law], Vol. 32, No. 1, pp. 139-152; Pelzer, N. (1987), "The impact of the Chernobyl accident on international nuclear energy law", *Archiv des Völkerrechts* [Archives of International Law], Vol. 25, No. 3, pp. 294-311; Pelzer, N. (2006), "Learning the Hard Way: Did the Lessons Taught by the Chernobyl Nuclear Accident Contribute to Improving Nuclear Law?" in NEA and IAEA (eds.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, pp. 73-118; Schwartz, J. (2006), "International Nuclear Third-Party Liability Law: the Response to Chernobyl" in NEA and IAEA (eds.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, pp. 41-80; Kuş, S. (2011), "International nuclear law in the 25 years between Chernobyl and Fukushima and beyond…", *Nuclear Law Bulletin*, No. 87, OECD, Paris, pp. 7-26.

affected by an urgent situation with radioactive consequences. Two conventions were accordingly drafted some months after the accident within the framework of the IAEA: the Convention on Early Notification of a Nuclear Accident[26] and the Convention on Assistance in the Case of a Nuclear Accident.[27] These two treaties were drawn up and entered into force very quickly and became effective just a few months after the Chernobyl accident.[28]

The Early Notification Convention, which entered into force just one month after its adoption, seeks to strengthen international co-operation. The states parties to this Convention undertake to notify, directly or through the IAEA, states that are or may be physically affected, and provide them with information as soon as possible on any event occurring on their territory that has resulted or may result in an international transboundary release that could be of radiological safety significance for another state. Similarly, the Assistance Convention seeks to facilitate co-operation between states in the event of a radiological emergency to minimise its consequences and to protect life, property and the environment from the effects of radioactive releases.

A very important instrument for areas that were previously not regulated by the treaties was the Convention on Nuclear Safety,[29] adopted in 1994 under IAEA auspices. The aim of the CNS is "to achieve and maintain a high level of nuclear safety" in land-based civil nuclear power plants, "to establish and maintain effective defences in nuclear installations against potential radiological hazards in order to protect individuals, society and the environment", and "to prevent accidents with radiological consequences and to mitigate such consequences should they occur".[30] As noted in the Preamble, the CNS has its roots in the fundamental safety principles (at the time contained in *The Safety of Nuclear Installations* of 1993,[31] but now addressed in the 2006 *Fundamental Safety Principles*).[32] Under the Convention, each contracting party must submit reports on the implementation of their obligations under the Convention for peer review at periodic meetings.[33]

26. Convention on Early Notification of a Nuclear Accident (1986), IAEA Doc. INFCIRC/335, 1439 UNTS 276, entered into force 27 October 1986 (Early Notification Convention).
27. 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 (Assistance Convention).
28. On these Conventions, see Moser, B. (1989), "The IAEA Conventions on Early Notification of a Nuclear Accident and on Assistance in the Case of a Nuclear Accident or Radiological Emergency", *Nuclear Law Bulletin*, No. 44, OECD, Paris, pp. 10-23.
29. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293, entered into force 24 October 1996 (CNS).
30. See on this subject Reyners, P. (1995), "*La Convention de 1994 sur la sûreté nucléaire*" [The 1994 Convention on Nuclear Safety], *Revue Générale de Droit International Public* [General Review of Public International Law], No. 99, pp. 605-621; Jankowitsch-Prevor, O. (2006), "The Convention on Nuclear Safety" in NEA and IAEA (eds.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, pp. 155-168; Strohl, P. (1994), "*La Convention sur la sûreté nucléaire*" [The Convention on Nuclear Safety], *Annuaire français de droit international* [French International Law Directory], Vol. 40, No. 1, pp. 804-822.
31. IAEA (1993), *The Safety of Nuclear Installations*, Safety Series No. 110, IAEA, Vienna (no longer valid).
32. IAEA (2006), *Fundamental Safety Principles*, SF-1, IAEA, Vienna.
33. For more information, see IAEA (2017), *Convention on Nuclear Safety (CNS): An Introduction to the CNS and Its Associated Rules of Procedure and Guidelines*, IAEA, Vienna, available at: www-ns.iaea.org/downloads/ni/safety_convention/related-documents/cns-brochure_final_2017-01-23.pdf.

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management[34] was adopted in 1997 and complements the CNS. One of the characteristics of this Convention is that it brings two separate subjects together within a "joint" framework: the safety of spent fuel and the safety of radioactive waste management. The objective of the Joint Convention is "to achieve and maintain a high level of safety [] in spent fuel and radioactive waste management, … so that individuals, society and the environment are protected from harmful effects of ionizing radiation". The obligations of the contracting parties fall into two main types.[35] The first is based on provisions of the CNS and on IAEA Safety Standards Series, while the second requires the contracting parties to draw up regular reports on the implementation of these obligations, which are submitted to a question and answer session and then peer reviewed at meetings of the contracting parties, similar to that which is done for the CNS.

With regard to the importance of the two conventions referred to above, Selma Kuş correctly pointed out that Chernobyl "facilitated international co-operation in fields that were until then strictly protected by individual states as falling under their sovereign jurisdiction".[36] It became apparent after Chernobyl that the treaty on compensation for cross-border damage, the Vienna Convention on Civil Liability for Nuclear Damage,[37] adopted in 1963 under IAEA auspices, could represent an appropriate instrument for settling compensation claims brought by foreign victims in similar situations. An urgent need then arose to adapt the Vienna Convention's provisions to take account of the technological progress made over the 25 years that had elapsed. After the Chernobyl accident, the then Soviet Union refused to pay compensation to the foreign victims. Some observers felt that if the Soviet Union had been bound by the Vienna Convention, foreign victims would at least have had a chance to receive damages. Their compensation, however, posed a problem: the amount finally payable under the 1963 Vienna Convention would have made it possible to satisfy only a ridiculously minimal proportion of the claims for compensation in light of the scale of the accident.[38]

34. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997), IAEA Doc. INFCIRC/546, 2153 UNTS 357, entered into force 18 June 2001 (Joint Convention).
35. See Tonhauser, W. and O. Jankowitsch-Prevor (2006), "The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management", in NEA and IAEA (eds.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, pp. 201-214; de Kageneck, A. and C. Pinel (1998), "The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management", *International & Comparative Law Quarterly*, Vol. 47, No. 2, pp. 409-425.
36. Kuş, S. (2011), *supra* note 25, p. 8.
37. Vienna Convention on Civil Liability for Nuclear Damage (1963), IAEA Doc. INFCIRC/500, 1063 UNTS 266, entered into force 12 November 1977 (Vienna Convention).
38. According to the Vienna Convention, the amount of the operator's liability may be limited, since Article V provides that "The liability of the operator may be limited by the Installation State to not be less than USD 5 million for any one nuclear incident."

Yet even if victims in Western Europe or Scandinavia were to suffer nuclear damage, they would not be entitled to claim compensation from the former USSR or from the Soviet operator, since rather than being contracting parties to the Vienna Convention, these states were actually parties to another convention, the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy.[39] There was therefore no link between the Vienna Convention and the Paris Convention. The contracting parties to the Vienna Convention were states that were not parties to the Paris Convention and *vice versa*, and the conventions did not apply to damage suffered on the territory of a state that was a contracting party to the other convention.

To resolve this issue, subsequent to the Chernobyl catastrophe, in 1988 the contracting parties to the two nuclear liability conventions adopted the Joint Protocol,[40] which established a "bridge" between the two conventions for compensation for cross-border damage.[41] Since the entry into force of the Joint Protocol in 1992, victims from states that are parties to the Paris Convention or the Vienna Convention, as well as the Joint Protocol, have been entitled to compensation for such damage from the operator of a nuclear facility in the territory where the other convention applies.

The consequences of Chernobyl have illustrated the inadequacies of the then applicable nuclear liability conventions. Negotiations to revise the Vienna Convention began in 1989, and the contracting parties to the Paris Convention followed suit several years later.[42] The results of these efforts were the Protocol to Amend the Vienna Convention[43] on the one hand,[44] and the Protocol to Amend the Paris Convention[45] and the Protocol to Amend the Brussels Supplementary Convention[46] on

39. Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1960), 1519 UNTS 329 (Paris Convention or PC). It must be added that the Brussels Supplementary Convention was adopted in 1963 to complete the compensation payable under the terms of the Paris Convention by establishing three cumulative bands of compensation. Convention of 31st January 1963 Supplementary to the Paris Convention of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1963), 1041 UNTS 358 (Brussels Supplementary Convention or BSC).
40. Joint Protocol Relating to the Application of the Vienna Convention on Civil Liability for Nuclear Damage and the Paris Convention on Third Party Liability in the Field of Nuclear Damage (1988), IAEA Doc. INFCIRC/402, 1672 UNTS 293, entered into force 27 April 1992 (Joint Protocol).
41. See von Busekist, O. (2006), "A Bridge Between Two Conventions on Civil Liability for Nuclear Damage: The Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention", in NEA and IAEA (eds.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, pp. 129-153.
42. On the negotiations and their results, see NEA (2000), *Reform of Civil Nuclear Liability: International Symposium, Budapest, Hungary, 31 May – 3 June 1999*, OECD, Paris.
43. Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage (1997), IAEA Doc. INFCIRC/566, 2241 UNTS 302, entered into force 4 October 2003 (1997 Protocol to Amend the Vienna Convention).
44. See Lamm, V. (2006), "The Protocol Amending the 1963 Vienna Convention" in NEA and IAEA (eds.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, pp. 169-185.
45. Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (2004) (not yet in force), available at: www.oecd-nea.org/law/paris_convention.pdf (2004 Paris Protocol).
46. Protocol to Amend the Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (2004) (not yet in force), available at: www.oecd-nea.org/law/brussels_supplementary_convention.pdf (2004 Brussels Protocol).

the other (the latter two protocols have yet to enter into force).[47] These amendments broadened the geographic scope of the conventions and expanded the notion of nuclear damage so that its definition included certain forms of damage to the environment, the costs of preventive measures and "economic loss". They also set out more stringent criteria for exonerating the operator and increased the amount of damages[48] and the limitation period for claims, which was raised to 30 years in the case of loss of life or personal injury.

In the negotiations on the revision of the Vienna Convention, in parallel to its amendment, a new treaty was adopted: the Convention on Supplementary Compensation for Nuclear Damage.[49] This instrument seeks to establish a worldwide liability regime and to make public funds available that establish an amount to supplement those made available by the existing systems as compensation for nuclear damage.[50]

The third nuclear catastrophe occurred on 11 March 2011 at the Fukushima Daiichi NPP in Japan. This was caused by a huge tsunami following an earthquake measuring 9.0 on the Richter scale, the epicentre of which was located in the Pacific Ocean 145 km from the Fukushima Daiichi NPP. This accident was also classified at level 7 on the INES scale. Over 100 000 people were subsequently evacuated because of radionuclide discharges into the environment, though the tragedy did not cause significant damage on the territory of foreign states.

Measures were taken worldwide after the Fukushima Daiichi accident to assess the safety of nuclear facilities in light of the lessons learnt from the accident, which "brought nuclear safety to the forefront of global attention".[51] The nuclear countries and international organisations commissioned supplementary safety studies on nuclear installations,[52] and on 25 March 2011, the EC took a decision to verify the safety of 143 European nuclear power plants and carry out global assessments of the

47. See Dussart Desart, R. (2005), "The Reform of the Paris Convention on Third-Party Liability in the Field of Nuclear Energy and of the Brussels Supplementary Convention", *Nuclear Law Bulletin*, No. 75, OECD, Paris, pp. 7-33.
48. The most notable amendments to the Conventions include the increase in the amounts of compensation. The Protocol to Amend the Vienna Convention provides that the legislation of the Installation State may limit the liability of the operator for any nuclear accident to not less than 300 million Special Drawing Rights (SDR); naturally, the upper limit of the operator's liability may be higher. Under the Paris Convention, the operator's liability was limited to SDR 15 million. The 2004 Protocol raised this band to a minimum of EUR 700 million. The second band was raised to between EUR 700 million and EUR 1.2 billion, payable by the Installation State (according to the currently applicable Brussels Supplementary Convention, this band covered the difference between the first band and SDR 175 million); finally, an international fund will henceforth contribute between EUR 1.2 and EUR 1.5 billion (the international fund provided for under the currently applicable Brussels Supplementary Convention called for over SDR 175 million up to SDR 300 million). Thus, under the 2004 Protocols, while maintaining the three-band system of compensation under the Brussels Supplementary Convention, the total compensation per accident available under the terms of the amended Paris-Brussels system amounts to EUR 1.5 billion.
49. Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 ILM 1473, entered into force 15 April 2015 (CSC).
50. See McRae, B. (20011), "Convention on Supplementary Compensation for Nuclear Damage (CSC) and harmonisation of nuclear liability law within the European Union", *Nuclear Law Bulletin*, No. 87, OECD, Paris, pp. 73-86.
51. Johnson, P.L. (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, p. 7.
52. See NEA (2013), *The Fukushima Daiichi Nuclear Power Plant Accident: OECD/NEA Nuclear Safety Response and Lessons Learnt*, OECD, Paris.

respective risks and of the security of such plants ("stress tests").[53] In addition, a 2014 Directive on nuclear safety stressed the independence of the competent regulatory authority in its regulatory decision making, stating that it was a fundamental requirement of the Community nuclear safety regulatory framework, and underscored the importance of enhancing transparency on nuclear safety matters.[54]

In legal terms, the events at the Fukushima Daiichi nuclear power plant demonstrated not only the importance of the CNS and the mechanism established by it, but also led the European Union (EU) to study opportunities for improving and strengthening nuclear liability schemes.[55] This was because the events in Japan also raised the question of whether nuclear power plant operators and the authorities of states with nuclear power plants were sufficiently prepared to respond to a serious nuclear accident. Subsequent to the Fukushima Daiichi accident, the Japanese Government introduced a range of measures to adapt the nuclear damage compensation scheme to the situation that had arisen, and the Japanese authorities established a special scheme for compensating victims of the accident.[56]

4. Interaction between soft law norms and binding norms in the area of nuclear law

Soft law norms or "advisory regulations" play a very important role in the area of the peaceful uses of nuclear energy,[57] as the legal scheme governing peaceful uses of nuclear energy are grounded in a mix of binding norms and advisory regulations.[58] The advisory regulations appear in the form of codes of conduct, recommendations or guidelines, etc. drawn up by expert groups of international nuclear organisations, particularly the IAEA, Euratom and the NEA, and subsequently approved by the governing bodies of those organisations.[59] These norms provide the international source for implementing national regulations by ensuring a level of uniformity, professionalism and accuracy.

53. On lessons learnt from the stress test, see ENSREG (2012), "Compilation of recommendations and suggestions: Peer review of stress tests performed on European nuclear power plants", Doc. HLG_p(2012-20)_101.
54. 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) (2014 Amended Safety Directive).
55. See Beyens, M. (2014), "The EU tentative to harmonise nuclear liability among the EU member states", in Mariano Manovil, R. (ed.) (2014), *Nuclear Law in Progress: XXI AIDN / INLA Congress – Buenos Aires 2014*, Legis, Buenos Aires, pp. 663-670.
56. See Legal Affairs Section of the OECD Nuclear Energy Agency (2011), "Regulatory and institutional framework in Japan against the background of Fukushima", *Nuclear Law Bulletin*, No. 87, OECD, Paris, pp. 27-44; Vásquez-Maignan, X. (2012), "Fukushima: liability and compensation", *Nuclear Law Bulletin*, No. 88, OECD, Paris, pp. 61-64; Nomura, T. (2014), "*La droit japonais de la responsabilité des dommages nucléaires et son évolution après l'accident de Fukushima*" [Japanese law of liability for nuclear damage and its evolution after the Fukushima accident], *Revue juridique de l'environnement* [Environmental Law Review], Vol. 39, No. 4, pp. 629-639.
57. On the importance and advantages of advisory standards and regulations in nuclear matters, see Wetherall, A. (2005), "Normative Rule Making at the IAEA: Codes of Conduct", *Nuclear Law Bulletin*, No. 75, OECD, Paris, pp. 71-93.
58. ElBaradei, M., E. Nwogugu and J. Rames (1995), "International law and nuclear energy: Overview of the legal framework", *IAEA Bulletin*, Vol. 37, No. 3, IAEA, Vienna, p. 16.
59. For the codes of conduct adopted by the IAEA, see also Reyners, P. (2010), "Three International Atomic Energy Agency Codes", in NEA (ed.) (2010), *International Nuclear Law: History, Evolution and Outlook*, OECD, Paris, pp. 171-185; Boustany, K. (2001), "The IAEA Code of Conduct on the Safety of Radiation Sources and the Security of Radioactive Materials: A Step Forwards or Backwards?", *Nuclear Law Bulletin*, No. 67, OECD, Paris, pp. 9-20.

Nowadays, these international organisations are producing an increasing number of technical guidelines and recommendations, and as the ICJ ruled in interpreting an agreement between the parties in the Pulp mills on the River Uruguay case (the "1975 Statute"),[60] the guidelines and recommendations of international technical bodies, while "not being formally binding, are, to the extent they are relevant, to be taken into account by the State so that the domestic rules and regulations and the measures it adopts are compatible ('con adecuación') with those guidelines and recommendations".[61] Thus according to the ICJ, despite their lack of binding force, these rules are of great practical importance.

The importance of soft law norms in nuclear law is reinforced by the fact that IAEA Safety Standards (the Safety Fundamentals, Safety Requirements and Safety Giudes) represent the minimum internationally acceptable standards of safety. Failure to adhere to these norms is regarded as a failure to fulfil the customary obligation of due diligence.[62] In international nuclear law, several soft law norms have been converted over the years into treaty-based sources of international law, a trend that not only continued but intensified after the Chernobyl accident.[63] The first stage of this process was the adoption of the Conventions referred to above on Early Notification and Assistance, both of which were founded on existing non-legally binding guidelines.[64]

The Convention on the Physical Protection of Nuclear Material[65] is a primary example of interaction between advisory regulations and treaty-based norms. The physical protection of nuclear material focuses mainly on physical protection against the theft or illegal use of nuclear material that could be used to produce a nuclear explosive device.[66] This physical protection was therefore a matter of constant concern to the international community. In order to avoid such occurrences, soft law norms drafted by the IAEA had existed since the 1970s, particularly on the physical protection of nuclear material during transport, when such material is particularly vulnerable to the risk of diversion and use for illegal purposes. The CPPNM was adopted in 1980 on the basis of non-binding norms and provided for the physical protection of nuclear material during international transport, the penalisation of offences and international co-operation.

60. "The 1975 Statute" was the "regime for the use of the river" set out in Article 7 of the Treaty of Montevideo entered into between Argentina and Uruguay in 1961 concerning the border on the River Uruguay.
61. *Case Concerning Pulp Mills on the River Uruguay* (Argentine v. Uruguay), Judgment of 20 April 2010, ICJ Reports, 2010, p. 45.
62. Boyle, A. (2014), "Soft Law in International Law-Making", Evans, M.D. (ed.) (2014), *International Law, Oxford University Press*, Oxford, 4th Edition, pp. 127-128.
63. Pelzer, N. (2006), *supra* note 25, pp. 83-84.
64. See IAEA (1984), "Guidelines for Mutual Emergency Assistance Arrangements in Connection with a Nuclear Accident or Radiological Emergency", IAEA Doc. INFCIRC/310, IAEA, Vienna; IAEA (1985), "Guidelines on Reportable Events, Integrated Planning and Information Exchange in a Transboundary Release of Radioactive Materials", IAEA Doc. INFCIRC/321, IAEA, Vienna.
65. Convention on the Physical Protection of Nuclear Material, (1980), IAEA Doc. INFCIRC/274 Rev. 1, 1456 UNTS 125, entered into force 8 February 1987 (CPPNM).
66. See Saizon Jr., D.L. (1980), "The Convention on the Physical Protection of Nuclear Material", *IAEA Bulletin*, Vol. 22, No.3, IAEA, Vienna, pp. 57-62.

In 2005, the CPPNM was amended by the contracting parties.[67] They significantly extended the scope of the Convention, since the instrument concerned the physical protection not only of nuclear material but also of nuclear facilities for peaceful purposes against theft or any other unlawful taking of such material, acts of sabotage or terrorism. The title of the instrument accordingly changed to the Convention on the Physical Protection of Nuclear Material and Nuclear Facilities (CPPNMNF).[68] The CPPNMNF also includes references to the soft law norms, since a new Article 2A provides for a number of "Fundamental Principles" of physical protection of nuclear material and facilities. The codification of advisory regulations in the CPPNM does not mean, however, that the soft law norms become less important. Rather, it is the combination of the CPPNM and its Amendment, along with the IAEA Nuclear Security Recommendations on the protection of nuclear material and nuclear facilities[69] that comprise the international physical protection regime.[70]

Both the CNS and the Joint Convention have a soft law basis. One of the characteristics of these two instruments is that they are classified in their preambles as "incentive conventions". The preamble to the CNS states that the instrument "entails a commitment to the application of fundamental safety principles for nuclear installations rather than of detailed safety standards and that there are internationally formulated safety guidelines which are updated from time to time and so can provide guidance on contemporary means of achieving a high level of safety".[71] The second part of the above text clearly alludes to the soft law codes and guidelines drafted by the international nuclear organisations. The Joint Convention is more specific in this respect than the CNS, given that its preamble lists certain soft law standards: "[k]eeping in mind the principles contained in the interagency 'International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources' (1996), in the IAEA Safety Fundamentals entitled 'The Principles of Radioactive Waste Management' (1995), and in the existing international standards relating to the safety of the transport of radioactive materials".[72]

The incentive nature of the nuclear safety conventions has drawn criticism that they may create expectations rather than specific obligations.[73] According to Menno Kaminga, the greatest weakness of the CNS is that it provides for courses of action rather than obligations to expect specific results.[74] Another commentator, Norbert Pelzer, on the other hand stresses the incentive nature of the nuclear safety

67. Amendment to the Convention on the Physical Protection of Nuclear Material (2005), IAEA Doc. INFCIRC/274/Rev.1/Mod.1, entered into force 8 May 2016 (ACPPNM). On the revision of the CPPNM, see Vez Carmona, M.d.L. (2005), "The International Regime on the Physical Protection of Nuclear Material and the Amendment to the Convention on the Physical Protection of Nuclear Material", *Nuclear Law Bulletin*, No. 76, OECD, NEA, pp. 29-46; Johnson, P.L. (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, pp. 9-42.
68. On the CPPNMNF, see Johnson, P.L. (2014), *supra* note 67.
69. IAEA (2011), *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities*, IAEA Doc. INFCIRC/225/Revision 5, IAEA, Vienna.
70. Johnson, P.L. (2014), *supra* note 67, pp. 14-15.
71. CNS, Preamble (viii).
72. Joint Convention, Preamble (xiv).
73. See Handl, G. (2004), "The IAEA Nuclear Safety Conventions: An Example of Successful 'Treaty Management'"? *Nuclear Law Bulletin*, OECD, Paris, No. 72, pp. 12-13.
74. Kamminga, M.T. (1995), "The IAEA Convention on Nuclear Safety", *International and Comparative Law Quarterly*, Vol. 44, No. 4, pp. 872-882.

conventions as one of their advantages, considering them to be more respectful of the sovereignty of states and consequently more acceptable.[75]

The reference to soft law norms in the conventions certainly does not change the legal status of those standards, but it has increased their importance, which also demonstrates how the two types of norms can interact in complex areas.[76] It should be added that this trend is not entirely new, and according to Günther Handl it exemplifies an ongoing wider trend in the design of multilateral (environmental or equivalent) agreements "that has increasingly de-emphasised coercive application/enforcement measures for the sake of a facilitative, co-operative approach".[77]

There is no doubt that reference in the international conventions to the application of non-binding standards drafted by the international nuclear organisations demonstrates a certain flexibility in the system, as well as an adaptation to the demands of different states and to the development of nuclear science and technology without the need for a lengthy process of amending the conventions. The question nevertheless arises of whether the time has come to introduce binding standards into the nuclear safety conventions, especially when the standards in question are not technical and in particular bearing in mind that, over the past 20 years, nuclear safety culture (to use the terminology of the nuclear safety conventions)[78] has expanded throughout the world.

In taking account of the lessons of the Fukushima accident, it should be noted that a Diplomatic Conference to revise the CNS was convened in 2015 with the specific aim of reinforcing the CNS. The conference agenda included a Swiss proposal to introduce a new subparagraph into Article 18 of the Convention to improve the safety of future nuclear power plants and of existing power plants as far as possible. Regrettably, however, the amendment to the Convention was rejected, and rather than drafting binding norms, a declaration entitled the "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"[79] was adopted by consensus, and this is yet again a non-binding instrument.[80] It would thus seem that the possibility of adopting non-binding rather than binding standards does not always help to improve nuclear safety, as illustrated here.

5. Conclusion

Since the beginning, efforts to eliminate or regulate the military uses of nuclear energy went hand-in-hand with the promotion of the peaceful uses. This demonstrates the responsibility and awareness of the international community of

75. Pelzer, N. (2013), "Safer nuclear energy through a higher degree of internationalisation? International involvement versus national sovereignty", *Nuclear Law Bulletin*, No. 91, OECD, Paris, p. 84.
76. Boyle, A. (1999), "Some Reflections on the Relationship of Treaties and Soft Law", *International and Comparative Law Quarterly*, 1999, Vol. 48, Part 4, p. 906.
77. Handl, G. (2004), *supra* note 73, p. 10.
78. On the notion of "nuclear culture", see Carnino, A. (1993), "Achievements in assessing safety culture", *Nuclear Law Bulletin*, No. 52, OECD, Paris, pp. 28-34.
79. See 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.
80. The Declaration is based substantially on the principles of the European Union directive on the safety of nuclear installations. See 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); 2014 Amended Safety Directive.

states, namely, that the prohibition and elimination of military uses of nuclear energy should not hamper its peaceful application, and also, on the other side of the coin, while promoting the peaceful application of nuclear energy, the diversion of peaceful applications of nuclear energy to military uses should be prevented. This duality has been reflected in several international instruments and in the activities of international organisations as well, and can be considered a special attribute of international nuclear law.

The impact of nuclear accidents on the development of international nuclear instruments is another special feature of international nuclear law. The scale and effects of catastrophic nuclear accidents are past all belief and have highlighted not only the technical shortcomings but also the gaps and incoherence in the legal framework for the peaceful use of nuclear energy at that time. The new instruments adopted following the Chernobyl accident, as well as the amendments to existing conventions, strengthened and broadened the framework for international co-operation in the nuclear field, improved the position of potential victims of nuclear accidents, and increased the safety, security and physical protection of nuclear materials and installations. Nevertheless, these issues should be the subject of further consideration, and all efforts and initiatives aimed at clarifying and detailing the content of the above-mentioned norms, as well as efforts to monitor their compliance, should be promoted and supported.

The interaction between soft law norms and treaty law is the last special aspect of the development of nuclear law, and one can see two trends. On the one hand, several soft law norms have been converted into treaty norms; and on the other hand, soft law norms, especially international standards and regulations, are referenced in international conventions. No doubt, the approach of using non-binding norms has great advantages, in view of their flexibility and the quick adoption in the development of science and technology. But, the preferred approach would be to introduce binding standards into, for example, the nuclear safety conventions, especially when the standards in question are not technical.

Facing the challenge of nuclear mass tort processing

by Norbert Pelzer[*]

1. Specific features of nuclear damage – A challenge for procedural law

There is ample literature and other material available to describe the detrimental effects and far-reaching consequences of major nuclear incidents.[1] Their potential magnitude became evident in particular through the 1986 Chernobyl nuclear accident[2] and the 2011 Fukushima Daiichi nuclear power plant (NPP) accident.[3] It is obvious that after a major nuclear accident, hundreds of thousands of people may suffer damage and thus may emerge to claim compensation for such damage.[4]

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1. See, e.g., Sovacool, B. K. et al. (2016), "Balancing safety with sustainability: assessing the risk of accidents for modern low-carbon energy systems", *Journal of Cleaner Production*, Vol. 112, pp. 3952-3965, at Table 3.
2. See, e.g., WHO/IAEA/UNDP, Joint News Release, "Chernobyl: the true scale of the accident" (5 September 2005), available at: www.who.int/mediacentre/news/releases/2005/pr38/en/. For more detail, see United Nations Scientific Committee on the Effects of Radiation (UNSCEAR) (1988), *Sources, Effects and Risks of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 1988 Report to the General Assembly, with annexes*, Annexes D, "Exposures from the Chernobyl accident" and G, "Early effects in man of high doses of radiation", available at: www.unscear.org/unscear/en/publications/1988.html; UNSCEAR (2000), *Sources, Effects and Risks of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2000 Report to the General Assembly, with annexes,* Report, Annex J, "Exposures and effects of the Chernobyl accident", available at: www.unscear.org/docs/publications/2000/UNSCEAR_2000_Annex-J.pdf; UNSCEAR (2001) *Sources, Effects and Risks of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2001 Report to the General Assembly, with Scientific Annex*, Annex, "Hereditary effects of radiation", available at: www.unscear.org/docs/publications/2001/UNSCEAR_2001_Annex.pdf; UNSCEAR (2008), *Sources, Effects and Risks of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2008 Report to the General Assembly, with scientific annexes*, Annex D, "Health effects due to radiation from the Chernobyl accident", available at: www.unscear.org/docs/publications/2008/UNSCEAR_2008_Annex-D-CORR.pdf.
3. See, *inter alia*, International Atomic Energy Agency (IAEA) (2015), *The Fukushima Daiichi Accident: Report by the Director General*, IAEA Doc. GC(59)/14, available at: http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1710-ReportByTheDG-Web.pdf; Japan (2011), *Report of Japanese Government to the IAEA Ministerial Conference on Nuclear Safety – The Accident at TEPCO's Fukushima Nuclear Power Stations*; UNSCEAR (2013), *Sources, Effects and Risks of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2013 Report to the General Assembly, with scientific annexes*, Annex A, "Levels and effects of radiation exposure due to the nuclear accident after the 2011 Great East-Japan Earthquake and Tsunami", available at: www.unscear.org/docs/publications/2013/UNSCEAR_2013_Annex-A-CORR.pdf. See also Tokyo Electric Power Company (TEPCO) (2017), "Records of Applications and Payouts for Indemnification of Nuclear Damage", available at: www.tepco.co.jp/en/comp/images/jisseki-e.pdf (updated monthly).
4. On the extent of economic damage caused by Chernobyl, see Nuclear Energy Agency (NEA) (1987), "Study: The Accident at Chernobyl – Economic Damage and its Compensation in Western Europe", *Nuclear Law Bulletin*, No. 39, Organisation for Economic Co-operation and Development (OECD), Paris, pp. 58-65.

Irrespective of whether a claim is justified or not, the person liable, the insurer and, at the end of the day, the judge will have to deal with the claim. This situation, *inter alia*, forms an immense organisational challenge. The person liable and the insurer have to deploy additional staff to satisfy claims or to negotiate with the claimants, and courts have to increase their personnel and provide additional courtrooms and offices. A great number of experts are needed to assess the nuclear damage claimed. Moreover, in order to avoid or to mitigate cases of hardship in individual cases, decisions on the payment of compensation have to be made quickly. It is not helpful to build on the well-known experience that the mills of justice grind slowly but steadily. The goal must be prompt reparation, including provisional payments, with a view to quickly re-establishing social peace.

Ionising radiation and radioactivity cannot be recognised by human senses. That makes them an eerie power that may cause unreasonable and unnecessarily expensive actions of the people concerned. This peculiarity may further increase the number of claimants. It may also trigger hysterical reactions. The author of this article was involved in Chernobyl compensation in Germany, and, indeed, strange claims were made.[5] For example, after the return from a walk in the rain, a family heard about the Chernobyl accident in the news and that there was a radiation risk for Germany. The family immediately disposed of all of their wet clothes, which required compensation. Other persons travelled to Cyprus and requested reparation for the travel costs. Cherries from Algeria could no longer be sold as all cherries were deemed to be contaminated by radioactivity, and dealers claimed compensation for a loss of turnover.[6]

Thus, processing major nuclear damage does not only cause organisational problems. The procedural law has to deal with people who are in an exceptional situation and in a state of real or perceived emergency. The invisibility of radiation makes people feel exposed to a scary and fatal threat. These people cannot easily be compared to other claimants. Adequate yardsticks have to be developed. The proceedings have to match the specific situation of the people damaged by nuclear energy and radiation. This applies not only to court proceedings but one must also consider whether the extraordinary situation warrants or even requires a special procedural approach for facilitating alternative dispute settlement.

5. Section 38(2) of the German Atomic Energy Act establishes a right of compensation to be paid by the Federal State ("*Ausgleich durch den Bund*" [Compensation by the Federation]) if the prosecution by a victim of a nuclear damage suffered in Germany in the state in whose territory the harmful event originated has no prospect of success. *Gesetz über die friedliche Verwendung der Kernenergie und den Schutz gegen ihre Gefahren (Atomgesetz)* [Act on the Peaceful Utilisation of Atomic Energy and the Protection against its Hazards (Atomic Energy Act)] of 23 December 1959, in the version of 15 July 1985 (*Bundesgesetzblatt* (BGBl.) 1985 I, p. 1565), as last amended by the Act of 27 January 2017 (BGBl. 2017 I, p. 114). An English translation of the Atomic Energy Act as last amended on 15 December 2016 is available at: www.bfe.bund.de/SharedDocs/Downloads/BfE/EN/hns/a1-english/A1-07-16-AtG.pdf?__blob=publicationFile&v=2. Section 38(2) of the Atomic Energy Act was applied to Chernobyl because the Soviet Union refused to pay any compensation for the accident. Roughly 300 000 claims were made and approximately DEM 500 million (equivalent to EUR 250 million) was paid out.
6. On details of the German compensation after Chernobyl see Eich, W. (2003), "The Compensation of Damage in Germany following the Chernobyl Accident", in NEA (ed.), *Indemnification of Damage in the Event of a Nuclear Accident: Workshop Proceedings*, Paris, France, 26-28 November 2001, OECD, Paris, pp. 89-116.

2. Nuclear mass tort litigations under the nuclear liability conventions

While the international nuclear liability conventions[7] are designed and equipped to deal in substance with the described large losses, i.e. with catastrophic damage and any other kinds of compensation for claims made, it is not likewise apparent that they also provide the necessary procedural regulations needed to process the claims at court. As a matter of fact, the nuclear liability conventions do not address procedural questions or even mass tort litigations. This is a consequence of the leitmotif of the conventions: "Whenever risks, even those associated with nuclear activities, can properly be dealt with through existing legal processes, they are outside the scope of the Convention."[8] For the drafters of the conventions, this appears to be the case as the national procedural law of the contracting parties shall continue to apply. There is no international harmonisation; rather, national rules regulate the procedure of bringing compensation claims. It follows that there might be differences in approach and in substance among the states.

There is one exemption, though. This exemption is of extraordinary and decisive importance: the conventions, in a binding way, define the court that has exclusive jurisdiction over actions made under the conventions. Jurisdiction lies exclusively with the courts of the contracting party in whose territory the nuclear incident occurred or, where the incident occurs outside the territory of the contracting parties, with the courts of the party in whose territory the nuclear installation of the liable operator is situated. Likewise, there are provisions on the enforcement of judgements.[9] Under the 1997 Vienna Convention and the 2004 Paris Convention,

7. The term "international nuclear liability conventions" refers to the following conventions: Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1960), 1519 UNTS 329 (Paris Convention or PC); Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (2004) (not yet in force), available at: www.oecd-nea.org/law/paris_convention.pdf (2004 Paris Protocol) (once in force, the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as Amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982, and by the Protocol of 12 February 2004, "2004 PC"); Convention of 31st January 1963 Supplementary to the Paris Convention of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1963), 1041 UNTS 358 (Brussels Supplementary Convention or BSC); Protocol to Amend the Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (2004) (not yet in force), available at: www.oecd-nea.org/law/brussels_supplementary_convention.pdf (2004 Brussels Protocol); Vienna Convention on Civil Liability for Nuclear Damage (1963), IAEA Doc. INFCIRC/500, 1063 UNTS 266, entered into force 12 November 1977 (Vienna Convention); Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage (1997), IAEA Doc. INFCIRC/566, 2241 UNTS 302, entered into force 4 October 2003 (1997 Protocol to Amend the Vienna Convention or, as consolidated, the 1997 VC); Joint Protocol Relating to the Application of the Vienna Convention on Civil Liability for Nuclear Damage and the Paris Convention on Third Party Liability in the Field of Nuclear Damage (1988), IAEA Doc. INFCIRC/402, 1672 UNTS 293, entered into force 27 April 1992 (Joint Protocol); Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 ILM 1473, entered into force 15 April 2015 (CSC).
8. NEA (1982), *Revised text of the Exposé des Motifs of the Paris Convention*, approved by the OECD Council on 16 November 1982, Para. 7, available at: www.oecd-nea.org/law/nlparis_motif.html.
9. PC and 2004 PC, Article 13; VC, Articles XI and XII; 1997 VC, Articles XI, XI A and XII; CSC, Article XIII.

contracting parties also have to ensure that only a single one of their courts is competent in relation to any one nuclear incident.[10]

The procedural concentration of lawsuits to the courts of one country, and even to a single court of the country that has jurisdiction, is an indispensable component for successfully overcoming the complex problems of mass tort litigation in cases of transboundary nuclear damage. It supplements the substantive concentration of liability solely onto the operator of a nuclear installation (channelling of liability). Without material and procedural channelling, the compensation of nuclear damage after a major nuclear incident with transboundary detrimental effects would be a most difficult and complex affair. The courts of all states in whose territories nuclear damage was suffered would be competent to hear claims. It does not need an explanation that such multiplicity is not at all helpful for smooth and quick compensation. Diverging judgements are probable, and that situation will not contribute to legal peace.[11]

But there are also – minor – drawbacks of the jurisdiction provisions. Although it is reasonable to link the court competence to the place of the nuclear incident or, if the incident occurred outside the territory of a party, to the place of the liable operator, this regulation did not find general acceptance. Some states felt threatened by transports of nuclear material passing their coasts outside their territorial waters.[12] If a nuclear incident happened off their coasts they nevertheless would not have been granted jurisdiction. For that reason, the 1997 Vienna Convention, the 2004 Paris Convention and the CSC introduced provisions whereby jurisdiction lies with the coastal state if the incident occurs in the exclusive economic zone of that state.[13] This certainly is in most cases a purely random competence, and there is doubt as to whether all of those coastal states, as, e.g. some small South Pacific island states, are adequately equipped to organise mass tort litigations to deal with the complex field of compensation for nuclear damage. However, it has to be taken into account that a nuclear incident occurring in the course of transport in a defined zone of the high seas will probably cause damage on a smaller scale than inside a populated land territory. Thus the risk of mass tort litigation in the coastal state may be deemed remote.

10. 1997 VC, Article XII(4) and 2004 PC, Article 13(h). There is no corresponding provision in the CSC.
11. This picture unfortunately becomes slightly unclear among European Union (EU) member states who are party to the liability conventions and those who are not. See Magnus, U. (2010), "Jurisdiction and Enforcement of Judgments under the Current Nuclear Liability Regimes within the EU Member States", in Pelzer, N. (ed.), *Europäisches Atomhaftungsrecht im Umbruch: Tagungsbericht der AIDN/INLA Regionaltagung in Berlin 2009* [European Nuclear Liability Law in a Process of Change: Conference Report of the AIDN/INLA Regional Conference in Berlin 2009], Nomos, Baden-Baden, pp. 105-121.
12. See Ludbrook, J. (2005), "Sea Transport of Nuclear Material – a Matter of Concern for Coastal States", in Pelzer, N. (ed.), *Die Internationalisierung des Atomrechts: Tagungsbericht der AIDN/INLA Regionaltagung in Celle 2004* [Internationalizing Atomic Energy Law: Conference Report of the AIDN/INLA Regional Conference in Celle 2004], Nomos, Baden-Baden, pp. 239-247.
13. 1997 VC, Article XI (1bis); 2004 PC, Article 13(b); CSC Article XIII(2).

In summary, nuclear mass tort litigation is only in parts, but not comprehensively, covered by the international nuclear liability conventions.[14] Reference to the respective national legislation and practice of states is necessary.

3. National law on nuclear mass tort litigations

3.1. General approaches

Dealing with disasters was a task of mankind from the beginning, and disasters also provide, as a matter of course, legal problems.[15] Disasters are either of a natural origin, like earthquakes, floods, tsunamis, fires, hurricanes and tornados as, for instance, was Hurricane Katrina in 2005, or are man-made, like chemical disasters such as the 1976 Seveso accident and the 1984 Bhopal accident. Reference has also to be made to oil and gas accidents, among the most famous of which are the 1967 Torrey Canyon accident, the 1978 Amoco Cadiz accident, the 1989 Exxon Valdez accident and the 2010 Deep Water Horizon accident.[16] The Torrey Canyon accident triggered international treaty making including liability instruments for oil spill damage.[17] Major nuclear accidents add a new facet to man-made disasters. The Chernobyl nuclear accident, so to speak, became the Torrey Canyon accident for nuclear pollution damage: it was the incentive for far-reaching international treaty making and in particular it improved international nuclear liability law by initiating the amendment of existing conventions and the adoption of new ones. Unfortunately, this effort did not considerably enhance the legal situation already existing at the time of Chernobyl regarding claiming catastrophic nuclear damage. There is still limited liability providing insufficient amounts of compensation – although the amended conventions now expressly permit unlimited liability by introducing minimum liability amounts – and there are still no international procedural provisions or at least recommendations on how to organise and internationally harmonise mass tort litigations.

This outcome may be regretted. But, on the other hand, it is for good reasons that the conventions leave the organisation of bringing claims to the laws of the contracting parties. It is true that states have general experience with the handling

14. This does not likewise apply to the nuclear disaster prevention. Here particularly Chernobyl triggered intensive international treaty-making. See, Handl, G. (1988), "*Après Tchernobyl: Quelques réflexions sur le programme législatif multilatéral à l'ordre du jour*" [After Chernobyl: Considerations on the current multilateral legislative programme], *Revue générale de droit international public*, No. 92, pp. 5-63; Pelzer, N. (2006), "Learning the Hard Way: Did the Lessons Taught by the Chernobyl Nuclear Accident Contribute to Improving Nuclear Law?", in NEA and IAEA (eds.), *International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, pp. 73-118.
15. See for example Caron, D., M. J. Kelly and A. Telesetsky (eds.), *The International Law of Disaster Relief*, Cambridge University Press, New York; Lauta, K. C. (2015), *Disaster Law*, Routledge, London.
16. See e.g. International Tanker Owners Pollution Federation Limited (ITOPF) (2017), "Oil Tanker Spill Statistics 2016", available at: www.itopf.com/fileadmin/data/Photos/Publications/Oil_Spill_Stats_2016_low.pdf; Sovacool, B. (2008), "The costs of failure: A preliminary assessment of major energy accidents, 1907-2007", *Energy Policy*, No. 36, pp. 1802-1820.
17. International Convention on Civil Liability for Oil Pollution Damage (1969), 973 UNTS 3, entered into force 19 June 1975. Among the rich literature on this accident, *inter alia*, see the comprehensive study by Chao, W. (1996), *Pollution from the Carriage of Oil by Sea: Liability and Compensation Issues*, Kluwer Law International, London. See also, Utton, A. E. (1968), "Protective Measures and the 'Torrey Canyon'", *Boston College Law Review*, Vol. 9, pp. 613-632; Cowan, E. (1968), *Oil and Water: The Torrey Canyon Disaster*, Lippincott, Philadelphia; Burrows, P., C. Rowley and D. Owen (1974), "Torrey Canyon: A Case Study in Accidental Pollution", *Scottish Journal of Political Economy*, Vol. 21, Issue 3, pp. 237-258.

of catastrophes, and the skeleton of a nuclear disaster does not considerably differ from any other type of disaster. However, consequences and ramifications are different. Nuclear disasters nearly unavoidably have transboundary effects. International co-operation is therefore a necessary element of fighting a nuclear disaster. Such co-operation cannot immediately and successfully be started only at the moment an accident occurs. It has to be learnt in advance and trained prior to the occurrence of an accident. Independent of the fact that the conventions are silent on this issue, one can nevertheless conclude that there exists a silent or implied accessory obligation to be prepared in time to make the conventions fully "workable". Where the conventions leave areas to the national law, contracting parties have to ensure that the respective national law can be applied properly with a view to meeting the objectives of the conventions. Since national procedural law shall govern mass tort litigation and since that field needs international co-operation with the parties concerned, the prerequisites of such co-operation have to be in place prior to the incident. Mutual knowledge of and familiarity with competences and administrative hierarchies have to be available among neighbouring states. This applies to all stakeholders: operators, insurers and authorities. In all states that are potentially affected by the accident, it has to be organised that the general public will quickly be informed on both the occurrence of a nuclear accident and the way to claim compensation.[18]

One could get the impression that this special field is not exactly a prime focus for states. The topic is neither the subject of governmental statements nor of declarations or action plans of international organisations. Of course, there are co-operation projects and practices among states in the field of preventive disaster protection, and this applies also to the nuclear field.[19] Reference has particularly to be made to the 1986 Convention on Early Notification of a Nuclear Accident[20] and to the 1986 Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency[21] and their national implementations. It is also known that the insurance industry co-operates internationally. So there is at least a rudimentary framework for international disaster co-operation available. But this framework is not specifically designed to solve the procedural problems of compensating nuclear mass damages.

In this connection, the NEA's activities deserve attention. Since 1993, the NEA has been organising International Nuclear Emergency Exercises (INEX).[22] States can train to handle nuclear emergencies with transboundary effects based on simulated cases. The 2001 INEX and the 2005 INEX included international and national

18. Article 10 of the BSC and Article VI of the CSC stipulate notification obligations of the parties. But these obligations are meant to enable the parties to prepare the necessary arrangements to settle the procedures under the conventions. They are not meant to ensure the information of the general public.
19. See on this subject in particular Handl, G. (2016), "Nuclear Off-site Emergency Preparedness and Response: Some International Legal Aspects", in Black-Branch, J.L. and D. Fleck (eds.), *Nuclear Non-Proliferation in International Law*, *Vol. III. Legal Aspects of the Use of Nuclear Energy for Peaceful Purposes*, Asser Press, The Hague, pp. 311–354.
20. Convention on Early Notification of a Nuclear Accident (1986), IAEA Doc. INFCIRC/335, 1439 UNTS 276, entered into force 27 October 1986 (Early Notification Convention).
21. 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 (Assistance Convention).
22. For more information on INEX exercises, see the NEA INEX website at: www.oecd-nea.org/rp/inex/.

compensation of nuclear damage.[23] Both workshops provided valuable insight into the problems of compensating nuclear disaster damage, including procedural issues. But, mass tort litigation nevertheless did not gain the attention it deserves. The INEX activities are the adequate fora to address the problems of nuclear mass tort litigation and especially to train international co-operation connected thereto. Those exercises should include teaching personnel, including judges and other lawyers, the basics of international nuclear liability law.[24]

Currently, the EU is also dealing with harmonisation and improvement of the nuclear liability regime within the Union.[25] It would certainly be most helpful if the EU embarked on discussing the procedural issues of mass nuclear tort litigations with a view to establishing a harmonised approach among its member states.

3.2. Catastrophic nuclear damage under national legislations

Most national nuclear liability laws do not provide special provisions on organising nuclear mass tort litigations in a case of catastrophic nuclear damage. However, general national law has options to deal with mass litigations. Those options may be used in the nuclear field as well. Mass litigations, for instance, require the bundling of actions of an identical type to minimise the number of lawsuits. Class actions and test case proceedings may be helpful, and there are other instruments available under national law.[26] So states may think that there is no urgent need for a detailed advance regulation of nuclear proceedings. They defer decisions to the time when concrete actions are needed after a nuclear incident. If they insert an express deferment decision into the national legislation it could serve as a reminder for the legislator to take action when it is needed. Such need may emerge if the magnitude of the nuclear damage exceeds the amount of the limited liability of the nuclear operator, or in cases of unlimited liability, exceeds the amount of coverage including all assets of the operator liable. Any detailed organisation of mass tort litigation prior to a nuclear emergency could miss the decisive issues that need to be considered in that specific case. In particular, the social consequences connected with wide-spread nuclear damage will require problem-adjusted special rules to adequately organise the proceedings to secure prompt compensation. The way compensation claims are processed may contribute to either mitigating or to amplifying scare and even hysteria on the part of the general public *vis-à-vis* radiation exposure.

An example of a deferred legislative approach is the 1959/1985 German Atomic Energy Act.[27] In cases where the damage exceeds the compensation money available, Section 35 of the Atomic Energy Act provides that the distribution of the compensation money available and "the procedure to be observed in this context shall be governed by an act or, pending such act, by statutory ordinance". The

23. NEA (ed.) (2003), *Indemnification of Damage in the Event of a Nuclear Accident: Workshop Proceedings*, Paris, France 26-28 November 2001, OECD, Paris; NEA (ed.) (2006), *Indemnification of Damage in the Event of a Nuclear Accident: Workshop Proceedings, Bratislava, Slovak Republic, 18-20 May 2005*, OECD, Paris.
24. See Pelzer, N. (2010), "Compensation for Large-scale and Catastrophic Nuclear Damages", in Tamás, N. and T. Gábor (eds.), *Prudentia Iuris Gentium Potestate: Ünnepi tanulmányok Lamm Vanda tiszteletére* (*Liber amicorum* Vanda Lamm), MTA Joqtud. Int., Budapest, pp. 341-357, 352 et seq.
25. See the unofficial status report at Beyens, M., D. Philippe and P. Reyners (eds.) (2012), *Prospects of a Civil Nuclear Liability Regime in the Framework of the European Union: Proceedings*, Bruylant, Brussels. See also EC (2013), "Green Paper on the insurance of natural and man-made disasters", COM(2013)213 final, 16 April 2013, no. 4.2, "Third-party nuclear liability insurance".
26. On these questions see Pelzer, N. (2010), *supra* note 24, p. 353.
27. Atomic Energy Act, *supra* note 5.

provision is not only a reminder but it also contains a clear mandate: an adequate procedure shall be adopted to deal with the distribution of the money available. This procedure may include specifically designed mass tort litigation rules.[28]

Another example is the French Nuclear Liability Law.[29] If the money available is insufficient to cover all nuclear damage, the cabinet of ministers has to state this "*situation exceptionnelle*" [exceptional situation] in a "*décret*" [decree] within six months after the nuclear incident and to fix the modalities of compensation within the amounts established under Articles 4 and 5 of the Nuclear Liability Law. Personal injury has to be prioritised, and the remaining money has to be apportioned among the victims with personal injury and victims suffering other damage (French Nuclear Liability Law, Article 13(3)).

The 1983 Swiss Nuclear Liability Act[30] contains a similar provision. If the financial means available to cover all compensation claims are insufficient ("*Grossschäden*"/ "*grand sinistres*"), Parliament shall, in accordance with Article 29 of the Act, adopt a regulation on compensation ("*Entschädigungsordnung*"/ "*régime d'indemnisation*"). For implementing this regulation, Parliament may establish a special independent authority. Decisions of this special independent authority must be appealable to the Federal Supreme Court (Swiss Nuclear Liability Act, Article 29(3)).

As compared to the German and to the French Acts, the Swiss Act contains an additional element: a special independent authority, which is not a court, may be established. Even without such express provisions, Parliaments would, of course, be entitled to establish special compensation authorities. But, it is a noteworthy aspect that the Swiss legislator explicitly inserted that possibility into the law. Comparative studies show that a considerable number of other countries also follow the same approach. An early example is the Netherlands. According to the Dutch Nuclear Accidents Liability Act,[31] the competent court may, in cases of catastrophic damage, apply special measures that include, *inter alia*, appointing a committee of liquidators

28. The legislator (Parliament) is, of course, not bound by this "mandate". Parliament may do more or less than what Section 35 prescribes. This does not apply for the statutory ordinance, which may be issued as a provisional instrument as long as the act on apportionment is still pending.
29. *Loi n° 68-943 du 30 octobre 1968 relative à la responsabilité civile dans le domaine de l'énergie nucléaire* [Act No. 68-943 of 30 October 1968 on third party liability in the field of nuclear energy], *Journal officiel de la République Française* [Official Journal of the French Republic] (JORF), 31 October 1968, p. 10195; as last amended by *Ordonnance n° 2012-6 du 5 janvier 2012 modifiant les livres Ier et V du code de l'environnement* [Ordinance No. 2012-6 of 5 January 2012 amending Books I and V of the French Environmental Code], JORF, 6 January 2012, p. 218, text no. 4; ratified by Article III of *loi n° 2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte* [Act No. 2015-992 of 17 August 2015 on the energy transition for green growth], JORF, 18 August 2015, p. 14263, text no. 1).
30. *Kernenergiehaftpflichtgesetz (KHG) / Loi sur la responsabilité civile en matière nucléaire* (LRCN) of 18 March 1983 as amended, *Systematische Sammlung des Bundesrechts (SR) / Recueil systématique du droit fédéral* (RS) [Systematic Collection of Federal Laws] 732.44.
31. *Wet van 17 maart 1979, houdende regelen inzake aanspraklijkheid voor schade door kernongevallen (Wet aansprakelijkheid kernongevallen)* [Act of 17 Marh 1979 containing rules on liability for damage caused by nuclear accidents (Nuclear Accidents Liability Act)], as last amended on 17 March 1979 (*Staatsblad* [Official Gazette] 1979, no. 160) and on 27 March 2014 (*Staatsblad* 2014, no. 129).

("*commissie van vereffenaars*") (Nuclear Accidents Liability Act, Article 22) to deal with preparatory questions of the satisfaction of claims.[32]

In fact, the total or partial outsourcing of nuclear claims processing to committees or fora other than courts may be attractive. There are an enormous number of claimants, and there is a need to decide quickly on compensation claims. Committees may react more flexibly and faster than a court that is part of the complex state judiciary. Claims adjustment will be accelerated. So there are advantages. But there are also disadvantages. The most serious one surely is that there might be a conflict with the fundamental law of being heard before a court established by law. Victims have a right to a fair and public hearing before a court.[33]

Committees also pose organisational problems. In theory, the number of those committees may, if necessary, be multiplied easier than the number of courts. The more committees that are involved, the more claims can be processed. But, at short notice it will be difficult to find and recruit a sufficient number of people to sit on the committees. They should at least have basic knowledge of the law and some understanding of the technical problems of nuclear energy and of radiation. It is also difficult to ensure that the committees are truly independent and impartial. Of course, the availability of those prerequisites can be organised. But that organisation takes time and thus may reduce the attraction of the committee approach, namely fast compensation that helps re-establish legal peace.

The described drawbacks can only be balanced if the final decision of a case remains with the courts. The committees may be entrusted with an important task in the peaceful settlement of disputes. However, if a claim is controversial and cannot be settled by the committee, then the competent court has to decide. Committees only have auxiliary functions to support courts. They cannot replace courts. This might compromise their advantages.

In the following text, focus will be on some selected national legislations that developed special procedures to handle the organisation of compensating major nuclear damage and that also build on "committees" or on other "out-of-court fora". The nuclear compensation regimes of Canada, India, Japan and the United States will be dealt with.

4. Canada: Nuclear Liability and Compensation Act

4.1. The Nuclear Claims Tribunal

As of 1 January 2017, compensation of nuclear damage in Canada is governed by "An Act respecting civil liability and compensation for nuclear damage in case of a

32. See in detail: Horbach, N. (2005), "Catastrophic Nuclear Damage under the Dutch Nuclear Liability Law", in Pelzer, N. (ed.), *Die Internationalisierung des Atomrechts*, *supra* note 12, pp. 213-228, 222 et seq. Horbach, in footnote 19 of her article, recommends the PhD thesis by Vanden Borre, T. (2001), "*Efficiënte preventie en compensatie van catastroferisico's: Het voorbeeld van schade door kernongevallen*" [Effective prevention and compensation of catastrophic risks: The Example of damage caused by nuclear accidents], Intersentia Uitgevers, Antwep, as a "very exhaustive and excellent description" of the Dutch regime.
33. See, e.g., United Nations General Assembly (UNGA) (1948), "Universal Declaration of Human Rights", UN Doc. A/RES/3/217/A, adopted on 10 December 1948, Article 10: "Everyone is entitled in full equality to a fair and public hearing by an independent and impartial tribunal, in the determination of his rights and obligations and of any criminal charge against him."; European Convention for the Protection of Human Rights and Fundamental Freedoms (1950), European Treaty Series No. 5, Article 6(1): "… everyone is entitled to a fair and public hearing within a reasonable time by an independent and impartial tribunal established by law."

nuclear incident, repealing the Nuclear Liability Act and making consequential amendments to other Acts", the short title of which reads "Nuclear Liability and Compensation Act" (NLCA).[34] It replaces the Nuclear Liability Act 1976/1985[35] and at the same time implements the CSC[36] after Canada's envisaged ratification.

In accordance with Section 36 of the Nuclear Liability and Compensation Act, the Governor in Council (e.g. the Prime Minister and the Cabinet)[37] may declare that claims for compensation are to be dealt with by a "Tribunal", "if he or she believes that it is in the public interest to do so, having regard to the extent and the estimated cost of the damage, and the advantages of having the claims dealt with by an administrative tribunal." This declaration has to be published, without delay, in the *Canada Gazette*, Part II. On the day of the declaration, NLCA, Section 34 on the jurisdiction of courts ceases to apply. Any proceedings brought or taken before the declaration are discontinued, and any further claims are only to be brought before the Tribunal (NLCA, Section 37). After the declaration, the Minister (NLCA, Section 4) has to prepare a report on the estimated cost of the indemnification to be presented to Parliament (NLCA, Section 38). The Minister may pay "interim financial assistance" to victims of the nuclear incident that the declaration relates to. The maximum amount of that assistance must not exceed 20% of the difference between the amount set out in NLCA, Section 24(1)[38] and the total amounts that are paid by the liable operator before the declaration was made (NLCA, Section 39).

The Tribunal has to be established "as soon as feasible after the declaration". Its purpose is "to examine and adjudicate claims for damage arising from the nuclear incident as expeditiously as the circumstances and consideration of fairness permit". Claims have to be dealt with "in an equitable manner, without discrimination on the basis of nationality or residence" (NLCA, Section 41).

The Governor in Council must appoint a minimum of five persons to the Tribunal; one of them is to be designated as chairperson. A majority of them have to be persons "who are sitting or retired judges of a superior court or members of at least 10 years' standing at the bar of a Province or the Chambre des notaires du Québec" (NLCA, Section 43). The members shall be appointed "to hold office during

34. Statutes of Canada (S.C.) 2015, Chapter 4, Section 120 (S.C. 2015, c. 4, s. 120), available at: http://laws-lois.justice.gc.ca/PDF/N-28.1.pdf. Order on the entry into force: Order Fixing January 1, 2017 as the Day on which Certain Provisions of the Nuclear Liability and Compensation Act Come into Force, P.C. 2016-302, 6 May 2016, available at: www.gazette.gc.ca/rp-pr/p2/2016/2016-05-18/html/si-tr23-eng.php.
35. An Act respecting civil liability for nuclear damage (Nuclear Liability Act), R.S.C., 1985, Chapter N-28. The 1985 Act deals with the compensation of nuclear damage exceeding the maximum liability of CAD 75 million and the related procedure in its Part II "Special Measures for Compensation" (Sections 18-31). See also Pelzer, N. (2010), *supra* note 24, p. 354.
36. On the international obligations of Canada, see NLCA, Sections 70-76. On the development of the Canadian nuclear liability law, see McCauley, D. and J. Hénault (2014), "Strengthening Canada's Nuclear Liability Regime", in Manóvil, R.M. (ed.), *Nuclear Law in Progress: XXI AIDN/INLA Congress – Buenos Aires 2014*, Legis, Buenos Aires, pp. 695-707 (2014).
37. See, e.g., Parliament of Canada (n.d.), "Compendium of Procedure: Parliamentary Framework", www.parl.gc.ca/About/House/Compendium/web-content/c_g_parliamentary framework-e.htm.
38. NLCA, Section 24(1) limits the operator's liability as follows: (a) CAD 650 million for a nuclear incident arising within one year after the day on which this paragraph comes into force – (b) CAD 750 million for a nuclear incident arising within one year after the year referred to under (a) – (c) CAD 850 million for a nuclear incident arising within one year after the year referred to in (b) – (d) CAD 1 billion for a nuclear incident arising after the year referred to in (c).

good behaviour for a term that the Governor in Council considers appropriate and may be removed for cause" (NLCA, Section 44).

The part of the NLCA on the Nuclear Claims Tribunal contains detailed provisions on the Tribunal's powers and duties regarding hearings to be held, interveners, witnesses and documents. As for evidence, in the hearing of claims, the Tribunal is not bound by the legal rules of evidence but it must not accept evidence that would be inadmissible in a court by reason of any privilege under the law of evidence. The Tribunal may make any rule it deems necessary to perform its duties and functions such as procedures for bringing claims, rules on evidence, fees or expenses.

The chairperson of the Tribunal may establish panels of the Tribunal consisting of one or more members to hear claims. In order to accelerate procedures, the Tribunal may establish classes of claims to be determined by a claims officer without oral hearing. It may designate as a claims officer anyone that it considers qualified (NLCA, Sections 49-60). A claimant or operator who is dissatisfied with a claims officer's decision is entitled to apply to the Tribunal for a rehearing by a panel. If a claim has been heard by a panel that consists of less than three members, the claimant may apply in writing to the chairperson for leave to appeal. The appeal must be heard by a panel consisting of three other members (NLCA, Sections 61-62).

The Act allows judicial review of the decisions of the Nuclear Claims Tribunal only in a few exhaustively listed cases. NLCA, Section 63 reads as follows:

> Subject to sections 61 and 62, every decision of the Tribunal is final and conclusive and is not to be questioned or reviewed at any court except in accordance with the Federal Courts Act on the grounds referred to in paragraph 18.1(4)(a), (b) or (e) of that Act.

The exceptional right to appeal applies according to this Section only if the Tribunal:

> (a) acted without jurisdiction, acted beyond its jurisdiction or refused to exercise its jurisdiction;
>
> (b) failed to observe a principle of natural justice, procedural fairness or other procedure that it was required by law to observe; …
>
> (e) acted, or failed to act, by reason of fraud or perjured evidence.[39]

NLCA, Sections 64-69 contain "Financial Provisions". At the end of the rehearing or appeal period, the Minister must pay the awarded amount out of the Nuclear Liability Account. The operator has to reimburse the amount paid by the Minister as defined in NLCA, Section 67.

The Governor in Council is entitled to issue general regulations (NLCA, Section 78), regulations on the Tribunal (NLCA, Section 79) and on compensation (NLCA, Section 80). The regulations on compensation shall deal with the compensation to be awarded and may include the establishment of priorities for classes of damage, the reduction of compensation on a *pro rata* basis and the fixing of maximum amounts for specified classes of damage, and the establishment of classes of damage for which compensation is not to be awarded.

39. An Act respecting the Federal Court of Appeal and the Federal Court (Federal Courts Act), R.S., 1985, c. F-7, s. 1; 2002, c. 8, s. 14, Paragraph 18.1(4) available at: laws-lois.justice.gc.ca/PDF/F-7.pdf.

4.2. Appraisal

NLCA, Section 34 stipulates that actions involving nuclear damage have to be brought to the court in Canada that has jurisdiction in the place where the incident occurs; in certain specified cases, the Federal Court is the competent court. The competence of the respective court is exclusive. This scheme concurs with the jurisdiction clauses of the international nuclear liability conventions. Notwithstanding this clear principle, NLCA, Section 36 et seq. authorises the Governor in Council to declare that another body, namely a so-called Nuclear Claims Tribunal, shall exclusively be competent to deal with nuclear claims. The declaration on the Tribunal discontinues procedures pending before courts. The nuclear jurisdiction is entirely shifted to the Tribunal.

One might question whether the legislator is well advised if it authorises the executive branch to encroach in such a comprehensive way on fundamental elements of the judiciary. In principle, only independent courts based on an Act of Parliament are the guarantors of the right to a "public hearing by an independent and impartial tribunal".[40] On the other hand, the catastrophic character of major nuclear incidents may require extraordinary means to fight their consequences. So the details of the Canadian approach have to be looked at more closely.

The authorisation provision of NLCA, Section 36(1) limits the authorisation to make a relevant declaration to "claims in respect of a nuclear incident". There is no explicit, but only an implied and not plain reference to the catastrophic extent of the nuclear incident and there is no reference to any other extraordinary specific of the nuclear incident. It suffices if the Governor in Council "believes that it is in the public interest to do so, having regard to the extent and the estimated cost of the damage, and the advantages of having the claims dealt with by an administrative tribunal". That language grants the executive a wide range of discretion. It stresses at the same time that the basis of the declaration is of a political rather than of a legal nature.

In Canada, "a tribunal is a public body that handles cases submitted to it, according to rules set out by law."[41] Administrative tribunals, which exist at the federal, provincial and territorial levels, are specialised and focus on specific subject areas.[42] They are referred to as "quasi-judicial" adjudicative bodies.[43] A website of the Canadian Department of Justice describes those administrative tribunals as follows:

> Administrative boards and tribunals
>
> There are other kinds of disputes that do not need to be dealt with in the courts. Different kinds of administrative tribunals and boards deal with disputes over the interpretation and application of laws and regulations, such as entitlement to employment insurance or disability benefits, refugee claims, and human rights.
>
> Administrative tribunals are less formal than courts and are not part of the court system. However, they play an essential role in resolving disputes in

40. Universal Declaration of Human Rights, *supra* note 33.
41. Council of Canadian Administrative Tribunals (2007), *Introduction to Administrative Justice and to Plain Language*, pp. 19, available at: www.ccat-ctac.org/CMFiles/Publication/CCAT-EN-new2.pdf.
42. *Ibid*.
43. *Ibid*., p. 72.

> Canadian society. Decisions of administrative tribunals may be reviewed in court to ensure that tribunals act fairly and according to the law.[44]

The author of this article is not sufficiently familiar with the Canadian legal system, but this is a surprising definition if we apply it to the Nuclear Claims Tribunal, which is not at all meant to deal with *minima* but possibly with the compensation to be paid after a catastrophic incident that may seriously impact on the general public and the entire state. Why do those lawsuits "not need to be dealt with in the courts"?

It is the Tribunal's purpose "to examine and adjudicate" nuclear claims "as expeditiously as the circumstances and considerations of fairness permit" (NLCA, Section 41(2)).This is a mandate that is different from that of ordinary courts. It in particular refers to "fairness" rather than to justice. A political element of the establishment of the Tribunal becomes evident if we look at the appointment of judges: each member of the Tribunal is to be appointed to hold office during good behaviour for a term that the Governor in Council considers appropriate and may be removed for cause.[45] So the Governor in Council has discretion to determine the tenure of judges. Moreover, the Tribunal apparently is not bound by the general rules on procedure but "may make any rules that it considers necessary for the exercise of his powers and the performance of its duties and functions" (NLCA, Section 55).

In summary, the picture of the Nuclear Claims Tribunal is not entirely clear. From the point of view of a foreign lawyer, there seem to be a number of legal drawbacks of the Tribunal approach that trigger questions: the transfer of nuclear compensation lawsuits from courts to the Tribunal will be established by a political decision of the Governor in Council and are not based on well justified legal prerequisites determined by Parliament; there are doubts as to whether the judges of the Tribunal enjoy the necessary independence to act impartially;[46] the right of appeal to a court is strictly and exhaustively limited to certain rare cases that in practice may result in a total denial of appeal to a court; the NLCA authorises the Governor in Council to issue regulations that cover areas that are to be decided by Parliament and not by the executive. This applies particularly to the regulation on compensation. It has, however, to be admitted that the Tribunal may be in a position to deal with compensation cases more expeditiously than courts, particularly because it may make its own rules of procedure and is not bound by the legal rules of evidence. Prompt compensation of nuclear victims is a major step on the way to regaining legal peace after a nuclear incident causing mass tort litigations.

44. Canada Department of Justice (2017), "The judicial structure", available at: www.justice.gc.ca/eng/csj-sjc/just/07.html.
45. This wording differs from the corresponding provision on the tenure of judges at general courts in Canada, see the British North America Act 1867 as amended in 1960 (British North America Act, 1960, 9 Eliz. II, c. 2 (UK)), Section 99, available at: www.justice.gc.ca/eng/rp-pr/csj-sjc/constitution/lawreg-loireg/p1t251.html.
46. On the independence of judges in Canada see: Gélinas, F. (2012), "Judicial Independence in Canada: A Critical Overview", in Seibert-Fohr, A. (ed.), *Judicial Independence in Transition: Strengthening the Rule of Law in the OSCE Region*, Springer, Berlin (Vol. 233 of *Beiträge zum ausländischen öffentlichen Recht und Völkerrecht* [Contributions to Foreign Public Law and International Law]), pp. 567-600; Binnie, I. (2011), "Judicial Independence in Canada", paper is submitted to the World Conference on Constitutional Justice on behalf of the Supreme Court of Canada in anticipation of its Second Congress to be held in Rio de Janeiro 16-18 January 2011, available at: www.venice.coe.int/WCCJ/Rio/Papers/CAN_Binnie_E.pdf.

5. India: The Civil Liability for Nuclear Damage Act, 2010

5.1. *Claims Commissioner and Nuclear Damage Claims Commission*

In India, the compensation of nuclear damage is regulated under the terms of:

> An Act to provide for civil liability for nuclear damage and prompt compensation to the victims of a nuclear incident through a no-fault liability regime channeling liability to the operator, appointment of Claims Commissioner, establishment of a Nuclear Damage Claims Commission and for matters connected therewith or incidental thereto.[47]

This is also known as "The Civil Liability for Nuclear Damage Act, 2010" (CLNDA). The CLNDA is supplemented by the Civil Liability for Nuclear Damage Rules, 2011.[48]

In the event of the occurrence of a nuclear incident, the Atomic Energy Regulatory Board[49] shall, within a period of 15 days from the date of occurrence of a nuclear incident, notify that incident and cause wide publicity to the occurrence if the gravity of the threat and risk involved so requires (CLNDA, Section 3). Victims of that nuclear incident shall be entitled to claim compensation in accordance with the provisions of this Act (CLNDA, Section 9(1)).[50]

For the purposes of adjudicating such claims, the Central Government shall, by notification, appoint "one or more Claims Commissioners" (CLNDA, Section 9(2)). This provision removes the competence to hear claims for the compensation of nuclear damage from the competence of the civil courts and transfers it to the Claims Commissioner. The Commissioner is exclusively competent in that area. Pursuant to CLNDA, Section 12(5), the Commissioner enjoys the privileges of a civil court: "the Claims Commissioner shall be deemed to be a civil court for the purposes of section 195 and Chapter XXVI of the Code of Criminal Procedure, 1973".[51] The details of the position of the Commissioner, the adjudication procedure to be followed and the powers of the Commissioner are regulated in CLNDA, Sections 13-18.

CLNDA, Section 16(5) is of outstanding relevance: every award made under Section 16(1) shall be final. That means there is no appeal possible against the Commissioner's decision on the award.

47. The Civil Liability for Nuclear Damage Act, 2010, No. 38 of 2010, *The Gazette of India*, Extraordinary, Part II, Section 1, No. 47 of 22 September 2010. The Act received the assent of the Indian President on 21 September 2010.
48. Civil Liability for Nuclear Damage Rules, 2011, No. 611, *The Gazette of India*, Extraordinary, Part II, Section 3(i), November 11, 2011. India ratified the CSC on 4 February 2016, which entered into force for India on 4 May 2016. IAEA (2016), Convention on Supplementary Compensation for Nuclear Damage: Status, IAEA Doc. Registration No. 1914.
49. The Board was constituted on 15 November 1983 by the Central Government based on the powers vested to it by the Atomic Energy Act, 1962, No. 33 of 1962, 15 September, as last amended by the Atomic Energy (Amendment) Act, 2015, No. 5 of 2016, 31 December 2015, *The Gazette of India*, Extraordinary, Part II, Section 1, No. 5, 1 January 2016.
50. The operator of a nuclear installation is the person liable. See CLNDA, Sections 3-8. The liability principles of the CLNDA are more or less identical with the international nuclear liability principles but there are differences. See, *inter alia*, Gruendel, R.J. and E. Reynaers Kini (2012), "Through the looking glass: placing India's new civil liability regime for nuclear damage in context", *Nuclear Law Bulletin*, No. 89, OECD, Paris, pp. 45-66; Pelzer, N. (2011), "The Indian Civil Liability for Nuclear Damage Act, 2010 – Legislation with Flaws?", *atw – International Journal for Nuclear Power*, Vol. 56, Issue 1, pp. 8-15.
51. The provisions referred to deal with offences affecting the administration of justice and the contempt of lawful authority.

The CLNDA does not stipulate any prerequisites for the appointment of the Claims Commissioner. In particular, it does not refer to the specifics and the potential magnitude of nuclear damage. If nuclear damage is suffered, the Central Government "shall" appoint the Commissioner (CLNDA, Section 9(2)). This wording seems to indicate that in principle the Commissioner is competent to adjudicate all types of nuclear incidents, ranging from minor ones to catastrophic incidents with mass tort litigation.

However, this legal situation will, according to CLNDA, Section 19, be changed:

> where the Central Government, having regard to the injury or damage caused by a nuclear incident, is of the opinion that it is expedient in public interest that such claims for such damage be adjudicated by the Commission instead of a Claims Commissioner, it may, by notification, establish a Commission for the purpose of this Act.

The "injury and the damage" will be taken into account. It may be concluded from this motif that the Commission will be established in case of a major nuclear incident only and this might entail mass tort litigations.

The Nuclear Damage Claims Commission shall consist of a chairperson and not more than six other members. They will be appointed by the Central Government on the recommendation of a Selection Committee consisting of three experts having experience of at least 30 years in nuclear science and a retired Supreme Court Judge (CLNDA, Section 20). Their terms of office are limited to three years but re-appointment for another three years is possible (CLNDA, Sections 20, 21).

CLNDA, Section 32(1) provides that the Commission "shall have original jurisdiction to adjudicate upon every application for compensation filed before it" regarding those cases that are filed in accordance with the requirements set out under CLNDA, Section 31(1) or that are transferred to it under CLNDA, Section 33, i.e. those cases that are pending before the Claims Commissioner. The Commission is not bound by the procedure laid down in the Code of Civil Procedure, 1908.[52] It shall be guided by the principles of natural justice[53] and subject to the other provisions of the CLNDA and any of its rules made thereunder. The Commission has power to regulate its own procedure (CLNDA, Section 32(4)). The Commission shall have, for the purposes of discharging its functions under the CLNDA, the same powers as are vested in a civil court under the Code of Civil Procedure, 1908.

A parallel provision to CLNDA, Section 16(5) for the Commissioner is CLNDA, Section 32(10) for the Commission: every award made under Section 32(6) shall be final. The decision of the Commission cannot be appealed.

All claims pending and all other future claims will be concentrated at the Commission. Every proceeding before the Commissioner or the Commission shall be

52. Act No. 5 of 1908.

53. The concept of natural justice comprises those legal sources that protect the rights of individuals. This applies in particular to Article 14 of the Indian Constitution, which guarantees equality before the law and equal protection. See also Articles 21, 22, 39, 136, 226, 233, 311 of the Indian Constitution (Constitution of India as of 9 November 2015). For a brief introduction to this concept, see Shivaraj, S. (2013), "Principles of Natural Justice in Indian Constitution", available at: www.legalservicesindia.com/article/article/principles-of-natural-justice-in-indian-constitution-1519-1.html.

deemed to be judicial proceedings within the meaning of Sections 193, 219 and 228, and for the purpose of Section 196, of the Indian Penal Code (CLNDA, Section 34).[54]

No civil court, except the Supreme Court and a High Court exercising jurisdiction under Articles 226 and 227 of the Constitution,[55] shall have jurisdiction to entertain any suit or proceeding regarding any matter in respect of which the Claims Commissioner or the Commission has competence. There is, however, an exception relating to claims against the operator made under CLNDA, Section 46 (CLNDA, Section 35).

If the Central Government is satisfied that the Commission has served its purpose, or if there is such a number of cases that the cost for the Commission would not justify its continued function, or if the Government considers it necessary or expedient to do so, the Government may, by notification, dissolve the Commission (CLNDA, Section 38(1)). With the effect of the notification, the proceedings pending before the Commission shall be transferred to the Commissioner (CLNDA, Section 38(2)).

5.2. Appraisal

Like in Canada, an Act below the level of the Constitution, namely the CLNDA, shifts the jurisdiction for nuclear compensation from the regular civil courts to other specially established bodies, namely to the Commissioner or to the Nuclear Damage Claims Commission. The Judiciary is no longer competent but the Executive is, by an ordinary law, authorised to transfer the exclusive competence from the courts to a person or to a commission that will be selected by the Government. This could – like in Canada – be interpreted as an interference with the principle of separation of powers.

The reason for this concern is that neither the decisions made by the Commissioner nor the decisions made by the Commission can be appealed before a court. This issue was the subject of discussion in India, too. An early comment made by Dipesh Patel shall be quoted here:[56]

> Concept of Judicial Review ignored
>
> According to clause 16 of the Nuclear Liability bill the matters of nuclear damage claim in case of a nuclear accident will only be dealt by a "Nuclear Damage Claims Commissioner" and any decision by the commissioner would be final. By including such a clause in the bill, the drafters have ignored the basic concept of Judicial Review under Indian Constitution. On the contrary, section 2210(n)(3) of US (equivalent Law) Price Anderson Act, has no such provision relating to the finality of the decision by the management panel, set up under the district court, for disposal of cases pertaining to claims in case of a nuclear accident.

54. The Sections referred to relate to punishment under the Indian Penal Code, 1860 as amended (No. 45 of 1860) for using false evidence (Sections 193, "Punishment for false evidence" and 196, "Using evidence known to be false"), corrupt unlawful reporting by an official (Section 219, "Public servant in judicial proceeding corruptly making report, etc., contrary to law") and insult of public servants (Section 228, "Intentional insult or interruption to public servant sitting in judicial proceeding").
55. Indian Constitution, *supra* note 53, Article 226, "Power of High Courts to issue certain writs" and Article 227, "Power of superintendence over all courts by the High Court".
56. Patel, D. (2010), "An Analysis of the Civil Liability for Nuclear Damage Bill, 2010", *India Law Journal*, Vol. 3, Issue 4, available at: http://indialawjournal.com/volume3/issue_4/article_by_dipesh.html.

Already in an earlier publication the author expressed his doubts as to "whether the Commissioner and the Commission have the appropriate judicial independence".[57] Reference to those comments can be made here. Apparently there could be a conflict with the Indian Constitution, a problem that was already discussed in India at an early stage of the CLNDA's legislative history.[58]

As summarised for Canada, it also applies to India that the establishing of fora other than courts to deal with nuclear compensation is a legally problematic approach. However, in the case of a major nuclear accident that entails mass tort litigations, it might be justified as a means to ensure prompt compensation. Nevertheless, this reason should not limit or, interfere with, the right to a public hearing before an independent court.

An Indian court expressed another view on this issue. In 2015, the High Court of Kerala ruled in a public interest litigation on the constitutional validity of the CLNDA.[59] The Court ruled under No. 19 on the independence of the Claims Commissioner:

> 19. The contention is with reference to the independence of the Claims Commissioner. When a person is appointed as claims Commissioner he performs a statutory function and is expected to carry out the statutory duty in accordance with law and it cannot be stated that he might be acting to the dictates of the Central Government. Whether an order passed by the Claims Commissioner is justifiable or not can be decided only at the relevant time and it cannot be stated that the legislation is bad. That apart such orders passed are subject to judicial review by the High Court under article 226 of the Constitution of India. Hence this ground also fails.

Under No. 22, the Court ruled on the independence of the Claims Commission as follows:

> 22. ... By virtue of Section 38 Central Government is given the power to dissolve of Commission in certain circumstances. It is stated that if the Central Government is satisfied that the purpose for which the Commission established under Section 19 has served its purpose, or where the number of cases pending before such Commission is so less that it would not justify the cost of its continued function, or where it considers necessary or expedient to do so, the Central Government may, by notification, dissolve the Commission. It is evident from the above provision that, the Commission is appointed in public interest to consider specified claims, its functioning, therefore, is always subject to the decision of the Central Government. But, in so far as statutory powers are vested in the said Commission and the procedure is regulated by the statute, there is no reason to doubt the independence of the Commission. Further, appointment of the Commission is in addition to the Claims Commissioner.
>
> For the aforesaid reasons, we are not satisfied that the impugned enactment suffers from any infirmity, arbitrariness or that it violates Part III of the

57. Pelzer, N. (2011), *supra* note 50, p. 12.
58. For references, see *ibid*. at note 62.
59. Yash Thomas Mannully and another v. Union of India and Others, W.P.(C.) No. 27960 of 2011, by the High Court of Kerala, 422 KLW 240 (21 August 2015), available at: https://indiankanoon.org/doc/105269224. See also the brief report on this judgement in NEA (2015), "Judgment of the High Court of Kerala in a public interest litigation challenging the constitutional validity of the Civil Liability for Nuclear Damage Act, 2010", *Nuclear Law Bulletin*, No. 96, OECD, Paris, pp. 69-70.

Constitution. Hence there being no merits in the writ petition, we dismiss the same.

This case is also pending at the Indian Supreme Court and more clarity on the constitutionality of the Act is expected by its ruling.[60]

6. Japan: Act on Compensation for Nuclear Damage and Related Legislation

6.1. Dispute Reconciliation Committee for Nuclear Damage Compensation

Since the early sixties of the last century, Japan has had an elaborate nuclear liability legislation that is more or less in line with the international nuclear liability principles.[61] The main instrument is the Act on Compensation for Nuclear Damage.[62] The law provides for strict liability of the operator, which is not limited in amount, and for legal channelling of liability onto the operator (CA, Articles 3-5). The Compensation Act is complemented by a number of Acts, Orders and other Instruments.[63]

According to Article 18(1) of the Compensation Act "the Dispute Reconciliation Committee for Nuclear Damage" – referred to as Reconciliation Committee – may be established. It shall, pursuant to the provisions of a Cabinet Order (CO), be an organisation attached to the Ministry of Education, Culture, Sports, Science and Technology (MEXT). It shall be in charge of arranging the settlement of any dispute arising from compensation of nuclear damage and of preparing general instructions to help operators reach a voluntary settlement of such disputes.

Paragraph 2 of Article 18 of the Compensation Act determines the tasks of the Committee in detail. It shall:

- arrange settlement of any dispute arising from compensation of nuclear damage;

60. Common Cause and others v. Union of India, W.P.(C), No. 464 of 2011, admitted by the Supreme Court of India on 16 March 2012. For more information on this case, see Common Cause (2014), "464/2011 Petition Challenging the Constitutional Validity of the Civil Liability for Nuclear Damage Act, 2010", available at: www.commoncause.in/ppil_details.php?id=9, and also on the nuclear liability legislation, Common Cause (2012), "W.P. (C) 407/2012 (Tagged with WP (C) 464/2011) to Bring Nuclear Suppliers of Kudankulam Nuclear Plant under 'Polluter Pays' and 'Absolute Liability' Principals", available at: www.commoncause.in/ppil_details.php?id=13.
61. In more detail see Vásquez-Maignan, X. (2012), "The Japanese nuclear liability regime in the context of the international nuclear liability principles", in NEA (ed.), *Japan's Compensation System for Nuclear Damage: As Related to the TEPCO Fukushima Daiichi Nuclear Accident*, OECD, Paris, pp. 9-14; Pelzer, N. (2011), "*Die Haftung für Nuklearschäden nach japanischem Atomrecht aus internationaler Sicht*" [Liability for Nuclear Damage under Japanese Nuclear Law from an International Perspective], *Zeitschrift für Japanisches Recht* [Journal of Japanese Law], Vol. 16, No. 32, pp. 97-122.
62. Act on Compensation for Nuclear Damage, No. 147, 17 June 1961, as last amended by Act No. 134 of 2014 (Compensation Act or CA). An unofficial English translation of the Compensation Act, as amended, is reproduced in NEA (2015), *Nuclear Law Bulletin*, No. 95, OECD, Paris, pp. 119-129.
63. The Japanese nuclear legal framework as of 2012 is reproduced in English in NEA (ed.), *Japan's Compensation System*, *supra* note 61, pp. 61-244. Special reference has to be made to the Act on Indemnity Agreements for Compensation of Nuclear Damage, Act No. 148 of 1961, as amended by Act No. 134 of 2014, an extract of which is reproduced in NEA (2015), *Nuclear Law Bulletin*, No. 95, OECD, Paris, pp. 131-132. Japan was not a party to any of the nuclear liability conventions until 15 January 2015 when it signed and accepted the CSC, IAEA (2016), Convention on Supplementary Compensation for Nuclear Damage: Status, IAEA Doc. Registration No. 1914.

- in the event of a dispute arising from compensation of nuclear damage, establish guidelines to judge the extent of the nuclear damage and other general guidelines to help operators reach a voluntary settlement of the said dispute;
- conduct necessary investigation and assessment of nuclear damage to deal with the matters specified in the preceding two items.

Necessary additional issues regarding the organisation and operation of the Committee as well as procedures of the request for, and handling of, mediation of settlements shall be provided in a Cabinet Order (CA, Article 18(3)). This CO apparently is not available in an English translation. The following text is therefore based on an article by Professor Toyohiro Nomura, et al. on Japan's nuclear liability system.[64]

The Reconciliation Committee is not a standing committee; rather, it is only set up if there is the concrete possibility that a dispute regarding nuclear compensation will occur. Its ten part-time members to be appointed by MEXT shall be people of high moral standing who are experienced or have academic standing relating to law, medicine, nuclear engineering or other nuclear related technologies (CO, Article 1). The Committee was for the first time established in connection with the 1999 Tokaimura accident,[65] where 8 000 claims were made. Nearly all claims were solved through settlement. Only less than 20 claims were brought to court. The total amount of compensation paid out was JPY 15 billion. The Committee relating to the Fukishima Daiichi accident was set up in April 2011.

Among the competences of the Committee as listed in CA, Article 18(2), the establishing of guidelines is of special importance. They shall promote the "voluntary out-of court settlement of disputes such as the standards for determining the scope of nuclear damage". The guidelines "have no legally binding force".[66] Nevertheless, the guidelines enjoy great authority due to the high competence of the Committee. They:

> are reasonably expected to serve as the compensation standard that can be trusted by both the victims and the nuclear operator. It is consequently expected that the Guidelines will serve as reference for the damage compensation negotiation ..., and thus will facilitate smoother settlement negotiations ... as well as promote fair compensation of similar damage.[67]

However, for the purpose of this article, there is no need to deal with the content of the various guidelines in more detail.[68]

It was recognised that courts alone would not be able to handle all claims. In implementing CA, Article 18, in 2011, an alternative dispute resolution (ADR) mechanism was established: the Nuclear Claims Dispute Resolution Centre. The Centre shall conduct mediation of settlement of Fukushima compensation disputes ("*Wakai-no-Chuukai*"). The Centre has no power to adjudicate or arbitrate the disputes. The ADR performed by the Centre is rule-oriented, which means it applies rules and general standards to ensure equal treatment of all parties involved. The

64. Nomura, T. at al. (2012), "Japan's nuclear liability system", in NEA (ed.), *Japan's Compensation System*, *supra* note 61, pp. 22-25.
65. For more information on the Tokaimura accident, see IAEA (2009), *Lessons Learned from the JCO Nuclear Criticality Accident in Japan in 1999*, available at: http://www-ns.iaea.org/downloads/iec/tokaimura-report.pdf.
66. Nomura, T. et al., *supra* note 64, p. 22.
67. *Ibid.*, p. 23.
68. The Guidelines published in 2012 are reproduced in NEA (ed.), *Japan's Compensation System*, *supra* note 61, pp. 89-183.

substantive rules governing the mediation are the Guidelines issued by the Reconciliation Committee.[69]

In the aftermath of the Fukushima Daiichi nuclear accident, the Japanese Diet issued additional acts to cope with the consequences of the accident. The Nuclear Damage Compensation Facilitation Corporation Act, 2011,[70] aims at providing additional compensation money beyond the amounts to be provided by the operator liable under the terms of the Compensation Act (Article 1). In Article 2 of that Act, the state explicitly accepts the social responsibility to provide the money taking into account that the state's responsibility comes along with promoting the nuclear energy policy. The Act on Emergency Measures Related to Damage Caused by the 2011 Nuclear Accident[71] entitles the Government to make provisional payments to parties who have sustained specified nuclear damage. For further details of the Japanese nuclear liability law and of the status of Fukushima Daiichi compensation, reference may be made to the ample literature available.[72]

6.2. Appraisal

Japan has recent and still ongoing experience with nuclear mass tort litigations to manage the consequences of the Fukushima Daiichi nuclear accident. This experience is still evolving. Fukushima taught lessons that Chernobyl could not likewise teach: a democratic state under the rule of law tries to satisfy claims for compensation of a major nuclear disaster. The main lesson that has been taught seems to be that Japanese victims preferred out-side-court settling of compensation to ordinary court procedures. This avenue was already in 1961 well paved by the 1961 version of the Compensation Act, and was "tested" after the Tokaimura nuclear accident. The Reconciliation Committee offered the framework for settlement outside courts. This approach seemed to be attractive for the victims. But nevertheless the Committee did neither close the doors to courts nor to direct negotiations with the operator liable. The Committee is not a "Tribunal" or any other

69. See in greater detail: Idei, N. (2012), The Nuclear Damage Claim Dispute Resolution Center, JCAA Newsletter, No. 28, pp. 1-4.
70. Act No. 94 of 2011, reproduced in NEA (ed.), *Japan's Compensation System*, *supra* note 61, pp. 185-204.
71. Act No. 91 of 2011, reproduced in NEA (ed.), *Japan's Compensation System*, *supra* note 61, pp. 237-241.
72. See, e.g., Matsuura, S. (2012), "The current progress of relief of victims of nuclear damage caused by the Fukushima Daiichi nuclear power plant accident", in NEA (ed.), *Japan's Compensation System*, *supra* note 61, pp. 29-39; Takahashi, Y. (2012), "The financial support by the Nuclear Damage Compensation Facilitation Corporation", in NEA (ed.), *Japan's Compensation System*, *supra* note 61, pp. 41-59; Kabashima, H. (2012), "Settlement in Pollution Cases: Contribution to the Dispute Resolution of the Fukushima Nuclear Power Plant's Melt Down", *GEMC Journal*, No. 6, pp. 14-25; Osaka. E. (2012), "Corporate Liability, Government Liability, and Fukushima Nuclear Disaster", *Pacific Rim Law & Policy Journal*, Vol. 21, No. 3, pp. 433-459; Feldman, E.A. (2013), "Fukushima: Catastrophe, Compensation and Justice in Japan", *DePaul Law Review*, Vol. 62, Issue 2, pp. 335-355; Kawasaki, K. (2014), "Introductory Statement: Japanese Experience in Nuclear Liability Compensation after Fukushima Incident", in Raetzke, C. (ed.), *Nuclear Law in the EU and Beyond: Proceedings of the AIDN/INLA Regional Conference 2013 in Leipzig*, Nomos, Baden-Baden, pp. 327-332; Rheuben, J. (2014), "Government Liability for Regulatory Failure in the Fukushima Disaster: A Common Law Comparison", *Pacific Rim Law & Policy Journal*, Vol. 23, No. 1, pp. 113-149; Weitzdörfer, J. (2013), "Liability for Nuclear Damages Under Japanese Law: Key Legal Problems Arising from the Fukushima Daiichi Nuclear Accident", in Butt, S. et al. (eds.), *Asia-Pacific Disaster Management: Comparative and Socio-legal Perspectives*, Springer, Berlin, pp. 120-139; Feldman, E.A. (2015), "Compensating the Victims of Japan's 3-11 Fukushima Disaster", *Asian-Pacific Law & Policy Journal*, Vol. 16, No. 2, pp. 127-157 (2015); Suami, T. (2015), "Legal Support to Fukushima Municipality: Law School, Lawyers, and Nuclear Disaster Victims", *Asian-Pacific Law & Policy Journal*, Vol. 16, No. 2, pp. 158-185.

body that decides finally and excludes appeals to courts. Here we see a most relevant difference from the Canadian and the Indian schemes.

On the other hand, criticism was also voiced regarding the Japanese approach of dispute resolution. Eric A. Feldman elaborates on the ADR in Japan.[73] He quite correctly identifies three ways for Fukushima victims to apply for compensation: (1) bringing an action to a court; (2) negotiating directly with the liable operator, TEPCO ("direct route"); and (3) ADR, namely claims resolution at the Nuclear Damage Claim Dispute Resolution Centre. According to his view, the Centre developed a "slow pace of claims resolution" and "the compensation process, and the awards resulting from it, should in certain ways resemble both in form and substance a conventional legal conflict".[74] If that statement is correct, ADR's advantage of quick compensation may indeed be questioned.

But it is still too early for a final assessment of the Japanese regime, and the limits of an article in a journal anyway do not allow a comprehensive assessment. In any case, the Japanese approach is worthwhile to observe and study carefully and it may perhaps produce feasible elements for other countries.

7. United States: Atomic Energy Act of 1954, as amended

7.1. Section 170 of the Atomic Energy Act

US nuclear liability law is a combination of state law and federal law. While the basis of liability – for instance, if it is based on fault or if strict liability is applicable[75] – is governed by the law of the state where the nuclear incident took place, the specifics of nuclear liability law, including the extent of liability and in particular its financial coverage ("financial protection"), are regulated by federal law, namely by Section 170 of the Atomic Energy Act, 1954, as amended (AEA).[76] The contribution of the federal law to the substantial nuclear liability law is to a large extent shaped through the definitions in AEA, Section 11 and particularly through the definitions of "extraordinary nuclear occurrence", "nuclear incident" and "public liability". They contribute to determining the extent of nuclear liability. AEA, Section 170 uses and refers to the said and to other definitions, and it mainly regulates the "financial protection". Financial protection is a condition of a licence under the Atomic Energy Act, and it is defined in AEA, Section 11(k) as follows: "the ability to respond in damages for public liability and to meet the cost of investigating and defending claims and settling suits for such damages." The total amount of financial protection currently aggregates roughly USD 12 billion, and this amount is the maximum public liability amount (AEA, Section 170(e)).

If a nuclear incident involves damages that "are likely to exceed the applicable amount of aggregate public liability" under AEA, Section 170(e)(1)(A)-(C), a Compensation Plan has to be prepared (AEA, Section 170(i)). The Secretary of the Nuclear Regulatory Commission (NRC) shall make a survey of the extent and the

73. Feldman, E.A. (2014), "No Alternative: Resolving Disputes Japanese Style", in Zekoll, Z. et al. (eds.), *Formalisation and Flexibilisation in Dispute Resolution*, BGrill Nijhoff, Leiden, pp. 130-147.
74. *Ibid*., pp. 140-146, 145. See also Nottage, L. and J. Rheuben (2015), "Resolving Claims from the Fukushima Nuclear Disaster", The University of Sydney, Japanese Law and the Asia-Pacific, available at: http://blogs.usyd.edu.au/japaneselaw/2015/01/resolving_nuclear_claims.html. In general on ADR see Zekoll, J. et al. (2014), "The Changing Face of Dispute Resolution", in Zekoll, J. et al. (eds.), *Formalisation and Flexibilisation in Dispute Resolution*, *supra* note 73, pp. 1-13.
75. Rylands v. Fletcher (1868) LR 3 HL 330, [1868] UKHL 1, LR 3 HL 330.
76. 42 USC 2011 et seq. The liability provisions, found at 42 USC 2210 (Sec. 170, "Indemnification and Limitation of Liability"), were inserted into the AEA in 1957 through the Price-Anderson Act.

causes of the damage, and the results of that survey have to be submitted to the Congress and to the Representatives and Senators of the affected states, and, provided the information will not seriously damage national defence of the US, to the public, to the parties involved and to the courts. Not later than 90 days after a court has determined, pursuant to Subsection o, that the public liability may exceed the applicable amount of aggregate public liability under AEA, Section 170(e)(1)(A), (B), or (C) the President has to submit to both Houses of Congress:

> (A) an estimate of the aggregate dollar value of personal injury and property damage that arises from the nuclear incident and exceeds the amount of aggregate public liability under subsection e.(1);
>
> (B) recommendations for additional sources of funds to pay claims exceeding the applicable amount of aggregate public liability under subparagraph (A), (B), or (C) of subsection e.(1) …;
>
> (C) 1 or more compensation plans, that either individually or collectively shall provide for full and prompt compensation for all valid claims and contain a recommendation or recommendations as to the relief to be provided, including any recommendations that funds be allocated or set aside for the payment of claims that may arise as a result of latent injuries that may not be discovered until a later date; and
>
> (D) any additional legislative authorities necessary to implement such compensation plan or plans.[77]

Congress has to deal with the compensation plan in accordance with an exact procedural schedule as provided for in AEA, Section 170(i) and make a resolution. "The Congress will thoroughly review the particular incident and will take whatever action is determined necessary and appropriate to protect the public from the consequences of a disaster of such magnitude." (AEA, Section 170(e)(2)).

The US Supreme Court identified that involvement of Congress with a view to ensuring compensation beyond the liability limitation of the operator liable already in its 1978 judgement as a prerequisite for accepting the arbitrary liability limitation as compatible with the US Constitution.[78]

AEA, Section 170(l)(1) obliges the US President to study "means of fully compensating victims of a catastrophic nuclear accident that exceeds the amount of aggregate public liability under subsection e (1)". This Report was published in 1990.[79] Its recommended system is divided into three categories: civil procedures, claims priorities and latent injuries. However, the findings of the Commission apparently did not have any effect on the US legislation or practice.

Major nuclear accidents impact on both the substance of nuclear liability law and the procedural rules independently of, and in addition to, possible actions by Congress. In the event of an extraordinary nuclear occurrence (AEA, Section 11(j)), AEA, Section 170(n)(1) authorises the NRC or the Secretary of Energy to incorporate provisions in the indemnity agreements with licensees and contractors that waive certain issues and defenses relating, for instance, to conduct of the claimant or to fault of the persons indemnified. Pursuant to AEA, Section 170(n)(2) the chief judge

77. AEA, Section 170(i)(2)(A)-(D).
78. Duke Power Co. v. Carolina Environmental Study Group, 438 US 59 (1978).
79. Griffith, Jr., S.C. et al. (1990), *Report to the Congress from the Presidential Commission on Catastrophic Nuclear Accidents*, Vols. 1 and 2. See on the report: Saltzman, J. (1993), "Conclusions of the Presidential Commission on Catastrophic Nuclear Accidents, I-II", in NEA, IAEA (eds.), *Nuclear Accidents: Liabilities and Guarantees*, Proceedings of the Helsinki Symposium, OECD, Paris, pp. 265-277.

of the competent court may appoint a special caseload management panel to coordinate and assign cases – but not necessarily hear cases themselves (AEA, Section 170(n)(3)(A)).

The caseload management panel may be established if the court decides that the public liability is likely to exceed the amount of primary financial protection or if the chief judge determines that cases will have "an unusual impact on the work of the court" (AEA, Section 170 (n)(3)(A)(i)-(ii)). The panel shall consist only of members who are US district judges or circuit judges (AEA, Section 170(n)(3)(B)(i)). The panel shall have the function:

(i) to consolidate related or similar claims for hearing or trial;

(ii) to establish priorities for the handling of different classes of cases;

(iii) to assign cases to a particular judge or special master;

(iv) to appoint special masters to hear particular types of cases, or particular elements or procedural steps of cases;

(v) to promulgate special rules of court, not consistent with the Federal Rules of Civil Procedure, to expedite cases or allow more equitable consideration of claims;

(vi) to implement such other measures, consistent with existing law and the Federal Rules of Civil Procedure, as will encourage the equitable, prompt, and efficient resolution of cases arising out of the nuclear incident; and

(vii) to assemble and submit to the President such data, available to the court, as may be useful in estimating the aggregate damages from the nuclear incident.[80]

AEA, Section 170(o) contains provisions on a "Plan for Distribution of Funds" if the public liability from a single nuclear incident may exceed the limit of liability under AEA, Section 170(e)(1).

In particular, the provisions on the Compensation Plan, on the Caseload Management Panel and on the Distribution Fund Plan aim at facilitating the handling and organising procedures dealing with major and catastrophic nuclear damage and including nuclear mass tort litigations.[81]

7.2. Appraisal

When the US nuclear liability law was drafted and enacted in 1957, it was a pioneer legislation: the first specialised nuclear liability law in the world. It was repeatedly amended, but those amendments did not affect its original architecture. The Price-Anderson legislation, i.e. AEA, Section 170, is not fully in line with the international nuclear liability principles. There are therefore doubts as to whether its basic legislative concept should be recommended as an example for other states. However, with regard to handling and organising major nuclear incidents and mass tort litigations resulting thereof, the amended Price-Anderson legislation deserves consideration.

80. AEA, Section 170(n)(3)(C)(i)-(vii).

81. The rich literature on the Price-Anderson Act is easily accessible in bibliographies, libraries and the internet. There is no need to present a selection here. It might, however, be interesting to give attention to an article that compares the US and the international nuclear liability regimes: Faure, M.G. and T. Vanden Borre, "Compensating Nuclear Damage: A Comparative Economic Analysis of the US and International Liability Schemes", *William & Mary Environmental Law and Policy Review*, Vol. 33, pp. 219-286 (2008).

AEA, Section 170 follows a twin-track approach. It explicitly involves the Congress with a view to increasing the compensation amount beyond the limit foreseen in the Act, and in parallel it leaves untouched the recourse of claimants to the courts. No special "tribunal" or other body outside the court regime is established to deal finally with claims for nuclear compensation. The "special caseload management panel" is only entrusted with tasks that are meant to prepare, to assist and to support the decision of the competent court. It does not have an autonomous judicial function. There is no risk that extra-judiciary bodies conflict with the judiciary and thus may interfere with the right of victims to a public hearing before a court. In cases of mass tort claims, the panel is well equipped to expedite procedures by pre-sorting classes of claims and cases. Thus, it is apt to contribute to the prompt compensation of the victims of a nuclear incident by the regular courts.

8. Conclusion

It is difficult or even impossible to draw general conclusions on how states will handle nuclear mass tort litigations since only a small number of national legislations could be looked at in more detail. So caution is advised if the author tries an assessment nevertheless.

A great majority of states do not issue any specific legislation on nuclear mass tort litigations. They apparently build on general traditional practice as most probably already tried and tested in other areas. Some states defer the decision on the way to deal with mass tort claims to the time of the nuclear incident. They insert into their nuclear liability laws respective "reminders" that contain an invitation or a demand to the legislator to take appropriate steps if and when necessary. Finally, there are a number of states that enacted elaborate regimes on how to react to, and organise, compensation of mass damages after a catastrophic nuclear incident. Among those states are in particular major nuclear states like Canada, India, Japan and the US. They developed compensation schemes where claims for compensation of nuclear damage shall be dealt with by fora that are not regular courts. In some of those states, the fora are exclusively competent without a right to appeal their decisions, while in other states the fora act in parallel or in complement to courts. So the international scenario appears to be somewhat confusing.

Of course, sovereign states are free to organise claims processing, including nuclear mass claims processing, as they deem fit. The discretion of states is, however, limited by obligations under public international law.

With regard to the victims of nuclear incidents, states are particularly bound by obligations under the 1948 Universal Declaration of Human Rights and other relevant instruments they may be a party to. National nuclear mass claim processing has in particular to comply with the obligation to guarantee "a fair and public hearing by an independent and impartial tribunal".[82]

With regard to possible international obligations *vis-à-vis* other states, it has to be taken into account that major nuclear incidents, as a rule, have transboundary detrimental effects. There is always a potential impact on territories other than the territory of the incident state.[83] As a consequence, states with nuclear programmes have to be aware that a nuclear incident may cause damage in the territories of other states and they have to take precautionary measures to prevent such impact on other territories. This brings into play the public international law principle of

82. See *supra* note 33.
83. Since Japan is an island, the transboundary effects of the Fukushima Daiichi NPP accident on the territories of states other than Japan seem to be more or less negligible.

good neighbourliness. The principle imposes the obligation on a state not to use its own territory in a way that causes significant damage in neighbouring countries.[84] Of course, that principle addresses states that have nuclear programmes rather than non-nuclear states. Those programmes may be qualified as constituting a permanent potential threat to neighbouring states. So a nuclear state and its non-nuclear neighbours form a risk community. If, however, a common risk exists, there are also common obligations to contribute to preventing that the risk is materialised into a damage or, if so, to contribute to mitigating the consequences of the damage.

In Section 3.1 of this article, it has already been explained that the advantages of the international nuclear liability conventions can only fully be enjoyed if parties jointly train to fight nuclear emergencies including the nuclear claims processing. Those exercises require that states have mutual knowledge of how other parties deal with nuclear mass tort litigations. The joint practice for an emergency indeed could be seen as complying with an implied accessory obligation under the nuclear liability conventions to fully be able to use their advantages. A treaty obligation to co-operate can be identified. That obligation may be supported and strengthened by the obligations connected with being part of the described risk community.

It follows from these considerations that states would be well advised if they at least develop, establish and publish, the basic schemes of their respective nuclear mass tort litigations organisation. That requirement would not adequately be met through legislation that defers the decision to the time of the nuclear incident. Such an approach does not provide sufficient detailed advance information to be used by other states. The victim of other states should know: what will happen if there is nuclear damage in excess of the compensation money to be provided by the person liable? Will there be *pro rata* compensation or will the state step in and ensure full compensation? Is class action possible under the respective national regime? Which rules apply to the onus of proof? Legislation covering those issues that is only enacted after the nuclear incident does not sufficiently support prompt compensation. Respective legislation should be made available prior to the occurrence of a nuclear incident.

The organisation of nuclear mass tort processing is a subject that needs further observation. Perhaps it might even be advisable to establish international treaty relations on a joint skeleton of nuclear mass tort litigation.

84. Trail Smelter Case (United States of America/Canada), Reports of International Arbitral Awards (RIAA), Volume III (11 March 1941), pp. 1905-1982. See, e.g., Bratspies, R.M. and R.A. Miller (eds.) (2006), *Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration*, Cambridge University Press, Cambridge, in particular the "Introduction" by the two editors at pp. 1-10. On this issue also see the general textbooks on public international law with further references. See in particular the "Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities", in UN General Assembly (2006), *Report of the International Law Commission*, UN Doc. A/61/10, pp. 106 and 110.

Case Law

United States

Virginia Uranium, Inc. v. Warren, 848 F.3d 590 (4th Cir. 2017)

The US Court of Appeals for the Fourth Circuit affirmed the lower court ruling that under the Atomic Energy Act conventional uranium mining on non-federal land is not regulated by the Nuclear Regulatory Commission (NRC).

In the United States District Court for the Western District of Virginia, the plaintiffs, a collection of uranium mining companies and owners of land containing uranium deposits, challenged a Commonwealth of Virginia moratorium on conventional uranium mining. The plaintiffs alleged that the state moratorium was pre-empted by federal law under the Supremacy Clause of the US Constitution.[1] Officials for the Commonwealth of Virginia moved to dismiss the plaintiffs' complaint, which was granted by the District Court. The District Court found that the Virginia moratorium on uranium mining was not pre-empted by federal law.[2] Specifically, the District Court stated that the Atomic Energy Act[3] does not give the NRC the authority to regulate the conventional mining of uranium deposits that are on non-federal lands.[4] Additionally, the District Court found that Virginia's implementation of the uranium mining moratorium did not intrude on an activity

1. The Supremacy Clause of the US Constitution is a conflict-of-laws type of provision with a long-standing history in American jurisprudence. Under the Supremacy Clause, if there is a clash between federal and state law, then federal law prevails and the state law is invalid. There are several types of pre-emption under the Supremacy Clause: express pre-emption, where Congress specifically states that a federal law pre-empts state law; field pre-emption, where federal laws are so pervasive in a field or area that states cannot create laws in that same field or area; and conflict pre-emption, where it would be impossible to comply with both state law and federal law or the state law places an obstacle in achieving Congressional objectives.
2. Virginia Uranium, Inc. v. McAuliffe, 147 F. Supp. 3d 462, 478 (W.D. Va. 2015).
3. 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, 2296a-2297h-13 (1954). Because the Atomic Energy Act provides the NRC authority to regulate the civilian use of nuclear materials and facilities in order to protect public health and safety, laws motivated by radiological safety concerns are solely within the province of the federal government through field pre-emption under the Supremacy Clause. Pacific Gas & Elec. Co. v. State Energy Resources Conservation & Dev. Comm'n, 461 US 190 (1983). However, under the Agreement State Program, states may voluntarily enter agreements with the NRC in which the NRC discontinues portions of its regulatory authority and allows the state to act in its stead so long as the states meet certain requirements.
4. Virginia Uranium, *supra* note 2, at 471.

that the Atomic Energy Act clearly committed to the NRC's regulatory authority because the Atomic Energy Act does not specifically regulate these activities.[5]

As a result of the District Court's decision to grant the motion to dismiss its complaint, the plaintiffs appealed the ruling to the US Court of Appeals for the Fourth Circuit. On appeal, the plaintiffs reasserted that the Virginia moratorium was pre-empted by the Atomic Energy Act.[6] The Court of Appeals affirmed the lower court's decision that the Virginia moratorium on conventional uranium mining was not pre-empted by federal statute.[7] In affirming the District Court's decision, the Court of Appeals rejected three arguments raised by the plaintiffs.

First, the Court of Appeals addressed whether conventional mining was an activity regulated by the NRC under the Atomic Energy Act.[8] In rejecting this first argument, the Court of Appeals deferred to the NRC's interpretation of its authority under the Atomic Energy Act – the NRC does not have authority to regulate conventional uranium mining on non-federal land, as is the case here.[9] Second, the Court of Appeals addressed arguments concerning the storage of uranium ore millings and tailings, which the plaintiffs argued is an NRC-regulated activity that was effectively banned by the Virginia moratorium out of concern for radiological hazards associated with such activities. The Court of Appeals declined, however, to look at the moratorium's effects on uranium ore millings and tailings storage and distinguished cases in which state laws that indirectly regulated activities that fell within the scope of the Atomic Energy Act were deemed pre-empted.[10] Finally, the plaintiffs argued that the Virginia moratorium prevents full implementation of the objectives of the Atomic Energy Act.[11] In addressing this argument, the Court of Appeals looked at several facts about the uranium supply in the United States and found that Virginia's moratorium would not materially affect the purposes and objectives of the Atomic Energy Act.[12]

United States v. Energy Solutions, Inc.; Rockwell Holdco, Inc.; Andrews County Holdings, Inc.; and Waste Control Specialists, LLC. (D. Del. June 21, 2017)

In 2016, the United States, acting through the US Department of Justice, commenced an action in United States District Court in Delaware seeking to enjoin the acquisition of Waste Control Specialists, LLC (WCS) and its parent company by Energy Solutions, Inc., and its parent. WCS and Energy Solutions are competitors in the market for the disposal of low-level radioactive waste (LLRW) produced by commercial generators of such material. The vast majority of this type of waste is generated by nuclear power plants, which produce such waste during both operations and decommissioning. The United States alleged that the proposed acquisition was unlawful under Section 7 of the Clayton Act, 15 USC § 18. That provision prohibits a merger "in any line of commerce or in any activity affecting commerce in any section of the country", where "the effect of such acquisition may be substantially to lessen competition, or to tend to create a monopoly". Because the case did not involve health and safety issues or protection of the public from radiological hazards, the US Nuclear Regulatory Commission was not a party to the case and did not take a position with respect to the proposed acquisition.

5. *Ibid*. at 476.
6. *Ibid*. at 478.
7. Virginia Uranium, Inc. v. Warren, 848 F.3d 590, 593 (4th Cir. 2017).
8. Atomic Energy Act, *supra* note 3, § 2021(k).
9. Virginia Uranium, *supra* note 7, at 596.
10. *Ibid*. at 598. See also Skull Valley Band of Goshute Indians v. Nielson, 376 F.3d 1223 (10th Cir. 2004); Entergy Nuclear Vermont Yankee, LLC v. Shumlin, 733 F.3d 393 (2d Cir. 2013).
11. Virginia Uranium, *supra* note 7, at 599.
12. *Ibid*.

The court agreed with the United States that the acquisition would have anticompetitive effects in the markets for the disposal of both lower-activity LLRW (i.e. class A waste) and higher-activity LLRW (i.e. class B and C waste) in the 38 US territories (36 states plus the District of Columbia and Puerto Rico) in which facilities owned by Energy Solutions (in Clive, Utah) and WCS (in Andrews, Texas) are the only places that will accept such waste. The court found that for both higher-level and lower-level LLRW, the result of the merger would be that Energy Solutions would hold an "undue percentage of the relevant product market", which would in turn harm competition.

The court rejected several arguments raised by Energy Solutions and WCS in defence of the acquisition. First, it rejected defendants' arguments that there were alternatives to disposal, such that the relevant markets should have been defined more broadly (and such that the extent of the combined market power of Energy Solutions and WCS would be less). Specifically, the court rejected the assertion that generator storage, on-site burial and waste minimisation were alternatives that should have been included in defining the relevant market. The court also rejected the defendants' assertions that other competitors could easily enter the market and that WCS is a "failing firm" that would go out of business absent the acquisition. The court noted that there were other potentially available purchasers of WCS.

As a result of its findings, the court enjoined Energy Solutions' acquisition of WCS.

Cooper v. Tokyo Electric Power Company, No. 15-56426 (9th Cir. 2017)

Even though Japan's nuclear liability law channels liability for nuclear damage exclusively to nuclear operators and provides for unlimited liability, a Fukushima-related lawsuit brought in 2012 is still pending in US Federal courts in California,[13] initially against Tokyo Electric Power Company (TEPCO) and later amended to include four suppliers as defendants (General Electric, EBASCO, Toshiba and Hitachi).[14] The plaintiffs are US Navy service members (or those claiming through them) who were deployed off the Japanese coast as part of the US effort to provide earthquake relief, named Operation Tomodachi. They allegedly were injured by radiation exposure when US Naval commanders allegedly positioned a "Strike Force" consisting of the *USS Ronald Reagan* and "other vessels" too close to the damaged Fukushima Daiichi Nuclear Power Plant (FNPP) after the 9.0 earthquake and tsunami that struck Japan on 11 March 2011.

13. In the first iteration of this case, plaintiffs' complaint was dismissed, though the District Court provided the plaintiffs an opportunity to amend their complaint. Cooper et al. v. Tokyo Electric Power Company, Inc., 990 F. Supp. 2d 1035, 1039-42 (S.D. Cal. 2013) (Cooper I) (more information about this opinion can be found in Nuclear Energy Agency (NEA) (2014), "Dismissal by US District Court Judge of lawsuit brought by US military personnel against Tokyo Electric Power Company (TEPCO) in connection with the Fukushima Daiichi nuclear power plant accident", *Nuclear Law Bulletin*, No. 93, OECD, pp. 94-95). This present decision arises out of the amended complaint.
14. On 18 August 2017, counsel for the Cooper plaintiffs filed another lawsuit in the same court that they seek to have consolidated with the existing action. Bartel et al. v. Tokyo Electric Power Company, Inc. et al., No. 17CV1671 DMS KSC (S.D. Cal., San Diego Div.). The new lawsuit identified an additional 157 individuals (for a combined total of 396) claimed to have been injured. Because of problems with service of process, the only named supplier defendant is General Electric. The plaintiffs' complaints, however, list numerous fictitious "Does" as defendants. This generally enables plaintiffs to add additional defendants identified later, even after statutes of limitations have run.

Plaintiffs sued alleging "that TEPCO was negligent in operating the FNPP and in reporting the extent of the radiation leak".[15] TEPCO moved to dismiss the complaint under the doctrine of international comity or *forum non conveniens* (among other arguments), which the District Court denied.[16] The District Court did, however, certify the issues for appeal to the US Court of Appeals for the Ninth Circuit.

On interlocutory appeal, the Government of Japan filed an *amicus* brief expressing Japan's interest in centralising claims in Japan, while the US Government (USG) argued in its *amicus* brief that "the district court did not err in allowing plaintiffs' claims to proceed for the time being" and "that allowing Plaintiffs' lawsuit to continue in the United States is consistent with US efforts to promote the Convention on Supplementary Compensation for Nuclear Damage".[17] On 22 June 2017, the Ninth Circuit Court of Appeals affirmed the US District Court's denial of TEPCO's motion to dismiss the *Cooper* lawsuit.

The Court of Appeals held that the provision in Article XIII of the Convention of Supplementary Compensation for Nuclear Damage[18] for exclusive jurisdiction in the courts of the accident country did not strip US courts of jurisdiction over claims arising out of nuclear incidents that occurred prior to the CSC's entry into force on 15 April 2015. This ruling emphasised the USG's position that if the court were to find otherwise (i.e. that Article XIII's jurisdiction-stripping provision also applies to claims arising out of nuclear incidents that occurred before the CSC's entry into force) would discourage other countries from joining the CSC before an accident, thereby interfering with the USG's "strong interest in maintaining jurisdiction over this in order to help promote the CSC".

The Ninth Circuit Court of Appeals further held that the District Court did not abuse its discretion when it did not dismiss the lawsuit on grounds of *forum non conveniens* or international comity, even though it recognised that Japanese courts would provide an adequate alternative forum and that approximately 2.4 million Fukushima claims then had been resolved in Japan with total payments equivalent to more than USD 58 billion. The case was then sent back to the US District Court in San Diego for further proceedings, which could include discovery and a trial.

The District Court in San Diego held a status conference on 31 August 2017; and, on 6 September 2017, issued Orders in both the Cooper and Bartel cases that give some indication as to how the cases will proceed. Tentative dates were set for further motions to dismiss and for another hearing on 20 November 2017. The Orders also said the Court is "…amenable to the trial date proposed by Plaintiff in May of 2019". Both further noted "…there are significant legal issues that must be resolved prior to the setting of a firm trial date". In short, the Cooper and Bartel cases are likely to remain unresolved for a few more years.

The Ninth Circuit's opinion and the USG's December brief against the positions of TEPCO and the Government of Japan starkly illuminate the danger for suppliers doing business in the United States to assume that lawsuits brought in US courts following a foreign nuclear accident generally will be dismissed where the foreign country is not in treaty relations with the United States under the CSC or on the basis of *forum non conveniens* or international comity. If the CSC had been in force between the United States and Japan at the time of the 2011 Fukushima accident, US courts would not have jurisdiction.

15. Cooper et al. v. Tokyo Electric Power Company, Inc., No. 15-56424 (9th Cir. 2017), p. 10. (Cooper II).
16. Id. at 10-11. Cooper et al. v. Tokyo Electric Power Company, Inc., 166 F. Supp. 3d 1103 (S.D. Cal. 2015).
17. Cooper II, *supra* note 15, p. 11.
18. Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 ILM 1473, entered into force 15 April 2015 (CSC).

National legislative and regulatory activities

Algeria

Nuclear safety and radiological protection

Executive Decree No. 17-126 of 27 March 2017

A new regulatory framework sets out the measures taken to prevent radiological and nuclear risks and the means and modalities put in place to respond to nuclear or radiological accidents should they occur.

The Algerian Executive Decree No. 17-126 of 27 March 2017[1] establishes a regulatory framework that organises and defines the roles and responsibilities of stakeholders in order to prevent and limit the consequences of any radiological or nuclear accident.

The new scheme is based on the system for preventing and combatting disasters established by Law No. 04-20 of 25 December 2004 regarding the prevention of major risks and the management of disasters within the context of sustainable development, as well as the International Atomic Energy Agency (IAEA) safety requirements relating to preparedness and response for a nuclear or radiological emergency.

The Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, to which Algeria is a party, encourage parties to implement arrangements in order to manage emergency situations.

The new Algerian regulatory framework ensures proper response co-ordination and management in accordance with the main features of the radiological and nuclear risks management principles which are: monitoring, alert and preparedness.

According to the new system, the Algerian Atomic Energy Committee (Commissariat à l'énergie atomique) is responsible for the monitoring of radiological and nuclear risks. It fulfils its mandate by managing a nation-wide surveillance network, analysing any unforeseen radiological or nuclear event and its impact as well as relaying relevant information to all levels of the country's administrative system.

Alerts can be raised at the local or national level, depending on the seriousness and scope of the foreseeable consequences of any event. The response is organised according to either the Internal Emergency Plans established by operators, the Detailed Emergency Plans set out by local authorities or the National Radiological and Nuclear Response Plan established by the Nuclear and Radiological Emergency Interdisciplinary Committee (the Interdisciplinary Committee) placed under the authority of the Ministry of the Interior and Local Authorities.

1. Executive Decree No. 17-126 of 27 March 2017 detailing the measures taken to prevent radiological and nuclear risks as well as the means and modalities put in place respond to radiological or nuclear disaster, should they occur. Available at: www.joradp.dz/FTP/jo-francais/2017/F2017021.pdf.

In case of an accident, response to the radiological and/or nuclear accident is co-ordinated by the Interdisciplinary Committee at the local and national levels. The Interdisciplinary Committee is responsible for activating international assistance and notification procedures pursuant to the above-mentioned conventions.

This system will also allow Algeria to respond to radiological emergency situations that may occur abroad and have an impact on the Algerian territory, as well as to malicious actions involving the use of radioactive material.

Belgium

Liability and compensation

Law of 7 December 2016 modifying the law of 22 July 1985 on third party liability in the field of nuclear energy[2]

The Belgian Law on nuclear third party liability of 29 June 2014 (2014 Law) entered into force on 1 January 2016, more than ten years after the signature of the 2004 Protocols[3] to amend the Paris[4] and Brussels Supplementary Conventions[5] (jointly referred to as the 2004 Protocols). The 2014 Law modified the existing Law of 22 July 1985 Law on nuclear third party liability in the field of nuclear energy (1985 Law), transposing the 2004 Protocols. The 2016 entry into force of the 2014 Law, however, was perceived to have taken effect somewhat prematurely: before the ratification by the EU member states of the 2004 Protocols, before the entry into force of the 2004 Protocols[6] and before a system was enacted to regulate the modalities of the state financial security to be provided to the nuclear operator to cover certain heads of damage provided in the 2004 Paris Protocol if it is proven impossible to obtain relevant full coverage from the private insurance or the financial markets.

The Belgian legislature intervened by adopting the Law of 7 December 2016 modifying the Law of 22 July 1985 on third party liability (2016 Law), to temporarily revert back to the previous legal situation for certain provisions. Indeed, according to Article 7 of the new 2016 Law, the definitions of the terms "nuclear damage", "measures of reinstatement", "preventive measures" and "reasonable measures", which had been amended by the 2014 Law to reflect the modified definitions

2. *Moniteur belge* [Belgian Official Journal] 14 December 2016, p. 86382-86383.
3. Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (2004) (not yet in force), available at: www.oecd-nea.org/law/paris_convention.pdf (2004 Paris Protocol); Protocol to Amend the Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (2004) (not yet in force), available at: www.oecd-nea.org/law/brussels_supplementary_convention.pdf (2004 Brussels Protocol).
4. Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1960), 1519 UNTS 329 (Paris Convention or PC).
5. Convention of 31st January 1963 Supplementary to the Paris Convention of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1963), 1041 UNTS 358 (Brussels Supplementary Convention or BSC).
6. The 2004 Protocol to amend the Paris Convention will enter into force upon ratification by at least two thirds of the contracting parties to the Paris Convention; and the 2004 Protocol to amend the Brussels Supplementary Convention will enter into force upon ratification by all the contracting parties to the Brussels Supplementary Convention.

contained in Article 1 of the Paris Convention as amended by the 2004 Protocol,[7] will enter into force only on 1 January 2018, or on such date as the King may establish by Royal Decree. However, the definitions will enter into force, in any event, on 1 January of the year following the entry into force of the 2004 Paris Protocol.

Thus, the heads of damage to be covered by insurance or other financial security according to the 2016 Law temporarily remain those referred to in the currently applicable Paris Convention, it being expressly stated in the 2016 Law that, until the entry into force of the new definitions, "nuclear damage" will mean "damage to persons and goods as provided in the Civil Code" (or, in other terms, the heads of damage that must be covered pursuant to the currently applicable Paris Convention, as required before the law of 29 June 2014 entered into force).

Similarly, the prescription period for claims for bodily injury brought between 10 and 30 years after the occurrence of a nuclear incident is again, as was the case before the entry into force of the 2014 Law, covered by a financial security provided by the Belgian State to the nuclear operators. This State financial security will be provided until 1 January 2018, or until an earlier or later date to be determined by Royal Decree, or until 1 January of the year following the entry into force of the 2004 Paris Protocol when the operator will have to obtain insurance or financial security in the insurance or financial markets.

The 2016 Law also specifies that the measures applicable to nuclear damage caused by a nuclear incident according to the Paris Convention and the Belgian Law will apply in non-contracting states of the Paris Convention without nuclear installations, if the King extends their application to such state by Royal Decree deliberated in the Council of Ministers. Thus, the modification of the territorial scope of application as foreseen in the revised Paris Convention is also postponed until the adoption of such Royal Decree.

Finally, with respect to the provision of Article 7(1) of the 1985 Law, the 2016 Law clarifies explicitly, as had also been the understanding of the nuclear sector even before the entry into force of the 2016 Law, that the maximum amount of nuclear damage for which the nuclear operator is liable amounts to EUR 1.2 billion for each nuclear incident.

The effect of the 2016 Law modifying the 1985 Law is therefore to reinstate the situation preceding the entry into force of the 2014 Law, while allowing the King to expeditiously react to any future change with respect to the entry into force of the 2004 Protocols, which is expected to take place soon, the date, however, remaining uncertain.

7. Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982, and by the Protocol of 12 February 2004 (not yet in force), an unofficial consolidated text is available at: www.oecd-nea.org/law/Unofficial%20consolidated%20Paris%20Convention.pdf (revised Paris Convention).

Canada

Liability and compensation

Ratification by Canada of the Convention on Supplementary Compensation for Nuclear Damage

On 6 June 2017, Canada ratified the Convention on Supplementary Compensation for Nuclear Damage (CSC).[8] Because Canada is not a member of the Paris Convention[9] or the Vienna Convention,[10] it was required to join as an Annex State. Ratification followed the 1 January 2017 entry into force of the Nuclear Liability and Compensation Act[11] and the Nuclear Liability and Compensation Regulations.[12] The NLCA replaced the previous domestic legislation in order to better address liability and compensation in the event of a nuclear accident in Canada. *Nuclear Law Bulletin* Nos. 92[13] and 95[14] provide a more detailed description of the NLCA.

In addition to implementing Canadian membership in the CSC, the NLCA provides that the operator of a nuclear installation is absolutely and exclusively liable for damages arising from an accident at that operator's nuclear installation or from an accident during transportation of nuclear material from the operator's nuclear installation. The legislation also increases the liability limit for operators and broadens the definition of compensable damages to include environmental damages and preventative measures. Finally, the legislation extends the limitation period for making claims for bodily injury and loss of life to 30 years and adapts a dual system for the compensation of claims. To meet its obligations under the CSC, Canada provided the Depositary of the CSC with a copy of the NLCA, which complies with the provisions of the CSC and CSC Annex.

Membership in the CSC is important to Canada, as it will address liability and compensation within member countries arising from nuclear accidents occurring at nuclear installations and during the transportation of nuclear material. The CSC also provides legal certainty on jurisdiction in the case of a nuclear incident in Canada or another CSC member country, and limits the liability of Canadian nuclear suppliers and contractors who wish to conduct business in member countries. In addition, it will make available an additional assured amount of compensation to claimants in Canada through the CSC's pooled funding. Canada's contribution to the CSC public fund will be reimbursed by nuclear power plant operators, pursuant to the NLCA.

8. Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 ILM 1473, entered into force 15 April 2015 (CSC). IAEA, News Report, "Canada Joins the Convention on Supplementary Compensation for Nuclear Damage" (8 June 2017), available at: www.iaea.org/newscenter/news/canada-joins-the-convention-on-supplementary-compensation-for-nuclear-damage.
9. Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1960), 1519 UNTS 329 (Paris Convention or PC).
10. Vienna Convention on Civil Liability for Nuclear Damage (1963), IAEA Doc. INFCIRC/500, 1063 UNTS 266, entered into force 12 November 1977 (Vienna Convention).
11. Nuclear Liability and Compensation Act, Statutes of Canada (SC) 2015, Chapter 4, section 120 (NLCA).
12. Nuclear Liability and Compensation Regulations, Statutory Orders and Regulations (SOR)/2016-88.
13. Nuclear Energy Agency (NEA) (2013), "Liability and compensation", *Nuclear Law Bulletin*, No. 92, OECD, Paris, pp. 99-100.
14. NEA (2015), "An Act respecting Canada's offshore oil and gas operations, enacting the Nuclear Liability and Compensation Act, repealing the Nuclear Liability Act and making consequential amendments to other Acts (Short title: Energy Safety and Security Act)", *Nuclear Law Bulletin*, No. 95, OECD, Paris, pp. 69-70.

Canada's ratification of the CSC demonstrates the Government of Canada's commitment to the establishment of a global nuclear liability regime.

France

Radioactive waste management

*Decree No. 2017-231 of 23 February 2017 implementing Article L. 542-1-2 of the French Environmental Code (*Code de l'environnement*) and setting out the provisions of the National Radioactive Material and Waste Management Plan*[15]

Order of 23 February 2017 implementing Decree No. 2017-231 of 23 February 2017 implementing Article L. 542-1-2 of the French Environmental Code setting out the provisions of the National Radioactive Material and Waste Management Plan[16]

The Decree of 23 February 2017 adds a new Section 9 to Book V, Title IV, Chapter II of the Environmental Code (Regulatory part). This new Section entitled "National Radioactive Material and Waste Management Plan" (Plan national de gestion des matières et des déchets radioactifs) (PNGMDR) comprises Articles D. 542-74 to D. 542-96.

The PNGMDR takes stock of the existing radioactive material and waste management methods and technical solutions implemented in this regard; lists the foreseeable needs of interim and final storage facilities; and sets out the required capacity of these facilities as well as the storage durations.

The new Section defines the roles assigned to radioactive waste producers, especially in relation to the studies that need to be submitted to French National Radioactive Waste Management Agency (Agence nationale pour la gestion des déchets radioactifs) (Andra) and the Minister of Energy. The Section details the management modalities for:

- interim situations (interim storage capacity for spent fuel and long-lived high-level (HLW) and intermediate-level (ILW) waste);
- nuclear material;
- long-term management of radioactive waste (legacy stocks, management by natural radioactive decay of very-short-lived waste (VSLW), management of very-low-level waste (VLLW), management of long-lived low-level waste(LLW), research and studies relating to HLW and ILW management, the CIGEO Project, spent fuel management, and ILW management).

This Decree repeals Decree No. 2013-1304 of 27 December 2013 implementing Article L. 542-1-2 of the Environmental Code and setting out the provisions of the PNGMDR, as well as Articles D. 542-18 and D. 542-19 of the Environmental Code.

The Order, also dated 23 February 2017, draws a detailed list of the studies and reports that need to be submitted pursuant to the PNGMDR 2016-2018.

For example, the Nuclear Safety and Radiological Protection Institute (Institut de radioprotection et de sûreté nucléaire) (IRSN) is expected to submit to the Ministers in charge of Nuclear Safety and Energy, by 31 December 2017, a report on the possible methodology and criteria that could be used to assess the level of harmfulness of radioactive material and waste. This report should also include

15. *Journal officiel "Lois et Décrets"* [Official Journal of Laws and Decrees] (J.O.L. et D.), 25 February 2017, text no. 9.
16. J.O.L. et D., 25 February 2017, text no. 12.

considerations on the evolution of radioactive material and waste characteristics on the short, medium and long term, the environmental toxicity of radioactive material and waste and the associated impact of the management modalities set out by the PNGMDR.

As from the 2018 edition, the National Inventory compiled by Andra under Article L. 542-12 of the Environmental Code shall:

- propose reference industrial scenarios in line with the objectives of Law No. 2015-992 of 17 August 2015 relating to the Energy Transition for Green Growth;
- present a prospective scenario of non-renewal of the nuclear electricity production in which material that cannot be reused is considered as waste; and
- consider an alternative scenario for the renewal of the French nuclear power plant fleet in which the future fleet contains no fast reactor.

All the required studies and reports are listed by topic, with an indication of the parties involved and a deadline for submission in either 2017 or 2018.

This Order repeals the Order of 7 November 2014 implementing Decree No. 2013-1304 of 27 December 2013 implementing Article L. 542-1-2 of the Environmental Code and setting out the provisions of the PNGMDR.

Liability and compensation

Order of 10 November 2016 amending the Appendix to the Order of 19 August 2016 setting the list of reduced liability amount sites pursuant to Decree No. 2016-333 of 21 March 2016 implementing Article L. 597-28 of the Environmental Code and relating to third party liability in the nuclear energy field[17]

Article L. 597-28 of the Environmental Code sets the liability amount for a nuclear installation's operator at EUR 700 million for a single nuclear accident. This amount can be reduced to EUR 70 million for a single nuclear accident when only low-risk facilities are operated on a single site.

The Decree of 21 March 2016 defines the characteristics of low-risk installations.

Pursuant to Article 3 of this Decree, the Appendix to the Order of 19 August 2016 draws the list of low-risk sites for which an operator's liability amount is reduced.

The list includes:

- the Aube waste disposal facility (Centre de stockage de l'Aube) (CSA), operated by Andra;
- 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

17. J.O.L. et D., 16 November 2016, text no. 6.

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; and
- the equipment servicing centre (Centre de maintenance des outillages) (CEMO), operated by AREVA.

The Order of 10 November 2016 amends the list drawn in Order of 19 August 2016 to add:

- the Basic Nuclear Installation (INB No. 138) operated by SOCATRI;
- the Basic Nuclear Installation (INB No. 143) operated by SOMANU; and
- the Basic Nuclear Installation (INB No. 160) operated by SOCODEI.

International co-operation

Decree No. 2016-1225 of 16 September 2016 making public the Protocol to the Co-operation Agreement between the Government of the French Republic and the Government of the Hashemite Kingdom of Jordan for the Development of the Pacific Uses of Nuclear Energy, signed in Paris on 27 August 2008[18]

This Decree makes public the Co-operation Agreement between the Government of the French Republic and the Government of the Hashemite Kingdom of Jordan for the Development of the Pacific Uses of Nuclear Energy, signed in Paris on 27 August 2008 and entered into force on 11 July 2016.

The Agreement aims to establish institutional and industrial co-operation between the parties and the entities they may designate in order to set up a responsible and sustainable civil nuclear programme in Jordan.

In this context, the Agreement provides for the creation of at least five topical working groups (such as the legal working group or the nuclear reactors working group) tasked with organising, initiating and following up on all the actions required for their activity, as well as negotiating and concluding other implementation arrangements or agreements as needed.

The objective of the legal working group is to support the implementation of the legal and administrative framework necessary to set up a civil nuclear programme in Jordan. The tasks of this working group include, among others:

- setting up the Jordanian Commission for the Organisation of Radiation Activities whose remit will include safety, security and physical protection, as well as protection against ionising radiations;
- drafting and implementing nuclear export control rules, taking into account the Directives of the Nuclear Suppliers Group, in particular;
- setting up a nuclear material control mechanism and organisation, and the related accounting procedures;
- implementing safeguards according to IAEA's criteria; and

18. J.O.L. et D., 18 September 2016, text no. 4.

- defining a national framework for nuclear liability based on established international principles.

Germany

Transport of radioactive materials

New Versions of Ordinances on the Transport of Dangerous Goods (2017)

By the Ninth Ordinance to Amend Ordinances on the Transport of Dangerous Goods of 17 March 2017,[19] the following Ordinances were amended:

- Article 1: Dangerous Goods Ordinance Road, Rail and Internal Waterways;
- Article 2: Safety Adviser for the Transport of Dangerous Goods Ordinance;
- Article 3: Dangerous Goods Cost Ordinance;
- Article 4: Dangerous Goods Exception Ordinance.

The Ordinance implements Commission Directive (EU) 2016/2309.[20]

The amendments entered into force on 1 January 2017.

In accordance with Article 5 of the Ninth Ordinance, a consolidated version of the Ordinance on the Domestic and Transboundary Transport of Dangerous Goods by Road, Rail and Internal Waterways (Dangerous Goods Ordinance Road, Rail and Internal Waterways) was published by the competent Federal Minister on 30 March 2017.[21]

Radioactive Waste Management

Act on the Reorganisation of the Responsibility of Nuclear Waste Disposal (2017)

The 2016 Draft Bill of an Act on the Reorganisation of the Responsibility of Nuclear Waste Disposal[22] passed Parliament on 27 January 2017 and was published in the *Bundesgesetzblatt*.[23] According to its Article 10, the Act will enter into force on the day the EU Commission grants its state aid approval or bindingly notifies that such approval is not required. The competent Federal Minister will inform on the day of the entry into force in *Bundesgesetzblatt*.

19. *Bundesgesetzblatt* (BGBl.) 2017 I, p. 568. The Ordinance is available (in German) at: www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&start=%2F%2F%2A%5B%40attr_id=%27bgbl117s0711.pdf%27%5D#__bgbl__%2F%2F*%5B%40attr_id%3D%27bgbl117s0568.pdf%27%5D__1491669479013.
20. Commission Directive (EU) 2016/2309 of 16 December 2016 adapting for the fourth time the Annexes to Directive 2008/68/EC of the European Parliament and of the Council on the inland transport of dangerous goods to scientific and technical progress, Official Journal of the European Union (OJ) L 345 (20 December 2016), p. 48.
21. BGBl. 2017 I, p. 711. The Ordinance is available (in German) at: www.bgbl.de/xaver/bgbl/start.xav?start=%2F%2F*%5B%40attr_id%3D%27%27%5D#__bgbl__%2F%2F*%5B%40attr_id%3D%27bgbl117s0711.pdf%27%5D__1491669201298. On the earlier, consolidated version, see NEA (2012), *Nuclear Law Bulletin*, No. 89, OECD, Paris, p. 121.
22. See NEA (2016), *Nuclear Law Bulletin*, No. 98, OECD, Paris, p. 73.
23. BGBl. 2017 I, p. 114. The Draft Bill is available (in German) at: www.bgbl.de/xaver/bgbl/start.xav#__bgbl__%2F%2F*%5B%40attr_id%3D%27bgbl117s0114.pdf%27%5D__1491734541927.

Lithuania

Nuclear security

Cyber security

An amendment to the nuclear safety requirements[24] introduced requirements for cyber security systems in operating organisations for ensuring the safety of technological processes, maintenance of functionality of equipment important to safety and maintenance of safety-related information. The amendment also includes other important safety-related provisions, such as: clarified classification and marking of security-related components; and more detailed provisions on lighting systems, handling of nuclear fuel at a unit, water chemistry, operation and accident management procedures, and routes of emergency evacuation. The amendment came into force on 1 May 2017.

Nuclear installations

Free release criteria of buildings and site of nuclear facilities

New nuclear safety rules[25] were approved by the Head of the State Nuclear Power Safety Inspectorate (VATESI) in 2016 and came into force on 1 May 2017. The new rules established the methodology for demonstrating compliance with free release criteria. The rules are applied for the free release of buildings and soil of nuclear facilities and include requirements for all stages of radiological surveying: planning, conducting, evaluating and recording.

Management systems

An amendment to the nuclear safety requirements[26] was approved in January 2017 by the Head of VATESI. The amendment introduces more detailed requirements for the programme of tests and inspections of the structures, systems and components important to safety performed during the construction of nuclear facilities, and for the transfer of structures, systems and components important to safety from the construction to the commissioning stage. The amendment came into force on 1 May 2017.

24. Order No. 22.3-16 (2017) of the Head of the State Nuclear Power Safety Inspectorate "On the Amendment of Order No. 22.3-16, 5 February 2010, On the approval of Nuclear Safety Requirements BSR-2.1.2-2010 "General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/b05c9e00e6f311e68503b67e3b82e8bd.
25. Order No. 22.3-206 (2016) of the Head of the State Nuclear Power Safety Inspectorate "On the Approval of Nuclear safety rules BST-1.5.1-2016 "Evaluation of Compliance with Free Release Criteria of Buildings and Site of Nuclear Facilities", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/d4591650c68f11e69dec860c1f4a5372.
26. Order No. 22.3-14 (2017) of the Head of the State Nuclear Power Safety Inspectorate "On the Amendment of Order No. 22.3-22, 29 January 2014, On the approval of Nuclear Safety Requirements BSR-1.4.2-2014 "Management of Construction of Nuclear Facility", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/e7308460e20111e68503b67e3b82e8bd.

Radioactive waste management

Safety of radioactive waste repositories

New nuclear safety requirements for radioactive waste repositories[27] were approved by the Head of VATESI in 2016 and came into force on 1 May 2017. The new requirements regulate site assessment, design, commissioning, operation, closure and supervision of closed radioactive waste repositories. In comparison to the previous nuclear safety requirements related to radioactive waste repositories, the new requirements cover all types of radioactive waste repositories (very low level, low and intermediate level and geological) to be constructed in Lithuania. More detailed requirements were introduced on waste acceptance criteria, safety analysis, design, closure and supervision of closed radioactive waste repositories. Additionally, detailed requirements for site evaluation and commissioning of radioactive waste facilities were introduced.

Slovak Republic

General legislation, regulations and instruments

Amendment to the Atomic Act

On 11 April 2017, the President of the Slovak Republic signed an amendment to the Atomic Act.[28] This amendment primarily transposes the 2014 Amendment to the Nuclear Safety Directive[29] and selected provisions of the Euratom Basic Safety Standards Directive.[30] Furthermore, it implements the recommendation contained in the draft findings and recommendations of the Aarhus Convention[31] Compliance Committee with regard to communication ACCC 2013/89/Slovakia. This communication dealt with the extent of disclosure of the environmental documentation containing sensitive information on the design of a nuclear power plant (Mochovce) in commissioning, as well as particular issues closely connected to the implementation of e-Government measures related to the statutory activities of the Nuclear Regulatory Authority of the Slovak Republic.

In general, the amendment governs these issues:

- setting the nuclear safety objective for existing and new nuclear installations in the Slovak Republic and its implementation;
- adapting the prospect for periodic safety reviews to the requirements defined by the Nuclear Safety Directive;

27. Order No. 22.3-188 (2016) of the Head of the State Nuclear Power Safety Inspectorate "On the approval of Nuclear Safety Requirements BSR-3.2.2-2016 "Radioactive waste Repository", available (in Lithuanian) at: www.e-tar.lt/portal/lt/legalAct/b55b1280b6d611e6aae49c0b9525cbbb.
28. Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy and on alterations of and amendments to some other acts (Atomic Act).
29. 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).
30. 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).
31. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (1998), 2161 UNTS 450, entered into force 30 October 2001 (Aarhus Convention).

- specifying the requirements applicable to the on-site emergency preparedness and response (including the activities of the point of contact for communication in this field) defined by the Nuclear Safety Directive and the Basic Safety Standards Directive;
- enabling the submission of applications according to the Atomic Act through electronic means; and
- adjusting the extent of the disclosure of documentation containing sensitive information to general public.

Slovenia

General legislation, regulations and instruments

Amendments to the Ionising Radiation Protection and Nuclear Safety Act

Based on the amendments to the Ionising Radiation Protection and Nuclear Safety Act (the Act) that were adopted at the end of 2015,[32] a number of implementing Rules and one implementing Decree were adopted from December 2016 to March 2017.

With the amendments to the Act as well as to the implementing Rules and implementing Decree, the provisions of the 2014 Amended Safety Directive,[33] the Waste Directive[34] and the Euratom Basic Safety Standards[35] have been transposed to a considerable extent into the Slovene legal framework.

Nuclear safety and radiological protection (including nuclear emergency planning)

Decree on activities involving radiation[36]

A Decree on activities involving radiation regulates the:

- types of radiation sources that do not require notification, and the radiation sources with small amounts of radioactive substances or low specific activity that do not exceed the exemption levels, and treatment of radiation sources that are exempt from control under the law governing radiation protection and nuclear safety;
- types of radiation practices that do not require notification;
- criteria for the classification of each part of radiation practices involving the use of unsealed sources;

32. For more information on these amendments, see NEA (2015), *Nuclear Law Bulletin*, No. 96, OECD, Paris, pp. 90-92.
33. 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) (2014 Amended Safety Directive).
34. 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) (Waste Directive).
35. 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) (Euratom Basic Safety Standards).
36. *Official Gazette of the Republic of Slovenia* (RS), No. 8/2017, p. 1152.

- criteria for the classification of high-activity and dangerous sources of radiation;
- clearance levels and the criteria for conditional clearance of certain radioactive substances arising from any practice subject to notification or authorisation that may be released from the requirements in the Decree;
- types of radiation practices that require a licence;
- types of radiation sources that have to be registered;
- types of radiation sources that require a licence;
- criteria for the classification of: radiation facilities and less important radiation facilities;
- radioactive substances that are subject to physical protection measures; and
- criteria for the period of validity of licences to carry out radiation practices, to use radiation source and to operate a radiation or nuclear facility.

The individual values of specific activities for exemption or clearance for natural and artificial radionuclides, the values for high-activity radioactive sources and the values for dangerous sources and quantities of nuclear materials to be transported are set out in the Annex to this Decree.

This Decree entered into force on 4 March 2017, i.e. 15 days after its publication in the *Official Gazette of the Republic of Slovenia*. Upon entry into force of this decree, the previous decree on activities involving radiation[37] ceased to apply.

Rules on radiation and nuclear safety factors[38]

The Rules on radiation and nuclear safety factors provide the:

- design bases for radiation and nuclear facilities;
- content of the application and documentation for obtaining approvals and permits for radiation, nuclear and less important radiation facilities;
- content of the safety analysis report and other documentation necessary to demonstrate and ensure the safety of radiation and nuclear facilities;
- detailed requirements for the organisation of a radiation or nuclear facility and on the content and format of the management system and its implementation in radiation and nuclear facilities; and
- detailed requirements as to the nature, scope, method of protection and preservation of documents of the operator of a radiation or nuclear facility.

These Rules entered into force on 10 December 2016, i.e. fifteen days after its publication in the *Official Gazette of the Republic of Slovenia*. Upon entry into force of this decree, the previous rules on radiation and nuclear safety factors[39] ceased to apply.

37. *Official Gazette of the RS*, No. 48/2004 and 9/2006.
38. *Official Gazette of the RS*, No. 74/2016, p. 10310.
39. *Official Gazette of the RS*, No. 92/2009 and 9/2010.

Rules on operational safety of radiation and nuclear facilities[40]

The Rules on operational safety of radiation and nuclear facilities provides for radiation and nuclear facilities detail the:

- method of operating limits and conditions;
- manner and frequency of reporting on the implementation of the programme for collecting and analysing operating experience;
- scope and nature of ageing management;
- method of maintenance, testing and inspection of components, systems and structures;
- content, scope and frequency of regular and *ad hoc* reporting;
- frequency, content, scope, duration and mode of implementation of periodic safety reviews and the manner of reporting on these reviews;
- cases in which the regulatory body (SNSA) itself orders a periodic safety review, if new and important evidence of radiation or nuclear safety of the facility exists;
- content, quality and use of probabilistic safety analyses to verify the safety of nuclear installations; and
- methodology for assessing and classifying changes and the manner and form of information and notification of changes in radiation or nuclear facilities.

These Rules also lays down specific requirements for the:

- emergency plan to cope with emergencies in radiation or nuclear facilities;
- procedures in case of emergency in radiation or nuclear facilities; and
- method of notification for emergencies.

This Rules entered into force on 31 December 2016, i.e. fifteen days after its publication in the *Official Gazette of the Republic of Slovenia*. Upon entry into force of this decree, the previous rules on operational safety of radiation and nuclear facilities[41] ceased to apply.

Rules on the method of keeping records of personal doses due to exposure to ionising radiation[42]

The Rules on the method of keeping records of personal doses due to exposure to ionising radiation provides the:

- method of managing data of personal doses of exposed workers;
- deadlines for data transmission to the central dose register;
- liabilities and the method of transmission of data from the central dose register to the body responsible for nuclear safety, vulnerable workers and employers; and

40. *Official Gazette of the RS*, No. 81/2016, p. 11969.
41. *Official Gazette of the RS*, No. 85/2009, 9/2010 and 87/2011.
42. *Official Gazette of the RS*, No. 81/2016, p. 11939.

- content, scope and manner of reporting and management of data for radiological procedures.

These Rules entered into force on 31 December 2016, fifteen days after its publication in the *Official Gazette of the Republic of Slovenia*. Upon entry into force of this decree, the previous rules on the method of keeping records of personal doses due to exposure to ionising radiation[43] ceased to apply.

Rules on the requirements and methodology of dose assessment for the radiation protection of the population and exposed workers[44]

The Rules on the requirements and methodology of dose assessment for the radiation protection of the population and exposed workers provides the:

- conditions for issuing permits in cases where the planned doses exceed the thresholds for each exposed worker who performs extraordinary tasks, and mandatory measures to be taken in order to reduce the effects of excessive exposure to the worker;
- content and scope of the assessment of radiation protection;
- terms and conditions for the review of the assessment of radiation protection, mandatory reviews of the contents of the assessment of radiation protection and other conditions relating to the obligation to review the assessment of radiation protection;
- methodology for assessing the doses due to external ionising radiation doses due to the intake of radioactive substances into the body;
- threshold doses, if workers or members of the public are exposed to radon; and
- method of data collection, storage relating to measurements of external doses, the methodology for assessing the intake of radionuclides and radioactive contamination as well as the methodology for assessing the doses received by reference groups and by the population as a whole, in relation to the preparation of the report on the estimates of the population doses.

These Rules entered into force on 7 January 2017, i.e. fifteen days after its publication in the *Official Gazette of the Republic of Slovenia*. Upon entry into force of this decree, the previous rules on the requirements and methodology of dose assessment for the radiation protection of the population and exposed workers[45] ceased to apply.

Rules on the obligations of persons performing radiation practices and holders of ionising radiation sources[46]

The Rules on the obligations of persons performing radiation practices and holders of ionising radiation sources provides the:

- criteria for the classification and labelling of worksites in supervised and controlled areas and working conditions and the employer's obligation for the control of radiation protection in supervised and controlled areas;

43. *Official Gazette of the RS*, No. 33/2004.
44. *Official Gazette of the RS*, No. 83/2016, p. 12302.
45. *Official Gazette of the RS*, No. 115/2003.
46. *Official Gazette of the RS*, No. 3/2017, p. 400.

- criteria for the classification of exposed workers in Categories A and B in relation to the expected exposure to ionising radiation during normal work and the probability and extent of potential exposure;
- conditions, method, scope and frequency of detection of radiation in the workplace;
- evaluation method of doses received in cases where direct measurements are not possible;
- type and quality of the measuring equipment;
- manner and scope of reporting of the results of assessing the exposure of workers and the doses received in the case of implementation of intervention measures and in the cases where permitted dose limits are exceeded due to the performance of exceptional tasks;
- manner and the time of data storage of the exposed workers to be provided by the employer;
- employer's obligations for special radiation protection for apprentices and students;
- organisational design of the radiation protection unit in nuclear and radiation facilities and the requirements for the quality of the equipment, the scope and content of the work of such unit;
- list of educational programmes and the programme and the method of examination for the professional exam for those performing radiation protection tasks, the method of determining the examination boards, the cost of examinations and recording of exams;
- scope, content and conditions for training, informing and verifying the qualifications of exposed workers, apprentices and students;
- obligations of licence holders and external service providers regarding radiation protection of outside workers and mode of transmission and storage of data on personal doses of exposed persons of external contractor in the central dose records; and
- scope, contents and conditions of training in the field of radiation protection of patients.

These Rules entered into force on 4 February 2017, i.e. fifteen days following its publication in the *Official Gazette of the Republic of Slovenia*. Upon entry into force of this decree, the previous rules on the obligations of persons performing radiation practices and holders of ionising radiation sources[47] ceased to apply.

Sweden

General legislation, regulations and instruments

Major revision of the Swedish Radiation Safety Authority's regulations

The Swedish Radiation Safety Authority (SSM) is currently revising regulations related to nuclear activities and radiation protection. Experience has demonstrated the need to clarify and broaden the regulations in order to create more predictability

47. *Official Gazette of the RS*, No. 13/2004.

for the licensees and to improve the regulatory support for the SSM in its supervisory activities.

In parallel with the SSM regulatory review, the Swedish Act on Nuclear Activities and the Act Radiation Protection are being reviewed to ensure that the latest Euratom Directives in the area of nuclear safety and radiation protection are appropriately implemented in Swedish legislation. In this regard, as requested by the government, the SSM has presented proposals for a new Radiation Protection Act and changes to the Act on Nuclear Activities. These proposals are undergoing extensive consultations and potential changes will be made in accordance with the time schedule for implementation, as defined by each Directive.

In 2013, the SSM began a comprehensive and thorough review of its Code of Statutes. The main reasons for initiating this review were as follows:

- In June 2012, an application was submitted to SSM by Vattenfall for permission to replace old nuclear power reactors with new nuclear power reactors. Existing regulations are developed for operating nuclear power plants (NPPs) and new nuclear power reactors were not considered at the time these regulations were developed and issued.

- SSM's own application experience has demonstrated the need to clarify and supplement the regulations in order to create more predictability for the licensees and improve the regulatory support for SSM in its supervisory activities. These clarifications and additions are necessary in a situation where continuing safety modernisation of the existing NPPs will take place and where the plants now gradually enter into long-term operation. The regulations also need to be revised to encompass experiences from the Fukushima Daiichi NPP accident and subsequent stress tests of Swedish NPPs.

- The International Atomic Energy Agency (IAEA) Integrated Regulatory Review Service (IRRS) mission report to Sweden in spring 2012 concluded that Swedish regulations for nuclear facilities have, historically, emerged as the need for regulation arose. The report also notes that the IAEA safety standards were used as the basis for the Swedish nuclear safety rules or referenced therein, but not in a systematic way. Therefore, the report recommended that the SSM review the existing regulatory framework and make it clearer, more consistent and comprehensive. This is now one important part of the SSM action plan to deal with recommendations and suggestions from the IRRS review.

The work is conducted in two projects: one focusing on the regulations on safety and security of nuclear facilities, one focusing on safety and security in the use of ionising and non-ionising radiation in other parts of society. The work also includes the formulation of basic safety and security rules that will be common to both nuclear installations and other licensable activities with radiation.

The structure adopted for the new Code of Statutes means that the safety and security of nuclear installations will be regulated partly for different stages of a plant's life and partly for the main types of specific radiation safety aspects. The regulation will also be made on the "three levels":

1. common to all activities involving ionising radiation;
2. on plant level for nuclear installations; and
3. more specific safety and security aspects.

In this way there will be a gradual specification of the requirements, from a more general level at level one to a more specific at level three, in a similar way as the IAEA and many other radiation safety agencies have built up their rule packages.

Important starting points for the work are the applicable Swedish and European legislation in the field, the current SSM rules and lessons learnt from applications in licensing and supervision activities. Other important starting points are as far as possible to relate to the IAEA's "Fundamentals", "Requirements", "Safety Guides" and "Security Series". There are several reasons for this. One is that these standards are of high quality and are produced in a process in which many international experts in various disciplines are involved. This makes the standards well-founded. Another reason is that some of these standards are the basis for the so-called reference levels ("Reactor Safety Reference Levels") that have been developed through inter-agency co-operation within the Western European Nuclear Regulators Association (WENRA) that SSM has undertaken to comply with.

The work to revise SSM's regulations is an ongoing process.

United States

General legislation, regulations and instruments

Commission policy statement setting principles to use to promote effective government-to-government interactions with American Indian and Alaska Native Tribes and encourage and facilitate Tribal involvement in areas of NRC jurisdiction

On 9 January 2017, the Nuclear Regulatory Commission (NRC) published its Tribal Policy Statement,[48] which provides guidelines that achieve consistency but also encourage custom-tailored approaches to consultation and co-ordination that reflect the circumstances of each situation and the preference of each Tribal government.[49] Under the Atomic Energy Act of 1954, the NRC licences and regulates the United States' civilian use of radioactive material in order to protect public health and safety, common defence and security, and the environment. As part of its evaluation of proposed licensing actions, rulemakings or policy development, the NRC consults with Tribal governments as required under the National Historic Preservation Act and other federal statutes. Historically, these consultations have been consistent with the spirit of several Presidential initiatives, but the NRC had not previously formalised an Agency-wide policy statement because it approached each Tribal government consultation on a case-by-case basis. However, in May of 2012, the Commission requested the NRC staff to provide a proposed Policy Statement and protocol on consultation with tribal governments that follows the language and spirit of Presidential Memoranda and executive orders. After soliciting public comment on its development, the proposed Tribal Policy Statement was published for public comment on 1 December 2014.

This past January, the Commission published its final Tribal Policy Statement. The Tribal Policy Statement consists of six principles:

1. The NRC recognises the Federal Trust Relationship with and will uphold its trust responsibility to Indian Tribes.

48. 82 Federal Register 2402-2417, "Tribal Policy Statement" (9 January 2017). The Tribal Policy Statement is also available at: www.nrc.gov/docs/ML1701/ML17011A243.pdf.
49. The NRC recognises Tribal governments as dependent domestic sovereign nations, independent from State governments, with separate and distinct authorities with inherent sovereign powers over their members and territory, consistent with applicable statutes and authorities.

2. The NRC recognises and is committed to a government-to-government relationship with Indian Tribes.
3. The NRC will conduct outreach to Indian Tribes.
4. The NRC will engage in timely consultation.
5. The NRC will coordinate with other Federal Agencies.
6. The NRC will encourage participation by state-recognised tribes.

The NRC expects all of its offices to consult and co-ordinate with Indian Tribes consistent with the Tribal Policy Statement.

Nuclear installations

NuScale Power, LLC submits design certification application for small modular reactor (SMR) to the NRC

On 12 January 2017, the NRC received a complete design certification application from NuScale for its SMR design. NuScale's application is for a standard design certification pursuant to Section 103 of the Atomic Energy Act of 1954, as amended, and Part 52 of Title 10 of the Code of Federal Regulations (CFR). NuScale's SMR design is a pressurised-water reactor and is based on the Multi-Application Small Light Water Reactor, which was developed in the early 2000s at Oregon State University. The SMR is a natural-circulation, light water reactor with a core and steam generator in a common reactor vessel, which is in a cylindrical steel containment. Each module is immersed in water in a safety-related pool, which is located below ground and designed to hold up to 12 modules. Each module has an electrical output of 50 megawatts; total plant electrical output with all 12 modules would be 600 megawatts.

The NRC staff started a detailed technical review of the design certification application on 30 March 2017.

NRC issues licences to three facilities

Over the past six months, the NRC issued licences for several mining and power production facilities. On 27 February 2017, the NRC issued a licence to AUC, LLC, a uranium mining company, for its Reno Creek Uranium In-Situ Recovery Facility, which is located in Campbell County, Wyoming. Additionally, on 19 December 2016, the NRC issued a Combined License (COL) to Duke Energy Carolinas, LLC for the William States Lee III Nuclear Station, Units 1 and 2. The William States Lee III Nuclear Station is located near Gaffney, South Carolina and uses part of the previously licensed, but uncompleted, Cherokee Nuclear Power Plant site (which was used as a film set for the 1989 James Cameron film The Abyss). Finally, on 26 October 2016, the NRC issued a COL to Duke Energy Florida, LLC for the Levy Nuclear Plant, Units 1 and 2, which will be located in Levy County, Florida.

Nuclear safety and radiological protection (including nuclear emergency planning)

NRC publishes draft guidance document for the development of principal design criteria for non-light water cooled nuclear reactors

On 3 February 2017, the NRC published draft guidance documents regarding the development of principal design criteria for non-light water cooled reactors. These principal design criteria establish the necessary design, fabrication, construction, testing and performance requirements for those structures, systems and components that provide reasonable assurance that a non-light water plant can operate without undue risk to the health and safety of the public.

Currently, design criteria for light water cooled reactors are in Title 10, Part 50, Appendix A of the CFR. However, because the design criteria in the CFR are specific for light water cooled reactors, the Department of Energy (DOE) and the NRC

established a joint initiative in 2013 to review these design criteria. As a result of the review, the NRC and DOE decided to develop the recently published new criteria to address the unique design features of non-light water cooled reactors. At the same time, these new design criteria are intended to be technology-neutral, with the expectation that they could apply to any type of non-light water cooled reactor.

Intergovernmental organisation activities

European Atomic Energy Community

Non-legally binding instruments

Report on Cyber Security in the Energy Sector

In February 2017, the Energy Expert Cyber Security Platform (EECSP) Group of the European Commission (EC) adopted its "Recommendations for the European Commission on a European Strategic Framework and Potential Future Legislative Acts for the Energy Sector".[1] Indeed, the EC is preparing a strategy on cyber security for the whole energy sector to reinforce and to complement the implementation of Directive on security of Network and Information Systems (NIS)[2] at the energy sector level and also to foster synergies between the Energy Union and the Digital Single Market agenda. In this respect, the EECSP Group started work in December 2015.

The report follows the view of the International Atomic Energy Agency (IAEA) by categorising cyber security as part of nuclear security. It proposes that the EC should analyse potential threats to cyber security within the European Union (EU) and how to combat them, and also encourage EU energy regions to co-operate and share information about cyber security risks. The report focuses on gaps and future actions on NIS. It addresses new developments and risks in the field of cyber security in the energy sector, including nuclear energy.

The report states *inter alia*:

> While the EURATOM Treaty contains no explicit provisions addressing nuclear security or physical protection, provisions in the preamble and in Article 2 have been interpreted as also covering the subject. In its Ruling 1/78 of 1978, the Court of Justice of the EU found that the EURATOM Community shares competence with the Member States in the area of physical protection of nuclear material, and should therefore become a Party to the Convention on the Physical Protection of Nuclear Materials (CPPNM) which was being negotiated at the time. While leaving room for interpretation on the extent of the Community's competences in this area, the Court clearly recognised that involvement of the Community in decision making on measures of physical protection was essential in order to implement our recognised responsibilities on safeguards, supply policy and ownership of nuclear materials. In spite of the Court's ruling and the Community's subsequent accession to the CPPNM, the Community has to date not proposed any secondary legislation specifically addressing e.g. physical protection in the scope of nuclear security.[3]

1. The report is available at: https://ec.europa.eu/energy/sites/ener/files/documents/eecsp_report_final.pdf. The EECSP Group gives guidance to the EC on infrastructure issues, security of supply, smart grid technologies and nuclear energy.
2. Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union, *Official Journal of the European Union* (OJ) L 194 (19 July 2016).
3. See p. 44 of the report.

Council decision (CFSP) 2016/2383 of 21 December 2016 on the Union support for the International Atomic Energy Agency activities in the areas of nuclear security and in the framework of the implementation of the EU Strategy against the Proliferation of Weapons of Mass Destruction[4]

On 8 May 2016, the Amendment to the Convention on the Physical Protection of Nuclear Material (ACPPNM)[5] entered into force. The EU and its member states promoted this Amendment through diplomatic outreach and financing of the IAEA activities. Following its entry into force, sustained efforts will be required to ensure national enforcement and universalisation of the ACPPNM.[6] The EU supports the IAEA's activities in the area of nuclear security, *inter alia* in order to further the objective of achieving progress towards the universalisation of international non-proliferation and nuclear security instruments.[7]

International relations

Memorandum of Understanding on a Strategic Energy Partnership between the European Union together with the European Atomic Energy Community and Ukraine[8]

Following the Association Agreement between the EU and Ukraine, which was signed in March and June 2014,[9] EC Vice-President for Energy Union Maroš Šefčovič and Energy Minister of Ukraine, Ihor Nasalyk, signed a new Memorandum of Understanding (MOU) on a Strategic Energy Partnership between the EU and Ukraine on 24 November 2016. The new Memorandum of Understanding aims to invigorate energy co-operation between the EU and Ukraine. It broadens the co-operation *inter alia* in the security of energy supply and transit, nuclear safety, infrastructure and market reforms, as well as in energy efficiency and renewable energy.

This new Memorandum of Understanding replaces the Memorandum that was signed in 2005 between the EU and Ukraine on co-operation in the field of energy. It covers an initial period of ten years. At the end of the fifth year of the Memorandum's term, the sides should confer at the appropriate level to decide on whether this Memorandum requires any revision, amendment and/or supplementation, and if so, they should revise and/or make the required amendments and/or supplements to the Memorandum.

Specifically, the sides should co-operate on:

- strengthening the capacity and competences as well as assuring full independence of national regulatory authorities;
- implementing high-level safety objectives in line with the Vienna Declaration on Nuclear Safety;[10]

4. OJ L 352 (23 Dec. 2016), p. 74.
5. 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 (ACPPNM).
6. See ACPPNM, Recital 10.
7. ACPPNM, Article 1(1)(a).
8. The Memorandum of Understanding is available at: https://ec.europa.eu/energy/sites/ener/files/documents/mou_strategic_energy_partnership_en.pdf.
9. Council Decision 2014/295/EU of 17 March 2014 on the signing, on behalf of the European Union, and provisional application of the Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part, as regards the Preamble, Article 1, and Titles I, II and VII thereof, OJ L 161 (29 May 2014).
10. 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.

- implementing, in a timely manner, the safety upgrades identified in the updated Ukrainian National Action Plan prepared in response to the "stress tests" results, and reporting to the relevant EU and international fora;
- promoting an effective nuclear safety culture among all concerned stakeholders;
- drawing up a national programme for the long-term management of all types of spent fuel and implementing a national programme for the management of radioactive waste in Ukraine;
- implementing a system of regular "Peer Reviews" in line with the ones in place in the EU within the framework of the nuclear safety and the radioactive waste and spent fuel management Directives;
- improving information exchanges and cross-border arrangements in the field of emergency preparedness and response; and
- increasing transparency on nuclear safety and on radioactive waste and spent fuel management matters, informing and involving the public.[11]

International Atomic Energy Agency

Convention on Nuclear Safety (CNS)

Seventh Review Meeting of the contracting parties to the CNS

The Seventh Review Meeting of contracting parties to the Convention on Nuclear Safety[12] was held at IAEA Headquarters from 27 March to 7 April 2017 with the participation of 77 out of a total of 80 contracting parties.[13]

Contracting parties met in seven country groups and discussed the measures taken to implement each of the obligations under the CNS. Following these discussions, country groups finalised and agreed by consensus on individual Country Review Reports. Country groups also identified a total of 4 "Good Practices", 228 "Challenges", 55 "Suggestions" and 188 "Areas of Good Performance".

The plenary sessions of the meeting focused on:

(i) challenges that were identified at the Sixth Review Meeting as a result of learning following the Fukushima Daiichi nuclear power plant accident;

(ii) a "peer review of the incorporation of appropriate technical criteria and standards used by Contracting Parties for addressing the principles of the Vienna Declaration on Nuclear Safety in national requirements and regulations";

(iii) major common issues arising from the country group discussions, i.e. safety culture, international peer reviews, legal framework and independence of the regulatory body, financial and human resources, knowledge management, supply chain, managing the safety of ageing nuclear facilities and plant life extension, emergency preparedness, stakeholder consultation and communication; and

11. MOU, *supra* note 8, p. 4.
12. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293, entered into force 24 October 1996 (CNS).
13. Status as of 31 May 2017.

(iv) challenges faced by non-nuclear power countries and embarking countries in complying with the obligations under the CNS.

A number of proposals to improve the peer review process under the CNS were also approved at the meeting, relating, *inter alia*, to issuing a survey at each Review Meeting to evaluate the effectiveness of the changes to the review process, continuing having topical sessions during future Review Meetings, organising regional CNS workshops for countries with no nuclear power reactors and assessing the possibility of video conferencing certain country group sessions using a secure platform as supplemental assistance to facilitate greater participation.

For the first time, states that have signed, but not yet ratified, accepted or approved the CNS (signatory states) were invited to attend selected parts of the meeting.

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

Third Extraordinary Meeting of the contracting parties to the Joint Convention

A Third Extraordinary Meeting of contracting parties to the Joint Convention[14] was held at IAEA Headquarters from 16 to 17 May 2017, with the participation of 57 out of a total of 74 contracting parties.[15]

At the meeting, contracting parties were informed of the outcomes of the First Meeting to Discuss Feedback from Contracting Parties to Improve the Review Process for the Joint Convention (Consultancy Meeting) held in October 2016 and discussed a number of proposals stemming from the Consultancy Meeting related to promotional activities, national reports and review meetings.

Contracting parties were also informed of the progress made in the context of the CNS, by way of two presentations, one focusing on the results and recommendations of the special session at the Seventh Review Meeting on "Challenges faced by non-nuclear power countries and embarking countries participating in the CNS review process" and the other one dealing with the experience regarding openness and transparency at the meeting.

Contracting parties further discussed a number of proposals submitted by contracting parties in advance of the Third Extraordinary Meeting relating to the procedure of identifying overarching issues during country group sessions, the implementation of the definition of "Good Practices", time management at the Joint Convention Review Meetings and the issue of transboundary movement and multinational disposal of spent fuel and radioactive waste.

Organisational Meeting for the Sixth Review Meeting of the contracting parties to the Joint Convention

The Organisational Meeting for the Sixth Review Meeting of contracting parties to the Joint Convention was held at IAEA Headquarters from 18 to 19 May 2017, with the participation of 57 out of a total of 74 contracting parties.[16]

At the meeting, contracting parties elected the President and the two Vice-Presidents for the Sixth Review Meeting, established eight country groups,

14. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997), IAEA Doc. INFCIRC/546, 2153 UNTS 357, entered into force 18 June 2001 (Joint Convention).
15. Status as of 31 May 2017.
16. Status as of 31 May 2017.

elected the country groups' Chairpersons, Vice-Chairpersons, Rapporteurs and Co-ordinators and assigned them accordingly to the country groups.

Two sequential topical sessions were held at the Sixth Review Meeting, the first focusing on disused sealed sources and the second being dedicated to general safety issues, challenges and public acceptance aspects associated with the long-term storage of higher-level radioactive waste.

The Organisational Meeting also decided on inviting observers, on the budget and languages in which country group discussions will be held, the provisional agenda as well as the associated timetable to the Sixth Review Meeting.

Finally, contracting parties agreed to invite the two states that have signed, but not yet ratified, accepted or approved the Joint Convention (signatory states) to attend selected parts of the Sixth Review Meeting.

The Sixth Review Meeting will be held from 21 May to 1 June 2018 at IAEA Headquarters.

Code of Conduct on the Safety of Research Reactors (Code)

Fourth International Meeting on Application of the Code

Progress in research reactor safety as well as good practices and international co-operation in this field were discussed at the fourth International Meeting on Application of the Code of Conduct on the Safety of Research Reactors,[17] held at IAEA Headquarters from 15 to 19 May 2017.

Experts from 40 countries shared their experience in applying the Code, including regulatory supervision, refurbishment and modernisation of reactor components for safety improvements, as well as safety infrastructure for new research reactor projects. The participants also shared and discussed the results of self-evaluations they had made in the application of the Code.

Convention on the Physical Protection of Nuclear Material (CPPNM) and the CPPNM Amendment

Second Technical Meeting of the representatives of states parties to the CPPNM and the CPPNM Amendment

The Second Technical Meeting of representatives of states parties to the CPPNM[18] and the CPPNM Amendment[19] was held from 30 November to 2 December 2016 at IAEA Headquarters in Vienna, Austria. In total, 119 participants from 71 parties of the CPPNM and CPPNM Amendment attended this meeting.

The purpose of the meeting was to discuss matters within the scope of the CPPNM and the Amendment thereto with particular emphasis on the mechanisms for information sharing and promoting universalisation of the CPPNM and the Amendment thereto.

International Conference on Nuclear Security: Commitments and Actions

The IAEA organised an International Conference on Nuclear Security: Commitments and Actions, in Vienna from 5 to 9 December 2016. The conference was attended by

17. IAEA (2006), Code of Conduct on the Safety of Research Reactors, IAEA Doc. IAEA/CODEOC/RR/2006 (Code).
18. Convention on the Physical Protection of Nuclear Material, (1980), IAEA Doc. INFCIRC/274 Rev. 1, 1456 UNTS 125, entered into force 8 February 1987 (CPPNM).
19. Amendment to the Convention on the Physical Protection of Nuclear Material (2005), IAEA Doc. INFCIRC/274/Rev.1/Mod.1, entered into force 8 May 2016 (CPPNM Amendment).

2 100 participants from 139 member states, 47 of which were represented at ministerial level, and also 29 organisations.

A Ministerial Declaration was adopted, that, *inter alia*, reasserted national responsibility for nuclear security, underlined the importance of keeping pace with evolving challenges and threats to nuclear security and recognised the central role of the IAEA in facilitating and co-ordinating international co-operation. Conference participants underscored the commitment of the international community as a whole to nuclear security and the unique platform the IAEA offers to assist member states in further strengthening a global response to a global threat.

The Conference's scientific and technical sessions addressed a range of topics, including: evolving challenges and threats to nuclear security; identifying gaps in and strategies for the secure management of radioactive material; international instruments for nuclear security; nuclear forensics; computer security for industrial control systems in nuclear facilities; public engagement on nuclear security; and nuclear security education.

Nuclear liability

Seventeenth meeting of the International Expert Group on Nuclear Liability (INLEX)

The International Expert Group on Nuclear Liability held its 17th regular meeting in Vienna from 9 to 11 May 2017. The Group discussed, *inter alia*, liability issues concerning long-term storage and disposal facilities, the transport of nuclear material and transportable nuclear power plants and decided to keep these items under review.

In addition, the Group examined the possible exclusion of low-risk installations from the scope of application of the IAEA liability conventions and the definition of radioactive products or waste under the conventions.

Workshops on Civil Liability for Nuclear Damage

The Sixth Workshop on Civil Liability for Nuclear Damage was held in Vienna on 8 May 2017 and provided participants with an introduction to the international legal regime of civil liability for nuclear damage. Diplomats and experts from 35 IAEA member states attended the workshop.

A sub-regional Workshop on Civil Liability for Nuclear Damage for Latin American States, hosted by the government of Uruguay, is scheduled to take place in Montevideo from 7 to 9 June 2017. Twelve IAEA member states from the region are expected to participate in the Workshop.

Legislative assistance activities

In addition to the regular legislative assistance activities carried out by the IAEA Office of Legal Affairs, three sub-regional Workshops on Nuclear Law were organised for IAEA member states, one for member states from the Asia and the Pacific region, which was held in Amman, Jordan, from 12 to 15 December 2016, one for African member states, which was held in Arusha, United Republic of Tanzania, from 13 to 17 March 2017 and one for member states from Latin America and the Caribbean, which was held in San Ignacio, Belize, from 25 to 28 April 2017. These workshops addressed all aspects of nuclear law and also provided for the planning of future legislative activities in participating member states, based on an assessment of their needs.

OECD Nuclear Energy Agency

Strategic Plan for 2017-2022

The Steering Committee for Nuclear Energy (Steering Committee) approved on 3 November 2016 the NEA Strategic Plan for 2017-2022. The NEA adopted its first Strategic Plan in 1999 as a central element of its reform process at that time and the Strategic Plan has been amended three times since then. This fourth Strategic Plan is intended to guide the NEA as it seeks to meet the evolving needs of member countries in the application and exploration of nuclear science and technology. The Strategic Plan is available at: www.oecd-nea.org/general/about/strategic-plan2017-2022.pdf.

Argentina and Romania to become members of the Nuclear Energy Agency

On 17 May 2017, upon the recommendation of the Steering Committee, the Council of the Organisation for Economic Co-operation and Development (OECD) agreed to invite the Argentine Republic and Romania to become full members of the NEA and its Data Bank. These accessions were formalised on 7 June 2017 with official exchange of letters between each country and OECD Secretary-General Angel Gurría. As each country may select the date at which its rights and responsibilities as an NEA member begins, Argentina selected 1 September 2017 as the start of its membership and Romania selected 15 October 2017. Both Argentina and Romania have well-established relations with the NEA. Their accession to the NEA will be mutually beneficial for both countries and the NEA membership in several fields, particularly know-how and research activities related to pressurised heavy water reactor technology.

Latest updates regarding the Paris Convention

On 3 November 2016, the Steering Committee adopted the following decisions regarding the Paris Convention on Third Party Liability in the Field of Nuclear Energy:[20] the Decision and Recommendation Concerning the Application of the Paris Convention to Nuclear Installations for the Disposal of Certain Types of Low-level Radioactive Waste[21] and the Decision on the Exclusion of Small Quantities of Nuclear Substances outside a Nuclear Installation from the Application of the Paris Convention.[22] The purpose of the latter decision was to update the technical criteria of an already existing decision (the 2007 Decision on the Exclusion of Small Quantities of Nuclear Substances from the Application of the Paris Convention[23]), which has now been abrogated. It should be noted that the exclusions provided in

20. Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (1960), 1519 UNTS 329 (Paris Convention or PC).
21. NEA Steering Committee for Nuclear Energy (2017), "Decision and Recommendation Concerning the Application of the Paris Convention on Third Party Liability in the Field of Nuclear Energy to Nuclear Installations for the Disposal of Certain Types of Low-level Radioactive Waste", NEA/NE(2016)7/FINAL, available at: www.oecd-nea.org/cen/docs/2016/ne2016-7-final.pdf.
22. NEA Steering Committee for Nuclear Energy (2017), "Decision on the Exclusion of Small Quantities of Nuclear Substances outside a Nuclear Installation from the Application of the Convention on Third Party Liability in the Field of Nuclear Energy", NEA/NE(2016)8/FINAL, available at: www.oecd-nea.org/cen/docs/2016/ne2016-8-final.pdf.
23. Draft Decision on the Exclusion of Small Quantities of Nuclear Substances from the Application of the Paris Convention on Third Party Liability in the Field of Nuclear Energy (Note by the Secretariat), NEA/NE(2007)8 (21 September 2007); Summary of Decisions Taken at the 115th Session of the Steering Committee for Nuclear Energy, NEA/SUM/DEC(2007)2, p. 4.

both decisions are subject to technical and regulatory exclusion criteria, and excluded installations remain subject to national regulatory control and ordinary tort law. The technical approach and exclusion criteria were developed by the NEA Committee on Radiological Protection and Public Health (CRPPH) to ensure the protection of people, goods and the environment. Both decisions are available online at: www.oecd-nea.org/law/paris-convention.html.

The NEA and China's National Energy Administration sign MOU to strengthen co-operation

On 28 April 2017, the NEA and the National Energy Administration of China (C/NEA) signed a Memorandum of Understanding (MOU) in the Field of Peaceful Uses of Nuclear Energy, enhancing co-operation between both parties. The agreement foresees co-operation in a number of fields, including nuclear energy development, nuclear safety research and radiological protection. The MOU represents further progress in the growing collaboration between China and the NEA, and complements the MOU signed by the NEA and the National Nuclear Safety Administration (NNSA) of China in 2014 and the Joint Declaration on Co-operation signed by the NEA and the China Atomic Energy Authority (CAEA) in 2013.

Stakeholder support and involvement essential to future of nuclear energy decision making

On 17-19 January 2017, over 130 experts from 26 countries came together to discuss international best practices and concluded that stakeholder support and involvement are essential to achieving accepted and sustainable decisions for nearly all aspects of nuclear energy. The experts convened in Paris at the NEA Workshop on Stakeholder Involvement in Nuclear Decision Making to compare their vast array of experiences and to identify approaches that help contribute, or not, to stakeholder confidence; to discuss the laws, policies and programmes underway in different countries; and to develop a collective wisdom from which all may learn and benefit. In addition to sharing experiences and best practices, during the workshop participants debated such questions as who among the members of the public and other stakeholders should be informed and how science should be used to address their concerns regarding the choices to be made; in what ways the full array of viewpoints can be put into a balanced perspective; and what roles social media can and should play in engaging with stakeholders. The workshop outcomes will be compiled into a report and shared with the NEA member countries. More information about the Workshop, including the programme and presentations, is available online at: www.oecd-nea.org/civil/workshops/stakeholder-involve2017/.

Nuclear Law Committee meeting

The NEA Nuclear Law Committee (NLC) met on 21-22 June 2017, bringing together over 68 experts from member countries and international organisations, including the European Commission (EC) and the International Atomic Energy Agency (IAEA), as well as representatives from non-member countries (China, Hong Kong, Lithuania, Romania and South Africa). 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 small modular reactors (SMRs) and nuclear liability, among other topics. In addition, a special session to introduce the revised edition of the Japan's Compensation System for Nuclear Damage as Related to the TEPCO Fukushima Daiichi Nuclear Accident was held on Wednesday 21 June 2017.

2017 International Nuclear Law Essentials (INLE) course

The sixth session of the NEA INLE course was held in Paris from 20 to 24 February 2017 with a diverse international group of professionals from 13 NEA member and non-member countries to learn more about the international nuclear law framework, as well as the major issues affecting the peaceful uses of nuclear energy. A total of 23 lecturers from the NEA, nuclear regulatory authorities and the private sector presented a series of master lectures on topics related to nuclear safety, security, non-proliferation and liability. NEA Director-General William D. Magwood, IV, and Commissioner Stephen G. Burns of the US Nuclear Regulatory Commission (NRC) were both among the lecturers who spoke during the week.

Regulatory and institutional framework for nuclear activities

The NEA has updated, in co-ordination with the Japanese Delegation, the report on the "Regulatory and Institutional Framework for Nuclear Activities in Japan". These NEA 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. The report on Japan is available for download at www.oecd-nea.org/law/legislation/japan.pdf and further information on Japanese nuclear law, such as translations in English of relevant legislation, is available at www.oecd-nea.org/law/legislation/japan.html.

NEA publications of interest

Since the *Nuclear Law Bulletin* No. 98, the NEA has issued a number of publications of interest. The report *Communication on the Safety Case for a Deep Geological Repository* compiled lessons from both failures and successes in communicating technical information to non-technical audiences in the development of deep geological repositories. The report addresses two key questions in particular: what is the experience base concerning the effectiveness or non-effectiveness of different tools for communicating safety case results to a non-technical audience and how can communication based on this experience be improved and included into a safety case development effort from the beginning. Another report, on the *Impacts of the Fukushima Daiichi Accident on Nuclear Development Policies* examines changes to national policies and plans and attempts to distinguish the impact of the Fukushima Daiichi nuclear power plant accident from other factors that have affected policymaking in relation to nuclear energy, in particular electricity market economics, financing challenges and competition from other sources (gas, coal and renewables). It also examines changes over time to long-term, quantitative country projections, which reveal interesting trends on the possible role of nuclear energy in future energy systems. Both reports are available for free online at: www.oecd-nea.org/pub/.

Belgium

Federal Public Service for the Economy, SMEs, Middle Classes and Energy

[C – 2014/11384]

29 June 2014 — Act amending the Act of 22 July 1985 on Third-Party Liability in the Field of Nuclear Energy (1)

PHILIPPE, King of the Belgians,

To all those present and to come, Greetings.

The Chambers have adopted and We sanction the following:

CHAPTER I. — *Introductory provision*

Article 1. The present Act governs a matter referred to in Article 78 of the Constitution.

CHAPTER II. — Provisions amending the Act of 22 July 1985 on Third-Party Liability in the Field of Nuclear Energy

Article 2. For Article 1 of the Act of 22 July 1985 on Third-Party Liability in the Field of Nuclear Energy there shall be substituted the following text:

"Article 1: The following definitions shall apply under the present Act:

(1) The "Paris Convention": The Convention on Third-Party Liability in the Field of Nuclear Energy of 29 July 1960, as Amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982 and by the Protocol of 12 February 2004;

(2) The "Supplementary Convention": The Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960, as Amended by the Additional Protocol of 28 January 1964, by the Protocol of 16 November 1982 and by the Protocol of 12 February 2004;

(3) The "Minister": The Minister in charge of nuclear insurance;

(4) The terms "nuclear incident", "nuclear installation", "nuclear fuel", "radioactive products or waste", "nuclear damage", "measures of reinstatement", "preventive measures" and "reasonable measures": The notions defined in Article 1 of the Paris Convention."

Article 3. For Article 2 of the same Act there shall be substituted the following text:

"Article 2. The provisions of Title 1 apply to nuclear damage resulting from a nuclear incident for which the operator of the nuclear installation located on Belgium's territory is liable, provided that the nuclear damage is suffered in the territory of, or in any maritime zones established in accordance with international maritime law of, or, except in the territory of a Non-Contracting State not mentioned under paragraphs 2 and 3 below, on board a ship or aircraft registered by:

(1) A Contracting Party to the Paris Convention;

(2) A Non-Contracting State which, at the time of the nuclear incident, has no nuclear installations in its territory or in any maritime zones established by it in accordance with international law;

(3) Any other Non-Contracting State which, at the time of the nuclear incident, has in force nuclear liability legislation which affords equivalent reciprocal benefits, as defined in Article 2(a)(iv) of the Paris Convention.

The King may, by Decree deliberated in the Council of Ministers, extend the scope of application of Title 1 of the present Act to nuclear damage resulting from a nuclear incident for which the operator of a nuclear installation located on Belgium's territory is liable and which is sustained by a national of a Contracting State in the territory of States not mentioned in subsections (1) to (3) of paragraph 1 above.

Under the present Article, Belgium's territorial waters and exclusive economic zone in the North Sea are considered as integral parts of Belgium's territory."

Article 4. In Article 5 paragraphs 1, 2 and 3 of the same Act, for every instance of the phrase "damage caused" there shall be substituted "nuclear damage caused".

Article 5. Article 6 of the same Act shall be amended as follows:

(1) For paragraph 2 there shall be substituted the following text:

"(2) is liable for nuclear damage caused to the means of transport on which the substances were stored at the time of the nuclear incident, if it is liable for nuclear damage caused during their carriage in the cases provided for under Article 4 of the Paris Convention.

The compensation for such nuclear damage shall not reduce the operator's liability for other nuclear damage to an amount lower than that established in Article 7, paragraph 1, of the present Act."

(2) A paragraph 3 shall be inserted in Article 6 as follows:

"(3) is liable for damage caused by a non-nuclear incident, if such damage is caused jointly by a nuclear incident, to the extent that it is not reasonably separable from damage caused by the nuclear incident."

Article 6. In Article 7, paragraph 1 of the same Act, as amended by the Act of 11 July 2000 and by the Act of 13 November 2011, for every instance of the phrase "damage caused" there shall be substituted "nuclear damage caused".

Article 7. For Article 8 of the same Act there shall be substituted the following text:

"Article 8. The operator of a nuclear installation shall, in accordance with Article 10(a) and (d) of the Paris Convention, have and maintain insurance or other financial security deemed appropriate by the Minister, of the amount established in or by virtue of Article 7 of the present Act.

The Minister shall ensure that the amount is sufficient to meet the requirements of the present Act and that the provider of the security is solvent, unless said provider is a company that is subject to the prudential supervision of the National Bank.

The operator shall renew its insurance or other financial security within sixty days of the damage.

The Minister is the competent public authority to whom written notice shall be sent as required under Article 10(d) of the Paris Convention.

The sums provided as insurance, reinsurance or other financial security may be drawn upon only for compensation for nuclear damage caused by a nuclear incident."

Article 8. An Article 10/1 shall be inserted in the same Act and shall be worded as follows:

"Article 10/1

§ 1. If an operator has established that the insurance or financial security made compulsory under this Act for certain types of risk is not available on the market, the operator may request the Government to provide a security, subject to the payment of a fee for the coverage of these types of risk.

Such request shall be made to the Ministry of the Economy, which shall determine its admissibility.

The King may, by Decree deliberated in the Council of Ministers, set the terms and conditions governing the granting of such security.

§ 2. The King, upon advice from the Treasury, the Financial Services and Markets Authority and the Insurance Committee (Commission des Assurances), shall set the fee of the security by Decree deliberated in the Council of Ministers. The Minister for Finance shall set a reasonable deadline for the Treasury to give advice. Once that deadline has passed, the advice shall no longer be necessary. The fee shall be paid annually and shall cover the risk incurred by the Government as well as the costs incurred in determining its amount. Such fee shall also cover the costs incurred in verifying that the damage actually occurred and that all the requirements were met for the security to be called upon, as well as loss adjustment expenses in the event the security comes into play.

§ 3. Should the security be called upon, the Government shall be subrogated in all the rights and remedies of the victims against the operator for the sums it will have provided."

Article 9. Article 14 of the same Act shall be amended as follows:

(1) Under (2), for every instance of the phrase "damage caused" there shall be substituted "nuclear damage caused";

(2) A paragraph 3 shall be added to Article 14, and shall read as follows:

"(3) The operator of a nuclear installation may only transfer its liability to the operator of another nuclear installation if that second operator has a direct economic interest in the nuclear substances in the course of carriage."

Article 10. In Article 15 of the same Act, for the words "4, c" there shall be substituted the words "4, d".

Article 11. In the same Act, for the title of Chapter VI there shall be substituted the following:

"Chapter VI. On compensation for nuclear damage"

Article 12. In Article 17 of the same Act, for every instance of the phrase "damage caused" there shall be substituted "nuclear damage caused".

Article 13. In Article 18 of the same Act, the following amendments shall be made:

(1) In paragraph 1, for the word "damage" there shall be substituted "nuclear damage";

(2) In paragraph 1, the words "and cumulative" shall be deleted;

(3) In paragraph 2, for the words "damage caused" there shall be substituted "nuclear damage caused".

Article 14. In Article 19 of the same Act, the following amendments shall be made:

(1) In paragraph 1, for every instance of the word "damage" there shall be substituted the words "nuclear damage";

(2) In paragraph 1, for the words "3, f" there shall be substituted the words "3, g";

(3) Paragraph 3 shall be repealed.

Article 15. In Article 20 of the same Act, for paragraph 2 there shall be substituted the following:

"If total compensation exceeds or may exceed the funds referred to in the previous paragraph, the King shall, by Decree deliberated in the Council of Ministers, set out the conditions for an equitable distribution."

Article 16. In Article 21, paragraph 2, for every instance of the word "damage" there shall be substituted the words "nuclear damage".

Article 17. An Article 21/1 shall be added to the same Act, worded as follows:

"Article 21/1

The King may, by Decree deliberated in the Council of Ministers, set out the provisions governing the system for compensating costs incurred in relation to preventive measures and measures of reinstatement of the environment following a nuclear incident."

Article 18. In Article 22 of the same Act, the word "nuclear" shall be inserted before the words "damage which".

Article 19. An Article 22/1 shall be added to the same Act, worded as follows:

"Article 22/1

The Government shall compensate, up to the amount established in Article 7 paragraph 1, nuclear damage caused by a nuclear installation or carriage, the amount of which exceeds the maximum amount established under Article 7, paragraph 2(2)."

Article 20. for Article 23 of the same Act there shall be substituted the following text:

"Article 23

Actions for compensation brought against the operator pursuant to this Act shall be brought within:

(1) Thirty years of the nuclear incident in the case of personal injury;

(2) Ten years of the nuclear incident in the case of any other nuclear damage;

Those time limits passed, actions shall lapse.

In any event, such actions shall lapse after three years from the day on which the injured party was made aware of the nuclear damage and of the identity of the operator or from the day on which he or she should reasonably have been aware of it, subject to the ten and thirty-year limitations set by the present Article.

Any individual who sustained damage caused by a nuclear incident and brought action for compensation within the time limits set in the present Article may lodge an additional claim should the damage have aggravated after the time limits provided no final ruling was issued regarding the final amount of compensation."

Article 21. In Article 24 of the same Act, for the words "damage is" there shall be substituted the words "nuclear damage is".

Article 22. In Article 25 of the same Act, the following amendments shall be made:

(1) In paragraph 2, for the words "5, a," there shall be substituted the word "5";

(2) Paragraph 3 is repealed.

Article 23. In Article 26, paragraph 2 of the same Act, for the word "This" there shall be substituted the words "The present".

Article 24. In Article 27 of the same Act, the following amendments shall be made:

(1) For the words "damage resulting" there shall be substituted the words "nuclear damage resulting";

(2) For the phrase "in the case referred to in Article 22" there shall be substituted the phrase "in the cases referred to in Articles 22 and 22/1".

Article 25. An Article 28/1 shall be added to the same Act, worded as follows:

"Article 28/1. Actions brought under the Paris Convention, the Supplementary Convention or the present Act are brought at the request of:

1) Victims of nuclear damage resulting from a nuclear incident;

2) The Government;

3) A foreign State acting in the name of and on behalf of persons that are nationals of such State or who have their domicile or residence on its territory and who have agreed to being represented by such State;

4) Any person who, under the Paris Convention, the Supplementary Convention or the present Act, enjoys rights by subrogation or assignment."

Article 26. An Article 28/2 shall be added to the same Act, worded as follows:

"Article 28/2

The Government of Belgium may bring actions in the name and on behalf of persons who have their domicile or residence in its territory and who have agreed to being legally represented by the Government, if such persons have fallen victim to a nuclear incident outside the jurisdiction of the Belgian courts.

The King may set out the procedures and criteria that victims of a nuclear incident falling under the jurisdiction of a foreign court have to comply with in order for the Government of Belgium to represent them in court."

Article 27. In Article 30 of the same Act, for the words "or 22" there shall be substituted the words ", 22 or 22/1".

Article 28. In Article 32 of the same Act, for the words "damage caused" there shall be substituted the words "nuclear damage caused".

Article 29. In Article 33 of the same Act, for the words "damage suffered" there shall be substituted the words "nuclear damage suffered".

Article 30. In Article 34 of the same Act, for the words "damage suffered" there shall be substituted the words "nuclear damage suffered".

CHAPTER III. — *Provision amending the Judicial Code*

Article 31. In Article 569(17) of the Judicial Code, for the words "the Act of 18 July 1966 on Third-Party Liability in the Field of Nuclear Energy" there shall be substituted the words "the Act of 22 July 1985 on Third-Party Liability in the Field of Nuclear Energy".

CHAPTER IV. — *Transitional provision*

Article 32. Operators that were recognised as such under the Act of 22 July 1985 on Third-Party Liability in the Field of Nuclear Energy, as amended on 11 July 2000 and 13 November 2011, shall retain their operator status provided that they amend their insurance or any other financial security covering their liability so as to comply with the requirements of the present Act within ninety days of its entry into force.

The ninety-day time limit set in paragraph 1 may be extended by the Minister to allow for the time necessary to process a request filed under Article 10/1, inserted by Article 8 of the present Act, provided that such request was made within thirty days of the entry into force of Article 8.

CHAPTER V. — *Final provision*

Article 33. The King shall set the date of entry into force of each of the provisions of the present Act, which will enter into force no later than the first day of the eighteenth month following its

publication in the Moniteur belge except for the present Article, which will come into force on the day the present Act is published in the Moniteur belge.

We promulgate the present law, order the Seal of State to be affixed thereto and for it to be published in the Moniteur belge.

Brussels, 29 June 2014

PHILIPPE

By the King:

The Minister for the Economy,

Johan Vande Lanotte

The Interior Minister,

Joëlle Milquet

The Minister for Finance,

Koen Geens

The Secretary of State for Energy,

Melchior Wathelet

Sealed with the Seal of State:

The Minister for Justice,

Stefaan De Clerck

(1) Note

Chamber of representatives (www.lachambre.be):

Documents: 53-3431 – 2013/2014

Full record: 22 April 2014

Senate (www.senate.be):

Documents: 5-2867 – 2013/2014

Senate annals: 24 April 2014

Belgium

Federal Public Service for the Economy, SMEs, Middle Classes and Energy

[C – 2016/11496]

7 December 2016. — Act amending the Act of 22 July 1985 on Third-Party Liability in the Field of Nuclear Energy (1)

PHILIPPE, King of the Belgians,

To all those present and to come, Greetings.

The House of Representatives has adopted and We sanction the following:

CHAPTER I. — *Introductory provision*

Article 1. The present Act governs a matter referred to in Article 74 of the Constitution.

CHAPTER II. — *Amendments to the Act of 22 July 1985 on third-party liability in the field of nuclear energy*

Article 2. Article 1 of the Act of 22 July 1985 on Third-Party Liability in the Field of Nuclear Energy, substituted by the Act of 29 June 2014, shall be amended as follows:

a) for subsection (4) there shall be substituted:

"(4) The terms "nuclear incident", "nuclear fuel", "nuclear installations", "radioactive products or waste" and "nuclear substances": The notions defined in Article 1 of the Paris Convention."

b) for the same Article, there shall be inserted a subsection (5), worded as follows:

"(5) The terms "nuclear damage", "reinstatement measures", "preventive measures" and "reasonable measures": The notions defined in Article 1 of the Paris Convention."

Article 3. In Article 2, paragraph 1 of the same Act, substituted by the Act of 29 June 2014, for subsection (2), there shall be substituted:

"(2) A Non-Contracting State which, at the time of the nuclear incident, has no nuclear installations in its territory or in any maritime zones established by it in accordance with international law if the King, by decree deliberated in the Council of Ministers, extends the scope of application of Title I of the present Act to such State;"

Article 4. Article 7, paragraph 1 of the same Act, as amended by the Acts of 11 July 2000, 13 November 2011 and 29 June 2014 shall be construed as follows:

"Article 7: The maximum amount of nuclear damage for which the operator is liable is set at EUR 1.2 billion for each nuclear incident."

Article 5. In Article 23 of the same Act, substituted by the Act of 29 June 2014, there shall be inserted the following paragraph:

"Compensation for personal nuclear injury within ten to thirty years from the day the incident occurred rests with the Government. Operators shall be responsible for compensating any nuclear incident that may occur as from 1 January 2018. The King may establish an earlier or later date. In any event, operators shall be responsible for compensation as from the 1 January of the year

following the entry into force of the 12 February 2004 Protocol amending the Convention of 29 July 1960 on Third-Party Liability in the Field of Nuclear Energy."

CHAPTER III – *Transitional and final provisions*

Article 6. Operators who were recognised as such by virtue of the Act of 22 July 1985 on Third-Party Liability in the Field of Nuclear Energy shall retain their operator status provided that they amend their insurance or any other financial security covering their liability so as to comply with the requirements of the present Act within ninety days of its entry into force or of the entry into force of Article 2(b).

The time limit set in paragraph 1 may be extended by the Minister to allow for the time necessary to process an application filed under Article 10/1 of the Act of 22 July 1985 on Third-Party Liability in the Field of Nuclear Energy, provided that such application was made within thirty days of the entry into force of the present Act or of Article 2(b).

Article 7. Article 2(b) shall enter into force on 1 January 2018. However, the King may establish an earlier or later entry into force date. In any event, this Article shall enter into force no later than the 1 January of the year following the entry into force of the 12 February 2004 Protocol amending the Convention of 29 July 1960 on Third-Party Liability in the Field of Nuclear Energy.

Until entry into force, the term "nuclear damage" shall mean damage to persons and goods as provided in the Civil Code.

We promulgate the present Law, order the Seal of State to be affixed thereto and for this Law to be published in the *Moniteur belge*.

Done in Brussels on 7 December 2016

PHILIPPE

By the King:

The Minister for the Economy,

K. PEETERS

The Minister for Energy,

Ms M.C. MARGHEM

Sealed with the Seal of the State:

The Minister for Justice,

K. GEENS

(1) Note:

House of Representatives (www.lachambre.be):

Documents: 54 2085

Full record: 24 November 2016

News briefs

Extension of the Framework Agreement of International Collaboration on Research and Development of Generation IV Nuclear Energy Systems

On 10 November 2016, Mr T. Navracsics, the European Commissioner for Education, Culture, Youth and Sport, signed, on behalf of the Euratom Community and in the presence of Mr V. Šucha, the Director General of the European Commission's Joint Research Centre, an agreement extending the Framework Agreement for International Collaboration on Research and Development of Generation IV nuclear Energy Systems.

IAEA Practical Arrangements on Nuclear Science Applications

The Practical Arrangements between the International Atomic Energy Agency (IAEA) and the European Commission on Cooperation on Nuclear Science Applications were signed by Mr V. Šucha, the Director General of the European Commission's Joint Research Centre, and Mr A. Malavasi, the Deputy Director General of the IAEA Department of Nuclear Sciences and Applications, on the occasion of the 5th EU-IAEA Senior Officials Meeting that took place in Brussels on 15 February 2017.

The purpose of these Practical Arrangements is to set forth the framework for co-operation in the area of nuclear science applications.

International Nuclear Law Association (INLA), German Branch, 2017 Bonn Conference

The German Branch of the International Nuclear Law Association (INLA) will hold its 15th regional conference on 28 and 29 September 2017 in Bonn, Germany.

Under the title "Nuclear Law in Motion", in four sessions German and international speakers will address the following topics:

- nuclear waste management: responsibility and liability;
- nuclear third party liability, with a focus on transport of nuclear material;
- legal issues in radiological protection, mainly regarding EU Basic Safety Standards, dismantling and waste disposal; and
- current trends in international nuclear law.

The conference will be conducted in English and German, with simultaneous translation being provided.

For more details and for registration, see the website of the German Branch: www.deutsche-inla.de.

Recent publications

Iran's Nuclear Program and International Law: From Confrontation to Accord (2016), by Daniel H. Joyner[1]

This book provides an analysis of the most important international legal questions relating to Iran's nuclear programme that have been raised since 2002. Setting these legal questions in their historical and diplomatic context, this book aims to clarify how the relevant sources of international law – including primarily the 1968 Nuclear Non-proliferation Treaty (NPT) and International Atomic Energy Agency (IAEA) treaty law – should be properly applied in the context of the Iran case.

It provides an instructional case study of the application of these sources of international law, the lessons from which can be applied to inform both the ongoing legal and diplomatic dynamics surrounding the Iran nuclear dispute itself, as well as similar future cases. The book includes a full consideration of the watershed diplomatic accord reached between Iran and western states in July 2015, known as the Joint Comprehensive Plan of Action (JCPOA). This legal analysis by a leading international law scholar will be of interest to diplomats and academics, as well as to anyone who is interested in understanding international law's application to this sensitive dispute in international relations.

This book contains chapters on:

- Iran's nuclear programme and the period of confrontation from 2002 to 2015;
- whether Iran violated the NPT;
- whether Iran was in violation of its safeguards obligations in 2003;
- Iran's failures to timely declare nuclear facilities;
- whether Iran was in violation of its safeguards obligations in July 2015;
- whether the IAEA used proper standards in its assessments of Iran's compliance;
- the implications of the actions of the United Nations Security Council; and
- the JCPOA and developments since July 2015.

Dan Joyner is the Elton B. Stephens Professor of Law, and Director of International Programs, at the University of Alabama School of Law.

1. Joyner, D.H. (2016), *Iran's Nuclear Program and International Law: From Confrontation to Accord*, Oxford University Press, New York.

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Feature articles in this issue include: "Reformed and reforming: Adapting the licensing process to meet new challenges"; "Reflections on the development of international nuclear law"; and "Facing the challenge of nuclear mass tort processing".

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