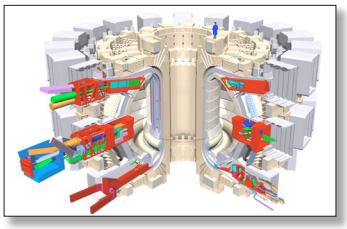
Legal Affairs
2014

Nuclear Law Bulletin No. 93

Volume 2014/1



OECD
BETTER POLICIES FOR BETTER LIVES

NEA
NUCLEAR ENERGY AGENCY

Legal Affairs

Nuclear Law Bulletin No. 93

NEA No. 7181

NUCLEAR ENERGY AGENCY
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 34 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Republic of Korea, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1 February 1958. Current NEA membership consists of 31 countries: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, the Republic of Korea, the Russian Federation, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission also takes part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes;
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include the safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information.

The NEA Data Bank provides nuclear data and computer program services for participating countries. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

Also available in French under the title:
Bulletin de droit nucléaire n° 93

Cover photos: Third annual meeting of the Nuclear Law Association (NLA) in India; the Tokamak ITER under construction in Saint-Paul-lez-Durance, France (© ITER Organization).

Acknowledgements

In addition to the authors of the articles, the NEA would like to thank the following individuals for their contributions to this edition of the *Nuclear Law Bulletin*: Dr. D. J. Lobach (Belarus), Ms. F. Touïtou-Durand (France), Prof. N. Pelzer, Ms. K. Odendahl and Mr. C. Raetzke (Germany), Mr. Z. Zombori (Hungary), Ms. I. Bolger (Ireland), Ms. U. Adomaityte (Lithuania), Ms. E. Mursa (Moldova), Mr. M. Sousa Ferro (Portugal), Mr. M. Pospíšil (Slovak Republic), Ms. I. D. Hernández (Spain), Mr. V. Shvitay (Ukraine), Mr. T. Rothschild (USA), Ms. A. Durand (EC) and Ms. S. R. Rivera (IAEA).

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.

Table of contents

Progress towards a global nuclear liability regime

During its April 2014 meeting, the Steering Committee for Nuclear Energy held a policy debate on "Progress towards a Global Nuclear Liability Regime". The Steering Committee heard presentations from several experts on nuclear liability issues. To prepare the delegates to the Steering Committee for the policy debate, the NEA Secretariat prepared a background note on the status of the nuclear liability regimes, as well as on current issues and challenges in implementing the regimes.

This article is based on the background note and is intended to provide basic information on the relevant international conventions and an overview of recent developments to enhance the understanding of the legal framework in which policymakers and practitioners are engaging to respond to the call for broader adherence to the international liability instruments.

Introduction

As the production and use of nuclear energy for peaceful purposes developed in the 1950s, a specific legal framework for third party nuclear liability was established to ensure adequate compensation for damage to persons and property resulting from a nuclear accident, but also to encourage the industry to develop nuclear technology and assume responsibility without being exposed to an uncertain and potentially ruinous liability burden.

Significant attention has been understandably placed at the international and national levels on fostering strong programmes to achieve safety, security and safeguards at a high level. Notwithstanding best efforts to achieve a high level of safety, the possibility remains that accidents may occur within a nuclear installation (i.e. not only nuclear power plants but also any installation in which there are nuclear fuel, nuclear substances, radioactive products or waste) or during the transportation of nuclear substances to or from a nuclear installation. As the experience shows from the accidents that occurred at Three Mile Island (United States) in 1979, Chernobyl (former USSR) in 1986, and Fukushima Daiichi (Japan) in 2011, severe accidents can have varying and potentially far-reaching consequences affecting both people and property.

In the wake of the Fukushima Daiichi nuclear power plant accident, the General Conference of the International Atomic Energy Agency (IAEA) endorsed in September 2011 an Action Plan on Nuclear Safety ("IAEA Action Plan")[1] to strengthen the global nuclear safety framework. The IAEA Action Plan calls upon member states "to work towards establishing a global nuclear liability regime that addresses the concerns of all states that might be affected by a nuclear accident with a view to providing appropriate compensation for nuclear damage", and "to give due consideration to the possibility of joining the international nuclear liability instruments as a step towards achieving such a global regime". As directed by the plan, the International Expert Group on Nuclear Liability (INLEX) made recommendations in June 2012 to facilitate the achievement of such a global

1. IAEA document GOV/2011/59-GC (55)/14 available at: www.iaea.org/About/Policy/GC/GC55/Documents/gc55-14.pdf.

regime.[2] More recently, the Joint Statement on Liability for Nuclear Damage signed by France and the United States in August 2013,[3] the G20 Leaders' Declaration of September 2013,[4] and the Franco-Russian Nuclear Power Declaration signed in November 2013 encourage multilateral co-operation towards achieving a global nuclear liability regime.[5]

The original nuclear liability regimes

The Paris-Brussels regime

The 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy[6] ("Paris Convention"), the first international nuclear liability instrument to be established, was adopted under the auspices of the Organisation for Economic Co-operation and Development (OECD), and more particularly its Nuclear Energy Agency (NEA). The government of any member or associate country of the OECD may accede to the Paris Convention, and the government of any other country may also do so with the unanimous assent of the contracting parties. The Paris Convention entered into force on 1 April 1968 and includes today 16 states, mostly members of the European Union (EU): Belgium, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom. The latest state to have acceded to the Paris Convention is Switzerland, which deposited its instruments of ratification on 9 March 2009.[7]

The Paris Convention states recognised that the liability amount provided in the Paris Convention would not likely be adequate to cover the damage suffered in the event of a serious nuclear accident. To remedy that deficiency, most of those states adopted the 1963 Brussels Convention Supplementary to the Paris Convention ("Brussels Supplementary Convention") under which additional compensation beyond that provided under the Paris Convention would be made available to victims through the establishment of a three-tier system: the first tier is provided by the operator; the second tier is provided by the state in which the nuclear installation of the liable operator is situated (unless the national law transfers the obligation to the operator); and the third tier is contributed jointly by all contracting parties to the Brussels Supplementary Convention. The convention, which entered into force on 4 December 1974, is only open to Paris Convention states and has been ratified by all of them, except Greece, Portugal and Turkey.

The Vienna regime

In 1963, member states of the IAEA adopted the Vienna Convention on Civil Liability for Nuclear Damage ("Vienna Convention"), which came into force on 12 November 1977. All members of the United Nations, or of any of the specialised agencies or of the IAEA, may accede to the Vienna Convention. Its 40 contracting

2. Available at: ola.iaea.org/ola/documents/ActionPlan.pdf.
3. Available at: www.oecd-nea.org/ndd/workshops/nuclearcomp/presentations/documents/document2013-08-28-185401.pdf.
4. Available at: www.g20.org/sites/default/files/g20_resources/library/Saint_Petersburg_Declaration_ENG.pdf.
5. Available in English and French in the *Nuclear Law Bulletin*, No. 92, OECD/NEA, Paris.
6. All the international conventions on nuclear liability are available at: www.oecd-nea.org/law/legal-documents.html#agreements.
7. The ratification of the Paris Convention by Switzerland is effective only with respect to the Paris Convention as amended by all its amending protocols, including the 2004 Protocol to amend the Paris Convention (discussed later in this note). The entry into force for Switzerland of the Paris Convention will therefore only take place once the 2004 Protocol to amend the Paris Convention has itself entered into force.

parties come from all geographical regions, except Oceania. The latest state to have acceded to the Vienna Convention is Jordan, which deposited its instruments of ratification on 27 January 2014. The Vienna Convention regime, in contrast to the Paris-Brussels regime, does not provide for a supplementary funding mechanism.

Enhancing the liability regimes

Just as the 1986 Chernobyl accident provided the catalyst for adoption of the 1994 Convention on Nuclear Safety and other international instruments focusing on emergency response and assistance, the accident also provided impetus to further improve the nuclear liability regimes by modernising the Paris-Brussels and Vienna regimes. In 1988, the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention ("Joint Protocol") was adopted, which linked the Conventions in the event a nuclear accident occurring in a state party to one regime caused damage in a state party to the other regime. Nine years later, a new nuclear liability instrument was adopted – the 1997 Convention on Supplementary Compensation for Nuclear Damage ("CSC"). The Joint Protocol and the CSC are discussed in more detail later in this note.

The Protocols amending the Vienna Convention and the Paris-Brussels Conventions

When the international community realised the extent of the consequences of the Chernobyl accident, it was clear that the original nuclear liability regimes needed to be improved in order to strengthen the protection that they provided to the victims. The improvements sought, among other things, to increase the operator's liability amount, to compensate a broader range of damage (including for the first time the environmental and economic costs of an accident), to compensate more victims by widening the geographical scope of the regimes, and to extend the time (or prescription period) in which the victims may make their claims taking into account the latent effects of radiation on human health. A synopsis of the main improvements is provided in Appendix 1.

The 1997 Protocol to Amend the Vienna Convention ("1997 Protocol") was the first to be adopted, and entered into force on 4 October 2003. There are 12 contracting parties, Jordan being the latest to have acceded in January 2014. The 1963 Vienna Convention and the 1997 Protocol, together referred to as the Vienna regime, exist concurrently: states may accede to i) the Vienna Convention only, ii) the Vienna Convention and the 1997 Protocol, or iii) the 1997 Protocol and not to the Vienna Convention. In case a state accedes to the 1997 Protocol only, it shall be bound by the provisions of the Vienna Convention as amended by the 1997 Protocol in relation to other states parties to the 1997 Protocol, and absent an expression of a different intention by that state, it shall be bound by the Vienna Convention in relation to states which are only parties to the Vienna Convention.[8]

The parties to the Paris-Brussels regime, which participated in the discussions regarding the 1997 Protocol, adapted the improvements made therein within their own regime. On 12 February 2004, the Protocol to Amend the Paris Convention and the Protocol to Amend the Brussels Supplementary Convention were signed. These Protocols have not yet entered into force, mainly because a decision of the Council of the EU of 8 March 2004[9] requires that the contracting parties to the Paris Convention that are also members of the EU "take the necessary steps to deposit simultaneously

8. Article 7 (6) of the 1997 Protocol.
9. Council Decision 2004/294/EC of 8 March 2004 authorising the member states to ratify, in the interest of the European Community, the Protocol of 12 February 2004 amending the Paris Convention, *Official Journal of the European Union* (OJ) L 97/53 (1 April 2004).

their instruments of ratification of the Protocol, or accession to it".[10] At the time, this requirement did not seem to be a constraint, but it ultimately became one. The Council had to authorise the member states that are contracting parties to the Paris Convention to ratify the 2004 Protocol to amend the Paris Convention because some of its provisions concern the judicial resolution of disputes, a subject that according to EU law falls under the exclusive competence of the EU. It is, however, important to note that the requirement to deposit simultaneously the instruments of ratification or accession was not required of the Republic of Slovenia when it joined the Paris-Brussels regime,[11] nor of certain member states when ratifying or acceding to the 1997 Protocol amending the Vienna Convention,[12] which also addresses judicial matters. The contracting parties to the 2004 Protocol amending the Paris Convention that are subject to the 2004 Council decision are now striving to deposit their ratification instruments in the near future.

The Convention on Supplementary Compensation for Nuclear Damage

During the 1997 Vienna Protocol deliberations, negotiating states decided to establish a mechanism for mobilising supplementary funds to compensate nuclear damage, in addition to the funds to be provided by the operator under the Paris and Vienna Conventions. One of the favoured approaches to this idea was to establish a system of supplementary state funding at both national and international levels, modelled in part on the Brussels Supplementary Convention. The result was the adoption of the 1997 Convention on Supplementary Compensation for Nuclear Damage ("CSC"), which is open to all states, including those already parties to the Paris-Brussels or Vienna regimes. At this date, the CSC has not yet entered into force.[13] Canada, which signed the CSC on 3 December 2013, is expected to ratify the CSC soon, and Japan has announced that it intends to ratify the CSC. Ratification by these two countries would allow the CSC to come into force.

The CSC provides for a two-tier compensation system: the first tier is provided by the operator and, if necessary, the state where its installation is situated; and the second tier is provided by the CSC states. The CSC allows a state to establish at its option a third tier of compensation. The CSC was also intended to form the basis for a global liability regime to supplement and enhance the measures provided in the Paris and Vienna Conventions, as well as in national legislation consistent with the provisions of the Annex to the CSC, which reflects the nuclear liability principles set forth in those conventions. Finally, the CSC allowed the United States to join an international nuclear liability convention without amending its national law, the 1957 Price-Anderson Act, which provides for an economic channelling to the operator instead of the legal channelling approach provided in the conventions, as explained later in this note.

10. Article 20 of the Paris Convention requires that two-thirds of the contracting parties deposit their instruments for the 2004 Protocol to come into force.
11. Council Decision 2007/727/EC of 8 November 2007 authorising the Republic of Slovenia to ratify, in the interest of the European Community, the Protocol of 12 February 2004 amending the Paris Convention, OJ L 294/23 (13 November 2007).
12. Council Decision 2013/434/EU of 15 July 2013 authorising certain member states to ratify, or to accede to, the Protocol amending the Vienna Convention, in the interest of the EU, and to make a declaration on the application of the relevant internal rules of Union law, OJ L 220/1 (17 August 2013).
13. The CSC will enter into force when ratified by at least five states with a minimum of 400 000 units of installed nuclear capacity. CSC, Article 20(1). As of July 2014, Argentina, Morocco, Romania, the United Arab Emirates and the United States have ratified the CSC, but the minimum installed capacity level has not been reached.

The nuclear liability principles: The common basis underlying all the regimes

The development of the nuclear liability regimes stemmed in part from the viewpoint that ordinary rules of tort law, while appropriate for conventional risks, could hamper rather than help victims of nuclear damage in obtaining adequate compensation in a timely manner. Typically, tort law requires that:

- The victim identifies the person(s) responsible for the accident: i.e. proves which of the many potential parties involved in a nuclear accident (operator, designers, constructors, suppliers etc.) is legally liable and proves its fault (i.e. its intentional or negligent failure to exercise the prescribed standard of care). Given the potential technical complexities of such a task, litigants could be subject to a costly and time-consuming legal procedure before the courts.

- In case of transboundary damage, the question of the applicable law and competent court, as well as the question of the recognition and enforceability of court decisions may arise if the concerned states (i.e. the states where the accident or the damage occurred) do not have treaty relations which address these questions.

Notwithstanding the above, some countries consider that the ordinary rules of tort law could put victims in a more favourable position and have not adhered to any of the nuclear liability regimes, mainly because under the ordinary rules of tort law:

- The liability of the entity proven to be responsible would be unlimited.

- The victims may bring a claim against any entity that they may consider liable for the accident, as long as they can prove the causal link between such entities' fault or negligence and the accident. Such an approach could significantly increase the financial capacity to compensate the victims if several entities are considered liable.

- Under international conventions that address determination of the competent tribunal,[14] victims may submit their claims before the court of their residence; the victims would thus benefit from the ordinary rules of tort law applicable in their country of residence.

The foundation for today's international conventions on civil nuclear liability takes into account these considerations as well as other aspects of the potential exceptional risks involved in nuclear energy production. The main principles common to the international conventions, which are also reflected in most national nuclear liability laws worldwide, may be summarised as follows:

- *The exclusive liability of the operator:* the operator of a nuclear installation is exclusively liable for damages suffered by third parties resulting from a nuclear accident occurring at its installation or during the course of transport of nuclear materials to or from its installation. No other person may be held liable for the damages caused by the nuclear accident as all liability for damage suffered by third parties is "channelled" directly to the operator.

14. See for example the Convention on jurisdiction and the enforcement of judgments in civil and commercial matters, done on 27 September 1968, 1262 UNTS 153, and Council Regulation (EC) No. 44/2001 of 22 December 2000 on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters, OJ L 12/1 (16 January 2001) or the Convention on jurisdiction and the enforcement of judgments in civil and commercial matters, done on 16 September 1988, OJ L 319/9 (25 November 1988).

There are two approaches to channelling: "legal" channelling, which is provided in the international nuclear liability conventions (i.e. all liability is channelled to the nuclear operator and to no other entity), and "economic channelling", which is provided, for example, under the United States' Price-Anderson Act, 42 USC 2210 (i.e. any entity, such as a supplier, may be held legally liable for the damage incurred, but the economic consequences of that liability are channelled to the operator of the nuclear installation where the accident occurred, which shall have to indemnify any person held legally liable for related damages, such as suppliers). Furthermore, the operator incurs no liability outside the nuclear liability conventions for nuclear damage caused by a nuclear accident.

- *The strict (absolute) liability of the operator:* victims need not prove fault or negligence in seeking compensation, but only a causal link between the nuclear accident and the damage suffered.

- The minimum liability amount borne by the operator: the contracting parties to an international nuclear liability convention shall provide under their legislation a liability amount which shall not be less than the minimum amount provided by the international convention. In most countries (whether they have adhered to a nuclear liability regime or not), the operator's nuclear liability is limited to a specified amount. Only a few countries at present have provided for unlimited liability under their nuclear liability legislation: e.g. Finland (only for those damages suffered within its territory), Germany, Switzerland and Japan. It is important to note that, at the beginning, the nuclear liability regimes (particularly the 1960 Paris Convention) provided for a cap on the operators' liability, but the enhanced regimes only provide for a minimum amount, thereby allowing the contracting parties to provide for greater or even unlimited liability at their option.

- *The obligation for the operator to have and maintain financial security:* to ensure availability of funds, the operator is required to maintain financial security up to its liability amount or, in case of unlimited liability, up to the amount required by law, which cannot be less than the minimum liability amount required under the international convention adopted by the state where the operator's installation is situated. The conventions, and usually national laws, do not require a specific form of financial security; thus, the operator may satisfy its obligation among the different options available, such as private insurance, self-insurance, a guarantee (whether a corporate guarantee or one provided by the state or a bank) or an operators' pool (available in Germany and the United States). However, the financial security mechanism must be acceptable to the competent public authority.[15]

- *The obligation of the victims to file claims within a certain period:* because health-related damage caused by the emission of ionising radiation may not be perceptible for an extended time after the nuclear accident occurred, the legal period during which an action may be brought is a matter of great importance for the victims. Over time, the revised Paris and Vienna Conventions have generally extended the period to the benefit of the victims as illustrated in Appendix 1.

15. See for example Article 10(a) of the Paris Convention.

The conventions also incorporate two additional principles, which are designed to address the complexities posed by the potential transboundary scope of nuclear damage and cross-border compensation claims:

- *Competent jurisdiction and enforcement of judgments*: jurisdiction over nuclear damage claims lies only with the courts of the state in which the accident has occurred, and more precisely only one court should be competent pursuant to the modernised regimes. The judgments rendered by the competent court are enforceable in any contracting party.

- *Applicable law and equal treatment*: the courts having jurisdiction will apply the relevant convention (if the state has adhered to one of them) and their own national law over claims arising out of a nuclear accident, and that law shall apply to all matters both substantive and procedural and to all victims, without any discrimination based upon nationality, domicile or residence.

There is currently a debate as to whether India's nuclear liability legislation adopted in 2010[16] is wholly consistent with the internationally accepted nuclear liability principles, and more specifically with the channelling principle under which only the operator of the installation where the nuclear accident occurred is held liable under the nuclear liability regime, to the exclusion of any other law which may potentially apply. The Indian regime provides for the operator's right of recourse against a supplier when "the nuclear incident has resulted as a consequence of an act of the supplier or his employee, which includes supply of equipment or material with patent or latent defects or sub-standard services".[17] This provision induces each supplier to have and maintain financial security up to the same amount of liability as required of the operator under the Indian legislation, i.e. the Indian rupee equivalent of SDR 300 million[18] or such higher amount as the central government may specify. This approach has raised concerns among potential suppliers, whether Indian or foreign, because it will increase their risks and costs; and some small or medium enterprises may not be able to bear the financial burden. Given the number of suppliers for a given nuclear project, this approach will likely require a greater financial capacity from the insurance market.

The Fukushima Daiichi nuclear power plant accident has demonstrated the effectiveness of the basic principles set forth in the international regimes which have been transposed into the Japanese nuclear liability regime. Of course, there are still areas for improvement.[19] Although much attention is understandably given to emergency preparedness and response arrangements to deal with and mitigate the

16. The Civil Liability for Nuclear Damage Act, No. 38, 2010, Gazette of India, No. 47, pt. II, sec. 1 (21 September 2010) and the Civil Liability for Nuclear Damage Rules, 2011, Gazette of India, No. 2112, pt. II, sec. 3, p. 17 (11 November 2011).
17. Article 17(b) of the Civil Liability for Nuclear Damage Act, 2010.
18. Special Drawing Right or SDR is a unit of account defined by the International Monetary Fund (IMF) based upon a basket of key international currencies. The currency value of the SDR is calculated daily and the valuation basket is reviewed and adjusted every five years. The current value is available at: www.imf.org/external/np/fin/data/rms_sdrv.aspx. On 10 July 2014, one SDR was equivalent to about USD 1.54 and EUR 1.13.
19. The NEA Secretariat, in co-operation with the Permanent Delegation of Japan to the OECD, prepared the publication *Japan's Compensation System for Nuclear Damage: As Related to the TEPCO Fukushima Daiichi Nuclear Accident*, available at: www.oecd-nea.org/law/fukushima/7089-fukushima-compensation-system-pp.pdf. This publication gathers in one volume the translations in English of the major acts, ordinances and guidelines issued in Japan for the implementation of the nuclear liability compensation scheme in response to the accident, as well as several related commentaries. The third supplement to the interim guidelines, issued in January 2013, was published in *Nuclear Law Bulletin* No. 92, OECD/NEA, Paris.

consequences of an accident, the Fukushima Daiichi accident has shown that it is also necessary to be prepared to deal with the legal consequences of a nuclear accident in a timely and financially adequate manner. A clear and comprehensive legal framework is needed to deal with compensating the victims of a nuclear accident, which allows the government and the operator to quickly adapt to the specific circumstances arising from the accident. Some of the lessons to be learnt from the accident at this stage may be summarised as follows:

- The exclusive and strict liability of the operator under the Japanese legislation has allowed the victims to concentrate their applications for indemnification on the Tokyo Electric Power Company (TEPCO), the operator of the damaged nuclear power plant units. As of 20 June 2014, TEPCO had received approximately 2.2 million applications from individuals and corporations.[20] To expedite the handling of such a large number of applications, it is imperative that nuclear states establish the basis for an effective claims handling procedure in advance, to ensure that the victims may be timely compensated and the nuclear liability legislation may be implemented as expected. This is even more important due to the fact that victims have a limited period of time to claim compensation before the courts should they disagree with the compensation offered by the operator.

- To facilitate the compensation procedure and minimise potential disputes, the operator and the victims must have guidance on defining the particular damage entitling the victims to receive compensation, and the appropriate compensation amount for a given type of damage. Pursuant to the Japanese nuclear liability act, a committee of experts[21] was responsible for issuing guidelines to determine the scope of and financial compensation for the nuclear damage, which it did in a fairly short time frame (mostly between 28 April 2011 and 16 March 2012). Supplementary guidance was also issued in 2013. Even though such guidelines are not legally binding, they have not been challenged and can be invoked before the courts by the operator or the victims.

- Under the Japanese legislation, the operator bears unlimited liability, but in case the compensation amounts exceed the financial security required by law, the government is required to provide, with prior approval of the National Diet, such aid as may be necessary to allow the operator to fully compensate the victims. Japanese operators are legally required to maintain a financial security of JPY 120 billion, but the compensation amounts paid by TEPCO as of June 2014 equal approximately JPY 4 trillion. The government provided its aid primarily by acquiring a controlling stake in TEPCO and setting up, together with the Japanese nuclear operators, the Nuclear Damage Compensation Facilitation Corporation (the "Corporation"). The Corporation's purpose is to provide, under certain conditions, financial support to any nuclear operator that may face nuclear damage compensation obligations beyond the required financial security amount. Such financial support is provided either through the "reserves" that are funded by the compulsory annual contributions to be paid by all Japanese nuclear operators to the Corporation and are not required to be reimbursed if called upon or, if certain prior

20. According to the table summarising the "Records of Applications and Payouts for Indemnification of Nuclear Damage" posted by TEPCO on its website at: www.tepco.co.jp/en/comp/images/jisseki-e.pdf.
21. The Dispute Reconciliation Committee for Nuclear Damage Compensation.

conditions are met,[22] through government bonds granted to the Corporation which amounts will have to be reimbursed by the operator that receives the financial support and, in turn, by the Corporation to the government.

As of June 2014, TEPCO had received approximately JPY 4.547 trillion through the Corporation.[23] The Japanese government decided to provide such financial aid[24] because it considered, among other reasons, that it was necessary to avoid TEPCO's liquidation, in which case: i) the victims of nuclear damage would have been unable to receive sufficient compensation (i.e. they would have had no special treatment and would have received their pro rata share of the operator's remaining property after the preferential creditors have been paid; and damage arising after the liquidation procedure would not have been compensated) and would only receive compensation after the conclusion of the legal liquidation; ii) it would probably have been difficult to gain sponsors and carry out corporate reorganisation procedures; and iii) it would have compromised the stable supply of electricity by TEPCO, which provides power to 35.1% of the Japanese population.[25] The scheme set up by the Japanese government to provide financial aid to nuclear operators is intended to put the financial burden primarily on the latter and to minimise the impact on the public.

Towards a global nuclear liability regime

Whether a nuclear accident affects only the territory of the installation state, as with the Fukushima Daiichi accident, or has transboundary effects, such as the Chernobyl accident, it is important that victims are adequately and timely compensated. Adhering to a nuclear liability regime provides the necessary treaty relations between the states that may be affected by a nuclear accident (e.g. on which territory an accident may occur or damage may be suffered) to clarify which law applies or which court is competent, to establish the recognition and enforcement of judicial decisions and, depending on the applicable convention, to increase the funds available to compensate the victims by contributing to an international fund.[26] In addition, because contracting states should ensure that their national legislation reflects the nuclear liability regime to which they adhere, a

22. The operator requesting the financial support will have to prepare, in co-ordination with the Corporation, a special business plan that must demonstrate business rationalisation and management accountability, and reach pre-agreements with other interested parties who may have benefited from its liquidation.
23. According to the TEPCO press release dated 23 June 2014, available at: www.tepco.co.jp/en/press/corp-com/release/2014/1238203_5892.html.
24. See "The financial support by the Nuclear Damage Compensation Facilitation Corporation", by Mr. Yasufumi Takahashi, and the Japanese Cabinet Decision of 14 June 2011 on the Framework of government support to TEPCO, both published in (2012), OECD (ed.), *Japan's Compensation System for Nuclear Damage: As Related to the TEPCO Fukushima Daiichi Nuclear Accident*, OECD/NEA, Paris, available at: www.oecd-nea.org/law/fukushima/7089-fukushima-compensation-system-pp.pdf.
25. As of 31 March 2013, according to TEPCO's "Annual Report 2013", available at: www.tepco.co.jp/en/corpinfo/ir/tool/annual/pdf/ar2013-e.pdf.
26. As noted by INLEX, "The nuclear liability conventions considerably improve the protection of victims in comparison to most national laws. Quite a number of the advantages, like procedural channelling, recognition and enforcement of judgements, liability for damage caused by state-run nuclear activities, free transferability of payable sums and contributions of other states to compensation funds can only be achieved by international agreements. National laws are unable to achieve these advantages", in "Civil liability for nuclear damage: Advantages and disadvantages of joining the International Nuclear Liability Regimes – A paper by the International Expert Group on Nuclear Liability (INLEX)" (undated), available at: ola.iaea.org/ola/treaties/documents/liability_regime.pdf.

broader adhesion to the Paris-Brussels regime, the Vienna regime or the CSC should lead to the harmonisation of the nuclear liability legislation and thus promote similar treatment to victims and operators worldwide.

It is important to note that greater globalisation and harmonisation of nuclear liability is not only to the benefit of the potential victims of an accident, but also has beneficial effects on nuclear trade. Although the Fukushima Daiichi accident led to a number of reviews of the role of nuclear power, it is noteworthy that at the end of 2013 there were 72 reactors under construction, the largest number in 25 years. Participants in an increasingly globalised market understandably want greater legal clarity and certainty to understand the risks to which they will be exposed when participating in a nuclear project, whether for the construction, refurbishment or decommissioning of nuclear installations. The nuclear liability principles set forth in the nuclear liability regimes help meet those objectives.

A global nuclear liability regime may be achieved if all states with nuclear installations and as many states as possible that may be affected by a nuclear accident establish treaty relations. Given the options currently available, states may consider ratifying or acceding to:

- the Paris or the Vienna Convention and the Joint Protocol, or
- the CSC, with the possibility of previously adhering to the Paris or Vienna Convention.

As the Paris-Brussels regime, the Vienna regime and the CSC reflect the same basic principles, the regimes are fundamentally compatible in ensuring similar legal treatment of victims and the operator even though there are certain differences (some of which are explained in Appendix 1), such as in the prescribed liability amount or the prescription period. Nonetheless, the differences and potential areas for further improvement with regard to their compatibility do not detract from the overarching goal of achieving a global liability regime through broader adherence to the international liability instruments.

The Joint Protocol

The Joint Protocol came into force on 27 April 1992 and is open to all states that have previously adhered to the Paris-Brussels or the Vienna regimes. It has 28 contracting parties; the latest state to have acceded to the Joint Protocol is France, which deposited its instruments of accession on 30 April 2014.

The Joint Protocol acts like a "bridge" between the Paris Convention and the Vienna Convention to determine which of them would apply in case that they are both potentially applicable and to extend their respective scope of application to embrace the contracting parties of the other convention. Its main principle is that "In the case of a nuclear incident occurring in a nuclear installation, the applicable Convention shall be that to which the state is a party within whose territory that installation is situated"[27] and the applicable convention shall be applied, with respect to the contracting parties to the Joint Protocol which are parties to the other convention, in the same manner as between parties to the applicable convention.[28]

The CSC

The CSC aims to gather under its "umbrella" the contracting parties to the existing Paris-Brussels and Vienna regimes, as well as any state that has not ratified either but has declared that its national law complies with the provisions of the

27. Article III (2) of the Joint Protocol.
28. Article IV of the Joint Protocol.

Annex to the CSC, which reflects the common nuclear liability principles. The CSC thereby "encourage[s] regional and global co-operation to promote a higher level of nuclear safety in accordance with the principles of international partnership and solidarity".[29] As noted by INLEX, "the CSC establishes treaty relations among States that belong to the Paris Convention, the Vienna Convention or neither, while leaving intact the Joint Protocol that establishes treaty relations among States that belong to the Paris Convention or the Vienna Convention".[30] As mentioned above, the CSC also provides for supplementary funding contributed by all its contracting parties upon notification that nuclear damage shall exceed the operator's nuclear liability amount provided in the convention.

Challenges and the path forward

Although progress toward extending the reach of the international liability conventions has at times been slow, recent developments reflect a renewed commitment in the international community to improve the prospects towards greater adherence to the modernised regimes. The path forward will be a product of a greater commitment by states to the following actions:

Encouraging more countries to adhere to one of the nuclear liability regimes and adopt consistent legislation. All states with nuclear installations, and as many states as possible that may be affected by a nuclear accident, should adhere to one of the enhanced nuclear liability regimes. Although there are compelling arguments in favour of a more global nuclear liability regime, today more than half of the reactors in operation or under construction worldwide are not currently subject to any of the international nuclear liability regimes in force (see Appendix 2). Nonetheless, there are signs of progress: several new entrants or potential new entrants into nuclear power generation (i.e. Jordan, Kazakhstan, Saudi Arabia and the United Arab Emirates) have acceded to one of the regimes.

Bringing the CSC and the 2004 Protocol to Amend the Paris Convention into force. With regard to the CSC, Canada recently signed the convention and may conclude the necessary steps for ratification in 2014, while Japan has indicated that it intends to sign the CSC. Ratification by these two countries would allow the CSC to come into force. The contracting parties to the Paris Convention are making their best efforts to have the 2004 Protocol to amend the Paris Convention enter into force in the near future.

Encouraging parties to the Vienna Convention to adhere to its enhanced form, the 1997 Protocol, and to adopt consistent legislation. All countries that have joined the Vienna regime since 2010[31] (except Mauritius, which is a non-nuclear country) have acceded to the 1997 Protocol, which provides for an enhanced protection of the victims, including a higher minimum amount of compensation.

Encouraging the contracting parties to the Paris-Brussels regime or the Vienna regime to join the efforts to establish a global nuclear liability regime. States can improve the prospects of a more global liability regime by adhering to the Joint Protocol and/or the CSC, if they have not already done so.

29. Preamble to the CSC.
30. INLEX (2012), "Recommendations on how to facilitate achievement of a global nuclear liability regime, as requested by the IAEA Action Plan on Nuclear Safety", available at: ola.iaea.org/ola/documents/ActionPlan.pdf.
31. Bosnia and Herzegovina (2013), Jordan (2014), Kazakhstan (2011), Mauritius (2013), Montenegro (2011), Poland (2010), Saudi Arabia (2011) and the United Arab Emirates (2012).

Continuing the efforts to maintain the compatibility of the Paris-Brussels regime, the Vienna regime and the CSC.

Ensuring that states provide for an adequate legal framework to ensure that funds will be available to compensate the victims in case of a nuclear accident, especially when the operator is subject to unlimited liability.

Drawing lessons from the Japanese experience in order to improve states' respective nuclear liability legislation. The Fukushima Daiichi accident revealed that good practices and improvements in the implementation of the nuclear liability principles should be considered in order to ensure legislative preparedness and response arrangements.

Appendix 1. Improvements brought by the enhanced regimes in case an accident occurs at a nuclear power plant

Victims will have access to larger amounts of compensation

Paris Convention (PC)	SDR 15 million maximum SDR 5 million minimum (In 1990, the NEA Steering Committee [NE/M(90)1] recommended a minimum of SDR 150 million)
PC as amended by the 2004 Protocol	EUR 700 million minimum
Brussels Supplementary Convention (BSC)	*1st tier (operator's tier):* SDR 15 million maximum *2nd tier (operator's state tier):* between 1st tier and SDR 175 million *3rd tier (BSC contracting parties' fund):* between SDR 175 million and SDR 300 million Total amount available: SDR 300 million
BSC as amended by the 2004 Protocol	*1st tier (operator's tier):* EUR 700 million minimum *2nd tier (operator's state tier):* between 1st tier and EUR 1.2 billion *3rd tier (BSC contracting parties' fund):* between EUR 1.2 billion and EUR 1.5 billion Total amount available: EUR 1.5 billion minimum
Vienna Convention (VC)	Minimum USD 5 million, based on USD gold value on 29 April 1963 (i.e. USD 35 per one troy ounce of fine gold)
VC as amended by the 1997 Protocol	SDR 300 million minimum
Convention on Supplementary Compensation for Nuclear Damage (CSC)	*1st tier (operator/state's tier):* SDR 300 million *2nd tier (CSC contracting parties' fund):* Not fixed: depends on number of nuclear power plants in the contracting parties. Amount expected: SDR 300 million

Victims may claim compensation for a wider range of damage suffered

Paris Convention (PC)	Damage to or loss of life of any person. Damage to or loss of any property.
PC as amended by the 2004 Protocol	Loss of life or personal injury, Loss of or damage to property, Economic loss arising from i) or ii) Costs of measures of reinstatement of impaired environment, Loss of income deriving from a direct economic interest in any use or enjoyment of the environment, Costs of preventive measures, and further loss or damage caused by such measures.
Vienna Convention (VC)	Same as PC *plus* - Any other loss or damage so arising or resulting if and to the extent that the law of the competent court so provides.
VC as amended by the 1997 Protocol	Same as PC as amended by the 2004 Protocol *plus* Any other economic loss, other than any caused by the impairment of the environment.
Convention on Supplementary Compensation for Nuclear Damage (CSC)	Same as VC as amended by the 1997 Protocol.

Victims will generally have more time to make their claims

Paris Convention (PC)	For all nuclear damage: 10 years from the date of the nuclear accident.
PC as amended by the 2004 Protocol	For loss of life and personal injury: 30 years from the date of the nuclear accident. For other nuclear damage: 10 years from the date of the nuclear accident.
Vienna Convention (VC)	For all nuclear damage: 10 years from the date of the nuclear accident.
VC as amended by the 1997 Protocol	Same as PC as amended by the 2004 Protocol.
Convention on Supplementary Compensation for Nuclear Damage (CSC)	For all nuclear damage: 10 years from the date of the nuclear accident.

More victims will be entitled to compensation

Paris Convention (PC)	Only applies to damage suffered in the territory of a PC state
PC as amended by the 2004 Protocol	Applies to nuclear damage suffered in the territory, or maritime zones, of: a PC state, a non-PC state which, at the time of the nuclear accident, is a contracting party to the Vienna regime *and* the Joint Protocol, if the state of the operator liable is also a party to the Joint Protocol, a non-PC state which, at the time of the accident, has no nuclear installation in its territory or in any maritime zones, any other non-PC state which, at the time of the nuclear accident, has in force nuclear liability legislation which affords equivalent reciprocal benefits and is based on the nuclear liability principles.
Brussels Supplementary Convention (BSC)	Only applies to damage suffered in the territory of a BSC state, provided that the courts of a contracting party have jurisdiction pursuant to the PC.
BSC as amended by the 2004 Protocol	Applies when an operator is liable under the PC, and only to nuclear damage suffered: in the territory of a BSC state, in or above a BSC state's exclusive economic zone, under specified circumstances, or in or above maritime areas beyond the territorial sea of a BSC state, under specified circumstances. Because the funds to be provided under the 2nd and 3rd tiers are considered "public" money, compensation is only available to compensate victims in BSC states.
Vienna Convention (VC)	No express provision, but generally considered as only applying to damage suffered in the territory of a VC state.
VC as amended by the 1997 Protocol	Applies to nuclear damage wherever suffered, but national legislation may exclude nuclear damage suffered in a non-contracting state which, at the time of the accident, - has a nuclear installation in its territory or maritime zones, - does not afford equivalent reciprocal benefits.
Convention on Supplementary Compensation for Nuclear Damage (CSC)	1st tier: covers nuclear damage wherever suffered with option by the installation state to exclude damage in territory of a non-CSC state subject to its obligations under the PC or the VC. 2nd tier: compensation is limited to damage suffered within the territory of a CSC state (similar approach as in the BSC).

Appendix 2. Ratification status of countries with reactors in operation or under construction

Status of ratification of international nuclear liability conventions (as of 10 July 2014)

Country/Economy	Plants: operating + under construction (UC)*	Conventions ratified/ [signed]	Country/Economy	Plants: operating + under construction (UC)*	Conventions ratified/ [signed]
Argentina	2 + 2 UC	VC; RVC; [JP]; CSC	Mexico	2	VC
Armenia	1	VC	Netherlands	1	PC; BSC; JP; [RPC; RBSC]
Belarus	1 UC	VC, RVC	Pakistan	3 + 2 UC	
Belgium	7	PC; BSC; [JP]; [RPC; RBSC]	Romania	2	VC; RVC; JP; CSC
Brazil	2 + 1 UC	VC	Russian Federation	33 + 10 UC	VC
Bulgaria	2	VC; JP	Slovak Republic	4 + 2 UC	VC; JP
Canada	19	[CSC]	Slovenia	1	PC; BSC; JP; [RPC; RBSC]
China	21 + 28 UC		South Africa	2	
Czech Republic	6	VC; [RVC]; JP [CSC]	Spain	7	PC; BSC; [VC]; [JP]; [RPC]; RBSC
Finland	4 + 1 UC	PC; BSC; JP [RPC; RBSC]	Sweden	10	PC; BSC; JP; [RPC; RBSC]
France	58 + 1 UC	PC; BSC; JP [RPC; RBSC]	Switzerland**	5	PC; BSC; [JP] RPC; RBSC
Germany	9	PC; BSC; JP; [RPC; RBSC]	Ukraine	15 + 2 UC	VC; [RVC]; JP [CSC]
Hungary	4	VC; [RVC]; JP	United Arab Emirates	2 UC	RVC; JP; CSC
India	21 + 6 UC	[CSC]	United Kingdom	16	PC; BSC; [VC]; [JP] [RPC; RBSC]
Iran, Islamic Republic of	1		United States	100 + 5 UC	CSC
Japan	48 + 2 UC	[intention to sign CSC]			
Korea, Republic of	23 + 5 UC		Chinese Taipei	6 + 2 UC	

Notes: PC: 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy.
BSC: 1963 Brussels Convention Supplementary to the Paris Convention.
RPC: 2004 Protocol to Amend the Paris Convention (Revised Paris Convention – not in force).
RBSC: 2004 Protocol to Amend the Brussels Supplementary Convention (not in force).
VC: 1963 Vienna Convention on Civil Liability for Nuclear Damage (Vienna Convention).
RVC: 1997 Protocol to Amend the Vienna Convention (Revised Vienna Convention).
JP: 1988 Joint Protocol Relating to the Application of the Vienna and Paris Conventions.
CSC: 1997 Convention on Supplementary Compensation for Nuclear Damage (not in force).

* Source: IAEA Power Reactor Information System (PRIS), www.iaea.org/pris/ (as of 10 July 2014).

** Switzerland deposited its instrument of ratification of the PC and BSC as amended by the 2004 Protocols; the conventions will only enter into force for Switzerland upon the entry into force of the 2004 Protocols.

The Convention on Supplementary Compensation for Nuclear Damage and participation by developing countries: A South African perspective

by David B. Davies[*]

Introduction

Nuclear energy plays a major role in the provision of baseload[1] power in countries throughout the world. It provides a clean, safe, economical and reliable source of power that is essential to the development of any economy, and particularly the economies of developing countries that have traditionally relied on whatever sources of power are at their disposal, irrespective of the disadvantages that some of these sources may carry. Whilst the worldwide debate on climate change continues, it is clear that nuclear energy has a distinct advantage due to its lack of carbon dioxide and other greenhouse gas emissions that are inherent in fossil-fired power plants.

Despite this advantage, nuclear energy continues to receive inadequate recognition relative to the advantages that it has to offer any economy, and this is largely a result of lack of knowledge and understanding. This equates to a lack of education about nuclear energy, which is compounded when considered in the context of developing countries. Many of the international nuclear institutions such as the International Atomic Energy Agency (IAEA)[2] and the Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA)[3] have been integral in educating its members, new entrants to the nuclear energy industry and the public at large as to the safe, environmentally-friendly and economical use of nuclear energy for peaceful purposes.

Unfortunately, nuclear accidents such as the Three Mile Island accident in 1979, the Chernobyl accident in 1986 and the Fukushima Daiichi accident in 2011 struck major blows to the public perception around nuclear energy worldwide, even though these events are few when compared to other industries and despite the fact that

---

* Mr. Davies is a specialist legal advisor at Eskom Holdings SOC Ltd, the state-owned energy utility that operates the sole nuclear power station in the Republic of South Africa. This article is written by the author in his personal capacity and the views expressed herein are those of the author and do not purport to represent the views of Eskom Holdings SOC Ltd or the Government of the Republic of South Africa.

1. The author defines "baseload power" as power supplied from a power station that generally provides power 24 hours a day, seven days a week and operates most of the time at full power. Coal-fired and nuclear power stations are typical base-load power stations.
2. The IAEA "is an independent intergovernmental, science and technology-based organisation, in the United Nations family, that serves as the global focal point for nuclear cooperation". IAEA, web page on "The IAEA Mission Statement", available at: www.iaea.org/About/mission.html, accessed 30 June 2014.
3. The NEA is a specialised agency within the OECD. A goal of the NEA in the area of nuclear law is "to help create sound national and international legal regimes required for the peaceful uses of nuclear energy, including international trade in nuclear materials and equipment, to address issues of liability and compensation for nuclear damage, and to serve as a centre for nuclear law information and education". NEA, web page on "Nuclear Law", available at: www.oecd-nea.org/law, accessed 30 June 2014.

the nuclear industry carries an exemplary safety record in over 14 500 cumulative reactor-years of worldwide operating history.[4]

Nuclear energy has not reached its true potential in the provision of power to developing countries. Various factors underlie this position, but it remains an area of great potential should the use of nuclear energy in developing countries be successfully unlocked. Developing countries without adequate fossil fuel reserves or that rely on a neighbouring country's energy production or resources should be increasingly interested in the use of nuclear energy in driving their economies. Security of electricity supply, and preferably energy independence, should be high on any country's development objectives and plans.

Energy is in many ways the lifeblood of any country and economy, as it plays a major role in industry, healthcare and the provision of basic services. In respect of low income countries, access to electricity has the largest impact in reducing child mortality in comparison to other variables, including access to sanitation or safe water.[5] Further, the impact is greater on rural populations than on urban populations because most of the electricity supply in developing countries is situated around urban areas.

As explained by Tonhauser and Wetherall in 2010, though still true in 2014:

> in recent years the international nuclear community has experienced a period of dynamic change. A significant number of countries – many for the first time and mostly from the developing world – are seeking to pursue civil nuclear power programmes in their efforts to find sustainable and secure energy solutions. Introducing such a programme is clearly a complex matter requiring even closer international co-operation to ensure that this is done properly. Also, establishing the needed national safety infrastructure is a lengthy process including the development of a comprehensive and adequate national nuclear legislative framework and building competencies of the nuclear stakeholders.[6]

Included within this national safety infrastructure is the building of technical expertise, development of local skills and local industries. These are of particular importance to any country embarking on a nuclear power programme, as such a programme constitutes a major commitment of capital investment and long-term energy infrastructure planning. Another key element of a nuclear energy programme is a country's nuclear liability regime. Although not all IAEA or OECD member countries (particularly nuclear power countries) have signed either the Vienna Convention (in its original or amended form),[7] Paris Convention[8] or the Convention

4. See World Nuclear Association, web page on "Safety of Nuclear Power Reactors", available at: www.world-nuclear.org/info/Safety-and-Security/Safety-of-Plants/Safety-of-Nuclear-Power-Reactors, accessed 17 June 2014.
5. Wang, L. (2002), "Determinants of Child Mortality in Low-Income Countries: Empirical Findings from Demographic and Health Surveys", The World Bank, pp. 20-22, available at: http://siteresources.worldbank.org/INTEEI/214578-1112740369617/20486217/Health Outcomes.pdf, accessed 30 June 2014.
6. Tonhauser, W. and A. Wetherall (2010), "The International Legal Framework on Nuclear Safety: Developments, Challenges and Opportunities", in OECD (ed.), *International Nuclear Law: History, Evolution and Outlook*, OECD/NEA, Paris, pp. 157-158.
7. Vienna Convention on Civil Liability for Nuclear Damage (1963), IAEA Doc. INFCIRC/500, 1063 UNTS 266, available at: www.iaea.org/Publications/Documents/Infcircs/1996/infcirc500.pdf; Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage (1997), IAEA Doc. INFCIRC/566, 2241 UNTS 302, available at: www.iaea.org/Publications/Documents/Infcircs/1998/infcirc566.pdf.
8. Paris 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

on Supplementary Compensation for Nuclear Damage (CSC),[9] all nuclear power states are encouraged to at least have national laws in place that reflect the fundamental principles of international nuclear liability and compensation for nuclear damage.

This article contends that it is essential that new entrant countries into the nuclear energy industry have comprehensive nuclear legislation; it is less clear, however, whether new entrant countries find it essential to join any of the various international nuclear liability conventions, as some countries have been slow or resistant to the idea. This article will take a closer look at the potential influencing factors driving membership or non-membership in the CSC by a developing country. First, however, is a discussion of the basic principles of international nuclear third party liability, the CSC itself, developing countries' current participation in the various international nuclear liability conventions and the advantages and disadvantages of the CSC. The author's views regarding participation by a developing country in the CSC will also be presented.

I. Basic principles of international nuclear third party liability

Over time, a special regime for nuclear liability and compensation has developed that "takes into account the exceptional risks involved in nuclear power production" and that "now forms the basis of national nuclear liability law in most industrialised countries in the world and has been adopted as the foundation for the international conventions on civil nuclear third party liability".[10] In general, it must be understood that this regime applies to a nuclear incident, which in turn is understood to mean an event that causes damage, provided that either the event or damage is due to the radioactive properties of nuclear fuel[11] or of radioactive products or waste.[12] With this understanding, there are certain basic principles that underpin nuclear third party liability and compensation, both nationally and internationally, which are set out in more detail below.

Strict liability

In a strict liability regime, liability is imputed to the operator of a nuclear installation (or holder of a nuclear installation licence as is the case in South Africa) irrespective of fault. No negligence need be proven, and only causation is required to find the operator or licence holder liable. This brings about a measure of fairness and enables the lodging of claims by persons who suffer damage caused by a nuclear

16 November 1982 ("Paris Convention"), 1519 UNTS 329, available at: www.oecd-nea.org/law/nlparis_conv.html;
Protocol to Amend the [Paris] Convention on Third Party Liability in the Field of Nuclear Energy (2004), available at: www.oecd-nea.org/law/paris_convention.pdf.

9. Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 I.L.M. 1473, available at: www.iaea.org/Publications/Documents/Infcircs/1998/infcirc567.pdf. For a detailed discussion and overview of the CSC, see IAEA (2007), "The 1997 Vienna Convention on Civil Liability for Nuclear Damage and the 1997 Convention on Supplementary Compensation for Nuclear Damage – Explanatory Texts", IAEA International Law Series No. 3, IAEA Doc. STI/PUB/1279 (Explanatory Texts), available at: www-pub.iaea.org/MTCD/publications/PDF/Pub1279_web.pdf.
10. Schwartz, J. (2010), "Liability and Compensation for Third Party Damage resulting from a Nuclear Incident", in OECD (ed.), *International Nuclear Law: History, Evolution and Outlook*, OECD/NEA, Paris, p. 308.
11. "Nuclear fuel is fissionable material (i.e. uranium and plutonium in all forms)." *Ibid.*, p. 309.
12. "Radioactive products or waste is essentially any material produced or made radioactive by exposure to the radiation incidental to producing or using nuclear fuel." *Ibid.*

incident at a nuclear installation. Key to the principle of strict liability is that no liability for nuclear damage exists outside of such regime and many nuclear suppliers require definitive proof of this legal regime.

Exclusive liability (legal channelling)

In an exclusive liability regime, the operator of the nuclear installation is exclusively liable for nuclear damage and liability is legally channelled to the operator of the nuclear installation as well.[13] The *Exposé des Motifs* of the 1960 Paris Convention justifies this concept as follows:

> Two primary factors have motivated in favour of this channelling of all liability onto the operator as distinct from the position under the ordinary law of torts. Firstly, it is desirable to avoid difficult and lengthy questions of complicated legal cross-actions to establish in individual cases who is legally liable. Secondly, such channelling obviates the necessity for all those who might be associated with construction or operation of a nuclear installation other than the operator himself to take out insurance also, and thus allows a concentration of the insurance capacity available.[14]

Although the operator may in certain circumstances have a right of recourse against a person for action or inaction when that person acted with intent to cause damage, the operator nevertheless remains exclusively liable *vis-à-vis* third parties who suffered damage.

Liability limited in amount

Limitation of liability in amount is seen as necessary to enable parties to participate and engage in nuclear activities. The principle underpinning limited liability in amount is that it protects operators from potential ruinous liability and financial burdens that would make their involvement in such nuclear activities untenable. The liability amount is always a contentious issue in the nuclear liability debate. Whatever figure is established by the legislator will seem to be arbitrary, but, in the event of a nuclear catastrophe, the state will inevitably step in and pay additional compensation.[15]

Although this is legislated in some countries and would seem to be the obvious or natural mitigation to a cap on liability of the operator, nuclear vendors and operators are inclined to see this "state rescue" as cold comfort to the commercial realities of being a participant in the international nuclear industry, unless express provisions are provided by the state in question. The CSC contains provisions that deal with additional or supplementary compensation from public funds in the event that the damage suffered exceeds the operator's liability amount.

Liability limited in time

Private insurers generally limit their coverage in time, usually to not more than ten years from the date of a given nuclear incident. Many countries differ in this regard as to how they apply time limits. Some impose a strict ten year time limit whilst others impose a 30-year time limit or differentiate between personal injuries, where claims can be submitted up to 30 years from the nuclear incident, and other

13. Stoiber, C., A. Baer, N. Pelzer and W. Tonhauser (2003), "Handbook on Nuclear Law", IAEA Doc. STI/PUB/1160, IAEA, Vienna, Austria, p. 112.
14. OECD/NEA, Revised text of the *Exposé des Motifs* of the Paris Convention, approved by the OECD Council on November 16, 1982, para. 15, available at: www.oecd-nea.org/law/nlparis_motif.html.
15. Stoiber et al., *supra* note 14, p. 113.

damages, where the 10-year period is applied.[16] Some jurisdictions apply a prescription period whereby any claim must be launched before a certain time running from when the party first became aware of the damage. This principle is seen as a *quid pro quo* for the benefits resulting from strict and exclusive liability.[17]

Jurisdiction and non-discrimination

Harmonising national laws was seen to create legal certainty, eliminate the possibility of discrimination between victims and ensure that claimants in states with harmonised legislation would have their actions judged by similar laws, regardless of the location of the accident or the damage.[18] In this regard, the Paris Convention, Vienna Conventions and CSC include provisions whereby member countries to the said conventions are able to regulate their international nuclear liability obligations with the further principles of "jurisdiction" and "non-discrimination".

The general rule is that a court of the contracting party in whose territory the nuclear incident occurs has exclusive jurisdiction to the exclusion of the courts in other countries. If legal proceedings arising out of the same incident were to be tried, and judgments rendered in the courts of several different countries, the problem of ensuring equitable distribution of compensation might be insoluble. Within the country having jurisdiction, one single competent forum should deal with all actions, including direct actions against insurers or other guarantors and actions to establish rights to claim compensation, against the operator arising out of the same nuclear incident.[19]

With regard to non-discrimination, the protection of the interests of foreign nationals suffering nuclear damage is of great importance. As explained in the IAEA *Handbook on Nuclear Law*, "the conventions and the national laws applicable under them must be applied without discrimination based on nationality, domicile or residence. This ensures in particular that victims in States other than the accident State are treated in the same way as victims in the accident State."[20]

II. Features of the Convention on Supplementary Compensation for Nuclear Damage

The IAEA explains that:

> Even before the development of an international legal regime of nuclear liability, the need to ensure adequate compensation for damage exceeding the amount of the operator's liability was met in several countries by making provision to cover such damage from public funds. This extra coverage was either automatically provided for by rules setting forth a specific obligation of the State to assume liability up to a certain amount, or simply envisaged in the form of special measures to be adopted by means of ad hoc legislation in case of a major accident; in some legal systems, the two methods were combined by providing for a specific obligation up to a certain amount and reserving for ad hoc legislation the additional coverage that may be required in the light of the damage actually caused.[21]

16. In South Africa, a general 30-year period applies, with a 2-year prescription period running from the date when the party first became aware of the facts giving rise to a claim for compensation. See National Nuclear Regulator Act, No. 47 of 1999, at S34.
17. Schwartz, *supra* note 11, p. 313.
18. *Ibid.*, p. 314.
19. Explanatory Texts, *supra* note 9, p. 1.
20. Stoiber et al., *supra* note 14, p. 115.
21. Explanatory Texts, *supra* note 9, p. 61.

The preamble to the CSC recognises the importance of the Paris Convention and Vienna Convention, as well as national legislation on compensation for nuclear damage consistent with the principles of these conventions. The preamble to the CSC further sets out the desire to "establish a worldwide liability regime to supplement and enhance" the measures under the Paris Convention and Vienna Convention "with a view to increasing the amount of compensation for nuclear damage".

A new global regime

In addition to enhancing the existing international nuclear liability regime, the CSC provides the framework for establishing a potential global nuclear liability regime. The CSC is a free-standing instrument open to all countries and offers a way to become part of the global regime without also having to become a member of the Paris Convention or the Vienna Convention. A country not party to an existing international nuclear liability convention would need to take actions to change its national law to the extent required to reflect the provisions in the CSC, including its Annex,[22] which reflects the basic principles of international nuclear liability law. The CSC also goes a step further in its global framework and has been developed as far as possible to be compatible with the Paris Convention and the Vienna Convention should a country also be a party to one of those regimes. A member country to the Paris Convention or Vienna Convention would need to change its national law only to the extent required to reflect the provisions in the CSC that apply to all member countries.

Some countries resisted amending their national legislation to comply with the principles of international nuclear liability. For example, the United States operates under a system of "'omnibus' coverage for any person who may be liable for nuclear damage under the general law of torts (so-called 'economic channelling')," [23] instead of channelling liability exclusively to the operator (legal channelling). However, the participation of the United States in a future global liability regime was deemed essential to ensure the availability of sufficient funds for supplementary compensation. The CSC therefore contains a provision to accommodate the unique legal regime in the United States, and thereby permits the United States to become part of a global regime without changing its national legislation.[24]

The preamble to the CSC recognises that a worldwide liability regime would encourage regional and global co-operation to promote a higher level of nuclear safety in accordance with the principles of international partnership and solidarity. Accordingly, the CSC specifies that a country having on its territory a nuclear installation as defined in the Convention on Nuclear Safety (CNS)[25] must be a party to the CNS before it can ratify, or accede to, the CSC.[26] By way of example, should South Africa (currently not a member to any international nuclear liability convention) wish to accede to the CSC, as a party to the CNS, it would be eligible to accede once it formally declared that its national law complies with the provisions

22. For example, the CSC requires a member country to accept higher compensation amounts, including participation in an international supplementary fund, and includes a broader definition of nuclear damage, as well as updated jurisdiction rules. The provisions of the CSC on such matters take precedence over any similar provisions in other nuclear liability instruments to which a country may be party. *Ibid.*, p. 3. The CSC sets out specific provisions on civil liability for nuclear damage for those countries not party to existing conventions in the Annex.
23. *Ibid.*, p. 64. See also Price-Anderson Act of 1957, 42 USC 2210.
24. Explanatory Texts, *supra* note 9, p. 64. This provision is referred to as the "grandfather clause".
25. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293.
26. CSC, Article XIX.

of the Annex to the CSC. Iran, on the other hand, is an example of a country that has a nuclear installation,[27] but is not currently eligible to ratify or accede to the CSC as Iran is not a party to the CNS.

The adoption of the CSC was an important step in the development of the international nuclear liability regime, in that a number of improvements were made regarding the scope of damages covered, jurisdiction rules and the amount of compensation available, as is set out in further detail in this article.

Nuclear damage

The CSC enhances the definition of "nuclear damage"[28] by explicitly identifying the types of damage that must be compensated. In addition to personal injury and property damage, which are included in the existing definition, the enhanced definition includes five categories of damage relating to impairment of the environment, preventive measures and economic loss. The definition makes it clear that these additional categories are covered to the extent determined by the law of the competent court.[29]

> The enhanced definition thus provides certainty that the concept of nuclear damage includes the costs of reinstatement of impaired environment, preventive measures and certain economic loss, while recognising that the forms and content of compensation is best left to the national law of the States whose courts have jurisdiction over a particular nuclear incident.[30]

Further,

> [t]he CSC also revise[s] the definition of "nuclear incident" to make it clear that ... preventive measures may be taken in response to a grave and imminent threat of a release of radiation that could cause other types of nuclear damage. The use of the phrase "grave and imminent" makes it clear that preventive measures can be taken if there is a credible basis for believing that a release of radiation with severe consequences may occur in the future.[31]

This is of particular importance for coastal states and the transport of nuclear material, where the cost of preventive measures could be covered for such state.

The "CSC [is] explicit that preventive measures (as well as measures of reinstatement relating to impairment of the environment) must be reasonable."[32] "Reasonable measures" is defined in the CSC as those "which are found under the law of the competent court to be appropriate and proportionate," taking into account all relevant factors.[33]

Exclusive jurisdiction

The CSC reaffirms the basic principle set out earlier where exclusive jurisdiction over a nuclear incident lies with the courts of the member country where the

27. For purposes of the CNS, this means a land-based civil nuclear power plant. CNS, Article 2(ii).
28. CSC, Article I(f).
29. CSC, Article I(k), which defines the meaning of this term as "the law of the court having jurisdiction under this Convention, including any rules of such law relating to conflict of laws".
30. Explanatory Texts, *supra* note 9, p. 2.
31. *Ibid.*
32. *Ibid.*
33. CSC, Article I(l).

incident occurs or with the courts of the "installation state"[34] if the incident occurs outside any member country. The principle of non-discrimination is also entrenched in the CSC in that victims of foreign states are covered in the event of suffering damage.

The CSC also:

> recognise[s] recent development in the law of the sea in respect of the exclusive economic zone (EEZ) and the concerns of some coastal States over compensation for possible accidents in the course of maritime shipments of nuclear material. Specifically, … the CSC provide[s] that the courts of a Member State will have exclusive jurisdiction over claims for nuclear damage resulting from a nuclear incident in its EEZ.[35]

Amounts of compensation available

National funds

The CSC now establishes a minimum amount of 300 million special drawing rights (SDRs)[36] (approximately USD 465 million)[37] as the amount that a member country shall make available under national law to compensate for nuclear damage suffered by victims. This represents an increase in the initial minimum amounts required by the Paris Convention and the Vienna Convention.

It is important to point out that the CSC does not itself specify on what basis the installation state has to ensure the availability of the national compensation amount. For compensation under the national amount, the law of the installation state may "exclude nuclear damage suffered in a non-Contracting State".[38] But, according to the IAEA's Explanatory Texts:

> if the Installation State is a Party to the Vienna Convention or to the Paris Convention, its choices in respect of the limit of the operator's liability and of the financial security required will have to be made in accordance with the provisions of the applicable convention.
>
> If, on the other hand, the Installation State is a Party to the [CSC] only, the Article 4.1 of the Annex gives it a choice similar to that given to the Contracting Parties to the 1997 Vienna Convention, i.e. it can either limit the operator's liability to not less than 300 million SDRs or limit that liability to not less than 150 million SDRs, provided that it makes public funds available in excess of that amount up to at least 300 million SDRs. Under Article 5.1 of the Annex, the Installation State is to specify the amount, type and terms of

34. *Ibid.*, Article I(e).
35. Explanatory Texts, *supra* note 9, p. 3.
36. CSC, Article I(c).
37. The SDR is an international reserve asset, created by the International Monetary Fund (IMF) in 1969 to supplement its member countries' official reserves. Its value was initially based on the equivalent of 0.888671 grams of fine gold (which at the time was also equivalent to one US dollar) but is now based on a basket of four key international currencies, being the Euro, Japanese Yen, Pound Sterling and US Dollar. See IMF (2014), "International Monetary Fund Factsheet: Special Drawing Rights", available at: www.imf.org/external/np/exr/facts/pdf/sdr.pdf, accessed 17 June 2014. The US dollar equivalent of the SDR is published daily on the IMF website and as of 17 June 2014 was USD 1.54100. IMF SDR Valuation, available at: www.imf.org/external/np/fin/data/rms_sdrv.aspx. Calculations in this article were made by the author at a rate of USD 1.55 to SDR 1.
38. CSC, Article III.2(a).

the insurance or other financial security which the operator is required to have and maintain.[39]

South African national law is largely aligned with this last principle.

Furthermore, Contracting Parties to the CSC may enter into regional or other agreements in order to implement their obligations in respect of the national amount provided that it does not add further obligations to other Contracting Parties under the CSC.[40]

International funds

The CSC provides for an international fund to supplement the amount of compensation available under national law through public funds to be made available in accordance with a specified formula as set out in more detail below. These are only required, however, if the national funds are inadequate to ensure payment of claims for compensation for nuclear damage. Depending on the extent of widespread adherence, this international fund could provide approximately 300 million more SDRs to compensate nuclear damage, which could result in a total compensation amount of approximately 600 million SDRs. Furthermore, interest and costs awarded by a court in actions for compensation of nuclear damage are payable in addition to both the national compensation amount and the total amount resulting from the contributions of the member countries. It is, however, specified that such interest and costs shall be proportionate to the actual contributions made, respectively, by the liable operator, the installation state and contracting parties together.[41]

Contributions to the international fund are based on a formula under which more than 90% of the contributions will come from nuclear power generating member countries on the basis of their installed nuclear capacity,[42] while the remaining portion comes from all member countries to the CSC on the basis of their United Nations rate of assessment.[43] Thus, member countries with nuclear power plants will be required to contribute on the basis of both the formula and the United Nations rate of assessment, whilst member countries with no nuclear power plants will be required to contribute solely on the basis of their United Nations rate of assessment. Member countries on the minimum United Nations rate of assessment and having no installed nuclear capacity are not required to make any contribution,[44] and since nuclear power generating countries generally have high United Nations rates of assessment (at least in the case of advanced countries), this formula should result in a high percentage of the contributions coming from nuclear power generating countries.

Only nuclear reactors (including research reactors), as opposed to all nuclear installations, are to be taken into account to calculate a member country's contribution on the basis of its installed nuclear capacity. By way of example, if a

39. Explanatory Texts, *supra* note 9, p. 78.
40. CSC, Article XII.3(a).
41. *Ibid.*, Article III.
42. *Ibid.*, Article IV.2, whereby the formula is 1 unit for each MW of thermal power multiplied by SDR 300. See McRae, B. (2007), "The Convention on Supplementary Compensation for Nuclear Damage: Catalyst for a Global Nuclear Liability Regime", *Nuclear Law Bulletin*, No. 79, OECD/NEA, Paris, p. 21.
43. The rate of assessment of each member state are decided by the United Nations General Assembly and range from a minimum of 0.001% to a maximum of 22%, and a maximum of 0.01% from least developed countries. United Nations Committee on Contributions, web page on "Regular budget and Working Capital Fund", available at: www.un.org/en/ga/contributions/budget.shtml, accessed 25 February 2014.
44. CSC, Article IV.1(b).

member country has a uranium enrichment facility but no nuclear reactors that country will not be required to contribute under the formula regarding installed nuclear capacity. In light of this, the CSC does not establish a fixed amount of supplementary compensation and the total amount of such supplementary compensation depends on the number of member countries, specifically the number of member countries having installed nuclear capacity. In a scenario where the application of this formula could lead to an imbalance of contributions given a country's level of installed capacity, the CSC caps the contribution of any member country to a percentage.[45]

Actual provision of supplementary funding

As a result of what has been discussed above regarding supplementary funding, the CSC does not require member countries to set aside funds, in advance of any nuclear incident, to compensate damage that may be in excess of the national compensation amount. As such, member countries will be called upon to make the additional funds available to the country whose courts have jurisdiction, but only once a nuclear incident occurs and once the additional funds are actually required. Accordingly, member countries need to have internal provisions and mechanisms to call on such funds if required.

Annex states not party to other international nuclear liability conventions

Unlike the 1997 Vienna Convention, which covers nuclear damage "wherever suffered", the Annex to the CSC has no such provision. Thus, under the CSC, an Annex country is "free to exclude damage suffered in non-Contracting States, irrespective of whether or not these States have a nuclear installation in their territory".[46] Article 3.5(b) of the Annex to the CSC also "excludes the operator's liability for damage caused by a nuclear incident directly due to a grave natural disaster of an exceptional character, unless the law of the Installation State provides to the contrary".[47] It will be interesting to note the impact of this Article of the CSC going forward as countries draft or amend national laws in the wake of the Fukushima Daiichi accident.

The need for implementing legislation

The Explanatory Texts is an authoritative work and states that the CSC is:

> based on the assumption that a worldwide system of supplementary compensation for nuclear damage must, to some extent, coexist with different national liability regimes. More specifically, the drafters of the [CSC] felt that, apart from the "grandfather clause", the basic principles of nuclear liability have to be the same for all States; but harmonization of the legal details was considered to be more appropriate at the regional level and inconsistent with an international nuclear liability regime that aimed at achieving broad adherence on a global basis.[48]

The Explanatory Texts goes on to state that:

> [m]ore specifically, all Contracting Parties, irrespective of whether they are party to the Paris Convention, the Vienna Convention, any amendment

45. *Ibid.*, Article IV.1(c), whereby the cap is calculated as the United Nations rate of assessment expressed as a percentage plus eight percentage points, but does not apply to the calculation of the contribution due on the part of the installation state of the liable operator.
46. Explanatory Texts, *supra* note 9, p. 66.
47. *Ibid.*
48. *Ibid.*, pp. 68-69.

> thereto, or no convention at all, will be required to adopt minimum limits of compensation of nuclear damage at the national level (Article III), as well as uniform rules on jurisdiction (Article XIII). Moreover, some degree of harmonization in the definition of nuclear damage is also required by the [CSC] [Article I(f)].[49]
>
> Apart from these requirements, a State party to either the Paris Convention or the Vienna Convention, whatever version is in force for it, will not need to change its domestic legislation on nuclear liability in any other respect in order to join the [CSC], and will only be required to implement the specific obligations relating to supplementary compensation. … [A] State party to neither the Paris Convention nor the Vienna Convention will also be required to conform its domestic law to the provisions on nuclear liability contained in the Annex to the [CSC].[50]

Or, in the case of States having no nuclear installation, at least have legislation in place to enable such State to give effect to its obligations under the CSC.[51] Should South Africa wish to join the CSC, its legislation would require some minor adjustments to be harmonised with such principles.

III. Current view of developing countries in nuclear power and participation in the international nuclear liability conventions

Currently there are 435 nuclear reactors in operation worldwide.[52] Of these 435 nuclear reactors, 111 nuclear reactors are within developing countries[53] and 324 nuclear reactors are within advanced countries. Accordingly, developing countries account for 25% of nuclear reactors worldwide, whilst advanced countries account for the other 75%.

In the nuclear reactor construction environment, 72 nuclear reactors are currently under construction worldwide. Of these 72 nuclear reactors under construction, 54 nuclear reactors are under construction in developing countries and 18 nuclear reactors are under construction in advanced countries. Accordingly, developing countries account for 75% of nuclear reactors under construction worldwide, whilst advanced countries account for the other 25%.

As it stands, 249 of the 435 operating nuclear reactors are not covered by an international nuclear liability convention currently in force. Thus, 57% of nuclear reactors worldwide are not covered by any international nuclear liability convention currently in force. For these purposes, and until such time as the CSC comes into force and effect, those signatory or ratification countries to the CSC that are not party to one of the international nuclear liability conventions currently in force, but that operate nuclear reactors, have been included as part of the 249 nuclear reactors.

49. *Ibid.*, p. 69.
50. *Ibid.*
51. Introduction to the Annex of the CSC.
52. For the purposes of the calculations in this section, the author has used the IAEA's Power Reactor Information System (PRIS) database, available at: www.iaea.org/pris/home.aspx. Country-specific information regarding operational and long-term shutdown reactors is also available from the IAEA's PRIS database, at: www.iaea.org/PRIS/WorldStatistics/OperationalReactorsByCountry.aspx. Country-specific information regarding reactors under construction is available from the IAEA's PRIS database at: www.iaea.org/PRIS/WorldStatistics/UnderConstructionReactorsByCountry.aspx. All information was last accessed by the author on 17 April 2014.
53. The concept of "developing countries" knows no single definition internationally and the author has used the concepts of "developing", "developed" and "advanced" in a generic context. The author makes no judgements on which countries are "developed" or not.

Three CSC countries – the United States, India and Canada – account for 140 of the 249 nuclear reactors not covered by an international nuclear liability convention currently in force. The United States has by far the most nuclear reactors (100) of the group, with India next at 21 nuclear reactors and Canada at 19 nuclear reactors. This creates an anomaly in the current nuclear liability picture, which will change quite dramatically when the United States, India and Canada are excluded from the 249 nuclear reactors when the CSC comes into force. In this scenario, the percentage would reduce from 57% to 25% if the CSC was in force with its current signatories.

Of the 249 nuclear reactors worldwide that are not covered by any international nuclear liability convention currently in force, developing countries only account for 19% of the total. Thus, advanced countries hold by far the greater number of nuclear reactors (and related risk) not covered by an international nuclear liability convention.

For the CSC to come into force, at least five states with a minimum of 400 000 units of installed nuclear capacity (i.e. 400 000 megawatts thermal [MWt]) need to have deposited an instrument of ratification, acceptance or approval, as referred to in Article XVIII of the CSC. Depending on which country would trigger the coming into force of the CSC (excluding current CSC signatories), the percentages as set out above could vary greatly if such trigger country was one with many nuclear reactors but which is not a party to any existing international nuclear liability convention currently in force. In this regard, Japan, and to a lesser extent the Republic of Korea and the People's Republic of China, are examples of such countries that operate a large number of nuclear reactors but are not party to any of the existing international nuclear liability conventions currently in force (and are not CSC signatories) and which could greatly "improve" the number of reactors covered by a nuclear liability convention if they were to join.

When the above scenario is applied to country participation[54] in currently in-force international nuclear liability conventions, rather than to a nuclear reactor quantity analysis as discussed earlier, country participation in international nuclear liability conventions amounts to 21 countries out of 31 countries with a resulting participation percentage of countries to international nuclear liability conventions of 68%. Of these 21 participating countries, 12 are advanced countries with the other 9 being developing countries.

In respect of the Paris Convention and Vienna Convention, the Paris Convention has 15 contracting countries[55] (all being advanced countries, with the exception of Turkey, which is categorised by the IMF as a developing economy) having a combined 113 nuclear reactors and the Vienna Convention has 40 contracting countries (with 37 being developing countries) having a combined 73 nuclear reactors. For the purposes of the analysis in this article, the Paris Convention may be viewed as an "advanced country convention" whilst the Vienna Convention may be viewed as a "developing country convention". This delineation is due to the current Paris Convention countries being OECD member countries, which are advanced countries. Whilst a few Vienna Convention advanced countries are also OECD member countries, these countries joined the Vienna Convention prior to becoming OECD members.

54. In this scenario it is only in respect of those countries that have operating nuclear reactors and thus by implication excludes non-nuclear power states party to the CSC or other international nuclear liability conventions.

55. The caveat to the number 15 is that Switzerland has also ratified the Paris Convention and its 2004 protocol, but it will not come into force until the 2004 Protocol comes into force.

In respect of the CSC, and based on the current 17 signatories, the CSC has five advanced member countries with 10 member countries also party to the Vienna Convention and one to the Paris Convention. Accordingly, the CSC only has a few current signatory countries that will participate through the Annex to the CSC. It is, however, interesting to note that whilst the CSC may also be viewed as a "developing country convention", it is the United States that has by far the greatest number of nuclear reactors and that will participate as a so-called "Annex country". As alluded to earlier in this article, it is this advanced Annex country that as a contracting state to the CSC is essential to the CSC providing sufficient supplementary funding and coming into force.

IV. Advantages and disadvantages of joining the CSC

Before progressing into a discussion on the possible factors influencing a country's consideration of prospective participation in the CSC, some advantages and disadvantages of joining the CSC are discussed below. [56]

Advantages

Jurisdiction – Under the CSC,[57] clear rules are provided in respect of jurisdiction which, as a general rule, lies only with the courts of one country, permitting all claims and proceedings (and hence the distribution of funds) to be handled by one particular court. This jurisdictional channelling thus allows fair treatment of victims and can only be achieved under a regime that provides rules around the jurisdiction of courts of different countries. National law does not provide for this and it does not bind the courts of other countries. This further prevents "forum shopping" by victims wishing to bring claims in other countries and provides nuclear suppliers with a level of certainty.

Applicable law – The CSC[58] provides for clear liability and compensation rules, and where certain aspects may not be covered by the CSC, it determines the applicable law as the law of the competent court, which as defined in the CSC includes "any rules of such law relating to conflict of laws". National law does not necessarily give certainty in this regard and certain applicable law may be unfavourable to claimants.

Recognition and enforcement of "foreign" judgements – Under the CSC,[59] judgements are recognised and enforceable in any other member country as if it were a judgment of a court of such country. Under national law, recognition and enforcement of "foreign" judgements may vary as it depends largely on the laws and rules applied by a particular country as to the recognition and enforcement of foreign judgements.

Rules on liability and compensation for damage – As discussed previously, the CSC contains a liability and compensation regime, together with substantive provisions, that provides a level of certainty and predictability. National law, on the other hand, does not necessarily provide similar comfort and could well be more onerous depending on the national law in question.

56. For a discussion related to all international nuclear liability regimes (including the CSC), see International Expert Group on Nuclear Liability, "Civil Liability for Nuclear Damage: Advantages and Disadvantages of Joining the International Nuclear Liability Regime", available at: http://ola.iaea.org/ola/treaties/documents/liability_regime.pdf.
57. CSC, Article XIII.
58. *Ibid.*, Article I(k).
59. *Ibid.*, Article XIII.5 and XIII.6.

Disadvantages

Victims of a transboundary accident will often be forced to bring legal proceedings in a foreign country depending on the outcome of the application of the relevant jurisdictional rules to the relevant facts of the incident. This is the reverse situation of the advantage obtained through jurisdictional channelling.

A legislative burden may be placed on countries that wish to give effect to the provisions of the CSC in their national laws. This may vary in degree according to the existing set of national laws in question.

Claims against third parties for nuclear damage, who would ordinarily be liable, are excluded due to legal channelling of claims to the operator.

V. Factors influencing country's consideration of prospective participation in the CSC

The international nuclear liability conventions have been around since the 1960s, yet many nuclear industry countries remain outside of the ambit of these conventions. Even though the CSC has been in existence since 1997, the uptake of new member countries has been slow, and to date only four countries have ratified the CSC. [60]

Whilst the advantages of joining the CSC are fairly compelling as opposed to relying purely on national nuclear liability laws (even to the extent they are drafted to conform as far as possible with the basic principles of international nuclear third party liability), there are other, less obvious factors that may influence countries.

Although the factors below could apply to participation in any relevant international nuclear liability convention, the CSC is specifically referenced insofar as it relates to these factors.

International nuclear industry relations and nuclear industry "citizenship"[61]

Some countries may view joining an international nuclear liability convention as part of being a responsible international nuclear industry citizen in respect of its approach to nuclear third party liability. It can be argued that country membership in entities such as the IAEA to some extent provides this feeling of citizenship and certainly does at least keep member countries fully integrated and involved in the international nuclear industry.

By way of example, if one considers the number of IAEA member states as opposed to the number of signatories to the Vienna Convention or CSC, it can be surmised that many states believe that membership in the IAEA and other related nuclear industry conventions are sufficient to allow them to conduct their nuclear industry as necessary, leaving national laws to deal with issues pertaining to nuclear third party liability. Nuclear accidents, such as the Fukushima Daiichi disaster in Japan, certainly heighten the issue of nuclear liability, compensation and the approach taken by countries on such matters.

Regarding the position of South Africa as an IAEA member and international nuclear citizen, the Nuclear Energy Policy of South Africa makes a number of statements regarding its participation in bilateral and multilateral co-operation on nuclear energy, taking into account international obligations arising from treaties

60. Argentina, Morocco, Romania and the United States.
61. The author uses the concept of "citizenship" in the generic context of a country being a participant, member or citizen in the international nuclear industry.

and other legally binding instruments, such as safeguards.[62] Express statements are also made in the Nuclear Energy Policy regarding the recognition of the IAEA and international collaboration. Looking at South Africa's participation in general, it can be said that South Africa is an involved citizen of the international nuclear community but has not at present joined one of the available international nuclear liability conventions. As such, this particular factor cannot be seen as one that is absolute, nor does it turn on the basis of a country being developed or advanced. This is borne out by the general trends of participation in international nuclear liability conventions discussed previously.

Government approach to nuclear energy

National governments and regulatory regimes governing energy in general, and nuclear in particular, vary. Although regulators are generally independent to one degree or another from the national government, the governmental authority over a country's energy policy will play the major role in the direction a country may take in respect of energy markets such as nuclear energy. In South Africa, as in other countries, it is the various government authorities that will direct and determine if and to what extent a country will participate in the international nuclear industry, including the international nuclear liability regime and related conventions. For example, the Department of Energy in South Africa has overall responsibility for nuclear energy in South Africa and is responsible for the national implementation of international obligations in the area of IAEA Safeguards.

Funding requirements of the CSC

The funding requirements in respect of compensation under the CSC may at a first glance seem onerous for a country contemplating joining the CSC. There are, however, a number of mitigating factors that temper this view. Firstly, it is only the availability of the national compensation amount (SDR 300 million) that must be ensured (although it is not clear as to how this amount will be ensured). Secondly, the supplementary funding is only required to be made available once a nuclear incident occurs and once the additional funds are actually required. Accordingly, member countries should at least have an internal provision and mechanism to call on such supplementary funds if required. Each country should weigh the funding requirements of such a regime against the ability of that country's economy to manage and sustain claims for nuclear damage and its general recovery in the event of a catastrophic nuclear incident, which could severely harm a country's economy (particularly a developing country's economy) if it were not a party to the CSC.

The IAEA has a CSC calculator that applies the contribution formula contained in Article IV of the CSC.[63] This programme enables a prospective member country to run scenarios of actual and possible contracting parties to the CSC to determine the supplementary amounts to be contributed to the international fund. Thus, any country can accordingly become better informed on the potential funding realities of joining the CSC.

62. Department of Minerals and Energy (2008), "Nuclear Energy Policy for the Republic of South Africa", available at: www.energy.gov.za/files/policies/policy_nuclear_energy_2008.pdf.
63. See IAEA, web page on "Calculator – Convention on Supplementary Compensation for Nuclear Damage", available at: http://ola.iaea.org/ola/CSCND/Calculate.asp (as of 17 June 2014, this site was down for further development). This calculator was developed using information on countries' installed capacity contained in the IAEA's PRIS database and Research Reactor Database.

As a starting point, the four countries that have ratified the CSC account for approximately 319 000[64] units of installed capacity, leaving a shortfall value of approximately 81 000 units of installed capacity required to be contributed by one or more countries depositing an instrument of ratification, acceptance and approval in accordance with Article XVIII of the CSC. As such, for the CSC to come into force and effect, either a great number of countries representing at least this shortfall value of installed capacity, or fewer countries representing at least this same shortfall value, are required to join the CSC. If one considers the list of IAEA countries who on their own could trigger the coming into force of the CSC, it is only France and Japan who are in such category.

It is important to remember that the actual contributions by member countries of the supplementary amount are not fixed and these contributions depend largely on the number of member countries to the CSC at the time of the nuclear incident, and particularly the number of member countries with installed capacity. The use of the United Nations rate of assessment in calculating a portion of each country's supplementary amount introduces an element of fairness and allows each country to participate without being unduly prejudiced.

It also implicitly makes a distinction between developing and advanced countries. As an example, the above is made clear when considering the contributions required of South Africa (as a developing country) were it to join the CSC as compared to the United States (as an advanced country) in the context of the amounts required under the United Nations rate of assessment[65] portion of the supplementary amount.

Geographic location

A country's geographic location should not be underestimated as a factor regarding participation in the CSC. Many countries, even those not involved themselves in the nuclear industry, could understandably show interest in participating in the CSC due to their location relative to major nuclear power countries. As an example, Europe has a concentration of countries participating in the nuclear energy industry and it is understandable that any other country in close proximity would consider joining the CSC due to the risk of transboundary damage, among other factors. The same thinking could apply to any coastal state in respect of shipments of nuclear material in its EEZ.

On the other hand, a country within no remote proximity to a nuclear power country or nuclear material shipping zone would naturally see its remoteness of location as a barrier to nuclear damage in and of itself and could thus be less incentivised to join the CSC. This factor will, in all probability, play some role in any analysis regarding international nuclear liability convention participation. Proximity will likely be a stronger factor for non-nuclear power countries situated in the vicinity of nuclear power countries or nuclear material shipping zones, with such countries potentially considering joining the CSC due to being provided the protection afforded by the CSC without being burdened financially by such membership.

64. As the IAEA's CSC online calculator was undergoing further development as of the date of submission of this article, approximate figures have been used.

65. South Africa has a United Nations rate of assessment of 0.37 whilst the United States has the maximum United Nations' rate of assessment of 22. See United Nations (2013), "Assessment of Member States' advances to the Working Capital Fund for the biennium 2014-2015 and contribution to the United Nations regular budget for 2014", UN Doc. ST/ADM/SER.B/889, available at: http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N13/634/29/PDF/N1363429.pdf?OpenElement.

Public perception of the nuclear industry

Public perception in any given country regarding the nuclear industry, and specifically nuclear energy, is another factor that should not be underestimated. The feeling of a country's general population toward nuclear energy can play a major role in the decisions made by governments regarding the pursuit of nuclear energy and a national nuclear industry. If one considers the Three Mile Island, Chernobyl or Fukushima accidents, together with the enhanced definition of nuclear damage contained in the CSC, environmental groups and anti-nuclear lobbyists can place great pressure on a country to either stay out of the nuclear industry, or to join the CSC or another international nuclear liability convention. This is but one example of the pressure that can be applied by a general population on a country in making determinations around nuclear energy and international nuclear liability convention participation. Interestingly enough, the arguments that can be made for or against a country's participation in nuclear energy can, depending on the context, both provide persuasive arguments and good reasons to join the CSC.

International nuclear commercial contracting

Assuming a country were to decide to pursue the establishment of a national nuclear industry, including nuclear power generation, the country's view on international nuclear liability and related conventions would certainly influence the approach taken by nuclear vendors and contractors. In this regard, countries are encouraged to acknowledge and accept the risks, not of a nuclear incident actually occurring, but of the potential damage suffered if a nuclear incident were to occur.

A country being party to the CSC or other international nuclear liability convention would serve to streamline commercial and contracting arrangements and interactions around nuclear liability, particularly given that a form of state guarantee may not be sufficient for some vendors. This having been said, if one considers any current country (not party to any liability convention) that is pursuing an aggressive nuclear power strategy, the commercial incentives around being a party to these major international projects has meant that this factor is by no means a deal-stopper. Commercial contracting parties continue to engage in business dealings, finding other ways to attempt to mitigate the risk of a party not being a member of an international nuclear liability convention. National law can provide some level of comfort to parties involved in the nuclear industry and, as has been discussed previously in relation to current international nuclear liability convention participation worldwide, this seems to be the case in many countries throughout the world.

Conclusion

The current participation by nuclear industry countries in the various international nuclear liability conventions, including the CSC, leaves something to be desired and a large degree of harmonisation and participation is required for the international nuclear liability conventions to fully address the concerns underlying their existence.

When one considers developing countries' participation in nuclear power generation and international nuclear liability conventions, some interesting observations are made. Whilst the majority of operating nuclear reactors are located in advanced countries, the great majority of nuclear reactors under construction are located in developing countries. This is largely due to developing countries such as China, Russia and India pursuing nuclear development strategies. Developing countries are also simply catching up to advanced countries due to ever-growing populations and the need for major energy infrastructure development, of which nuclear energy plays a part, to keep their economies on a reasonable growth path.

Although the World Bank does not currently fund nuclear energy projects, institutional funders could play a positive role not only in relation to the funding of nuclear build programmes but also by way of introducing conditions to funding that would encourage participation in international nuclear liability conventions. Detailed analysis would be required before taking a firm view on such possibility.

In respect of the relatively high percentage of nuclear reactors not covered by the Paris Convention or Vienna Convention, only a minor portion of these reactors are located in developing countries. Thus, it can be said that the participation in international nuclear liability conventions by developing countries relative to the number of reactors in those countries is fairly acceptable.

Regarding participation by developing countries in the CSC, it appears from the current signatories that developing countries are quite satisfied in being a member of both the Vienna Convention and the CSC. As more developing (or advanced) countries join the CSC it will be interesting to monitor the number of countries that join the CSC as an Annex country or whether these countries will first join one of the other international nuclear liability conventions.

From purely a developing country standpoint, assuming a country wishes to join an international nuclear liability convention, the choice will most likely be either the CSC, the Vienna Convention or both. Once a developing country has decided to join an international nuclear liability convention, based on some of the factors discussed in this article, it is this decision that should lead to a detailed comparative analysis of the relevant nuclear liability conventions, having regard to the unique nature of the CSC together with the advantages that it contains.

Leaving aside the financial implications of the national compensation amount, the CSC does not contain provisions that are overly burdensome on developing countries (nuclear or non-nuclear) wishing to participate in the CSC. Some of the features of the CSC, such as the opportunity to leverage bilateral or regional agreements to implement obligations, in respect of the national amount, may facilitate developing countries' participation in the CSC. The United Nations' rate of assessment also implicitly takes into account any given country's development status.

Further, continuous worldwide education on the CSC is required to create and enhance awareness of the benefits it contains. The CSC provides an opportunity to nuclear and non-nuclear countries (both developing and advanced) to participate in the international nuclear liability regime and time will tell if the CSC attains the undoubted potential that it holds.

Fusion energy and nuclear liability considerations

by William E. Fork and Charles H. Peterson[*]

I. Introduction

For over 60 years, fusion energy has been recognised as a promising technology for safe, secure and environmentally-sustainable commercial electrical power generation. Over the past decade, research and development programmes across the globe have shown progress in developing critical underlying technologies. Approaches ranging from high-temperature plasma magnetic confinement fusion to inertial confinement fusion are increasingly better understood.

As scientific research progresses in its aim to achieve fusion "ignition", where nuclear fusion becomes self-sustaining, the international legal community should consider how fusion power technologies fit within the current nuclear liability legal framework. An understanding of the history of the civil nuclear liability regimes, along with the different risks associated with fusion power, will enable nations to consider the proper legal conditions needed to deploy and commercialise fusion technologies for civil power generation.

This note is divided into three substantive parts. It first provides background regarding fusion power and describes the relatively limited risks of fusion technologies when compared with traditional nuclear fission technologies. It then describes the international nuclear liability regime and analyses how fusion power fits within the text of the three leading conventions. Finally, it examines how fusion power may fall within the international nuclear liability framework in the future, a discussion that includes possible amendments to the relevant international liability conventions. It concludes that the unique nature of the current civil nuclear liability regime points towards the development of a more tailored liability solution because of the reduced risks associated with fusion power.

II. Background: Fusion power

A. The long-term need for fusion

Providing for the world's rapidly escalating energy demands is one of the most urgent and difficult challenges facing our society. Even with likely improvements in efficiency and energy conservation, there is a critical need to move power generation away from hydrocarbon fuels in order to reduce carbon emissions and meet energy demands.

Solar, wind, geothermal and hydro sources of energy will play an important role in meeting this challenge. However, not all countries have sufficient resources of these forms of energy to meet future power requirements and wind and solar cannot

[*] Mr. Fork and Mr. Peterson are attorneys at Pillsbury Winthrop Shaw Pittman LLP. This contribution sets forth the views of the authors and does not reflect the views of Pillsbury Winthrop Shaw Pittman LLP or its clients.

provide reliable base-load power without utility-scale energy storage facilities.[1] Traditional nuclear fission power reactors offer many advantages but also require addressing the safety and proliferation concerns associated with enrichment, reprocessing and high level waste disposal. While stakeholders continue to pursue these solutions, current fleets of hydrocarbon and nuclear power plants will eventually need to be replaced and preparations will need to be made for future energy systems.

B. Understanding fusion

While nuclear fission involves splitting heavy atoms, nuclear fusion is the process of combining two light atoms to form one atom of another, heavier, element. Discovered before fission in 1934, fusion results in the release of atomic particles with significant energy. In order to produce fusion, the fuel must be confined and compressed to high energy levels. The easiest way to enable the fusion of two nuclei is through confinement and heat: once an atom is heated above its ionisation energy, its electrons are separated from the nucleus. There are two primary approaches to fusion energy that receive international funding: (1) magnetic confinement and (2) inertial confinement.[2] There are more than a dozen technologies that are being considered for generating power from nuclear fusion.

Magnetic confinement fusion uses heat exceeding 100 million degrees Celsius to create an electrically conductive plasma cloud.[3] The fuel (e.g. deuterium and tritium) is confined in a magnetic field within a protected chamber. With the heat generated by the confinement, the fuel converts into a plasma cloud containing separated ions and electrons that release additional energy upon ignition.[4] Magnetic confinement designs include the tokamak, stellarator, spherical torus, reversed-field pinch, field-reversed configuration and tandem mirror.[5] Magnetic confinement facilities include: the Joint European Torus (JET) in Culham, United Kingdom; the National Spherical Torus Experiment (NSTX), in Princeton, New Jersey, United States; the EAST (HT-7U Superconducting Tokamak) in Hefei, China; and the Korea Superconducting Tokamak Advanced Research (KSTAR) in Daejon, South Korea.[6] Ongoing international efforts in the development of magnetic fusion include the International Thermonuclear Experimental Reactor (ITER), which is under construction in France.[7] ITER will provide an opportunity to test tritium breeding

1. In the next few years, new adiabatic energy storage technologies may allow more wind and solar to provide base-load power, though with a loss in efficiency. Liquefied air energy storage is gaining in acceptance, while compressed air and pumped hydro facilities continue to be constructed where conditions allow.
2. Electric Power Research Institute (2012), *Program on Technology Innovation: Assessment of Fusion Energy Options for Commercial Electricity Production*, Palo Alto, California, p. 2-1.
3. National Research Council (1989), *Pacing the U.S. Magnetic Fusion Program*, National Academy Press, Washington, DC, p. 16. The inside walls of the designs can be cooled by various methods, including liquid helium and liquid nitrogen, as well as ceramic plates that are designed to withstand high temperatures.
4. *Ibid.* Depending on the design, plasma can be heated by several methods, including the introduction of an electrical current, magnetic compression, microwaves, the injection of neutral beams of atoms and radio frequency waves.
5. Krivit, S. B., T.B. Kingery and J. H. Lehr, (eds.) (2011), *Nuclear Energy Encyclopedia: Science, Technology, and Applications*, John Wiley & Sons, Inc., Hoboken, New Jersey, sec. 5.2.
6. JET began operation in 1983, NSTX began operation in 1999, EAST began operation in 2006 and KSTAR began operation in 2008.
7. Ikeda, K. (2010), "ITER on the Road to Fusion Energy", *Nuclear Fusion* 50.

blanket modules.[8] In 2012, it became the world's first fusion reactor to obtain nuclear licensing following a review of its safety characteristics by the French regulatory authority.[9] Additionally, the Wendelstein 7-X, a stellarator fusion experimental reactor at the Max-Planck Institut für Plasmaphysik, is nearing completion in Germany.

Inertial confinement fusion uses compression and energy to heat fuel targets using beams of high-energy laser light, ions or electrical current. These laser targets can be heated through direct and indirect mechanisms. In a direct-drive target, the driver energy (e.g. the laser or ion beam) strikes the fuel directly. In an indirect-drive target, the driver energy strikes the inner surface of a hohlraum that re-radiates the energy in the form of x-rays to compress the fuel.[10] Several inertial confinement systems have been developed, the largest being the National Ignition Facility (NIF) in California, which uses an indirect-drive confinement technology.[11] Similar-scale facilities are now under construction in France (Laser Megajoule, LMJ) and Russia (UFL-2M) and there are plans for a similar device in China (SG-IV).

For both magnetic and inertial fusion confinement installations, the heat transfer processes are similar (e.g. the excited particles that are generated from fusion are captured in a molten salt or other liquid blanket), as described later in this note. Balance-of-plant facilities in fusion energy installations can use existing technologies found in fission and fossil-fuelled plants.[12]

C. Limited risks

There are important differences between the limited risks associated with fusion and the well-publicised radiological risks associated with fission energy. First, unlike fission reactors, pure fusion facilities that do not contain fissile or fertile materials cannot undergo fission.[13] This means that the source terms that describe the radiological risk in fusion installations are essentially eliminated when the system is not operating, thereby removing the nuclear criticality and associated transboundary risks that exist with fission reactors. Second, while fission results in long-lived and biologically hazardous materials, the radionuclides generated in fusion installations

8. See Giancarli, L. et al. (2006), "Breeding Blanket Modules Testing in ITER: An International Program on the Way to DEMO", *Fusion Engineering and Design*, Vol. 81, Issues 1-7, pp. 393-405.
9. ITER Organization (2012), "ITER Organization: 2012 Annual Report", Saint-Paul-lez-Durance, France, p. 3.
10. National Research Council (2013), *An Assessment of the Prospects for Inertial Fusion Energy*, The National Academies Press, Washington, DC, p. 4.
11. Moses, E.I. (November 2001), "The National Ignition Facility: Status and Plans for Laser Fusion and High-Energy-Density Experimental Studies", *8th International Conference on Accelerator and Large Experimental Physics Control Systems*, San Jose, California, p. 1. In 2013, the National Ignition Facility achieved an important milestone in the history of fusion, where the energy generated through a fusion reaction exceeded the amount of energy deposited into the fusion fuel during the implosion process, resulting in a fuel gain greater than unity. Hurricane, O. A. et al. (20 February 2014), "Fuel Gain Exceeding Unity in an Inertially Confined Fusion Implosion", *Nature*, Vol. 506, pp. 343-48.
12. Applicable systems include the steam, gas-turbine, Rankine and Brayton cycles.
13. See US Department of Energy (1996), "Safety of Magnetic Fusion Facilities: Requirements", DOE-STD-6002-96, p. 14. As discussed later in this article, there are some non-pure hybrid-fission-fusion designs that use fissile or fertile materials in the surrounding blanket.

by the irradiation of the surrounding materials are distinctly shorter-lived.[14] Third, although fission reactors must be operated as a nuclear facility, those fusion facilities that are operated without tritium (e.g. only with protium or deuterium) may not require special considerations as a nuclear facility.[15]

The nuclear insurance industry has examined the risks associated with fusion facilities. For example, in 1991 the European Insurance Committee provided the Group of Governmental Experts on Third Party Liability in the Field of Nuclear Energy (today the Nuclear Law Committee) of the Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA) with findings regarding the radiological risks associated with fusion reactors. The report noted that it was the view of the Nuclear Insurance Pools, which provide insurance for nuclear installations, that "… the risks associated with the fusion process are of a lower order of magnitude than for fission reactors …".[16] Similarly, a European Fusion Power Plant Conceptual Study in 2005 estimated that the maximum radiological doses to the public arising from the "most severe conceivable accident" driven by in-plant energies at a fusion installation would not approach the evacuation levels required in many national regulations.[17]

To examine these relatively small risks of fusion more closely, this paper next studies two key areas of risk regarding nuclear fusion facilities: (1) fusion fuel and tritium handling and (2) neutron release and activation.

1. Fusion fuel and tritium handling

Leading fusion energy designs utilise a fuel consisting of deuterium and tritium, both heavy isotopes of hydrogen. Deuterium is widely available and can be extracted from water. Tritium is extremely rare, formed naturally by the interaction of cosmic rays with atmospheric gasses and in smaller amounts through nuclear reactions in the earth.[18] Tritium can also be produced in light water reactors through neutron interaction with boron and in heavy water reactors through the neutron interaction of lithium or deuterium. Tritium is a low-energy beta emitter, with a half-life of 12.3 years.[19] Since tritium is a beta emitter, it is not dangerous externally (its beta particles are unable to penetrate the skin), but it is a radiation hazard when inhaled,

14. See *ibid*. See also European Fusion Development Agreement (13 April 2005), "A Conceptual Study of Commercial Fusion Power Plants: Final Report of the European Fusion Power Plant Conceptual Study", Doc. EFDA (05)-27/4.10, Rev. 1, p. 19; see also European Commission (23 May 2007), "Report on the Hearing of Nuclear Fusion Platform", p. 1.
15. See Safety of Magnetic Fusion Facilities: Requirements, *supra* note 13.
16. The Nuclear Insurance Pools concluded, however, that although the risk was lower, insurance within the nuclear pooling system was appropriate because fusion reactors still contain a "real" radiological risk. Group of Governmental Experts on Third Party Liability in the Field of Nuclear Energy (1991), "Note provided by the European insurance committee: radiological risks associated with fusion reactors", OECD/NEA Doc. No. NEA/LEG/DOC(91)7, p. 2.
17. The report estimated that the maximum radiological doses would not exceed 18 mSv, in comparison to national regulations which are 50 mSv. A Conceptual Study of Commercial Fusion Power Plants: Final Report of the European Fusion Power Plant Conceptual Study, *supra* note 14, p. iv.
18. SongSheng, J. and H.E. Ming (February 2008), "Evidence for Tritium Production in the Earth's Interior", *Chinese Science Bulletin*, Vol. 53, No. 4, p. 540.
19. Note provided by the European insurance committee: radiological risks associated with fusion reactors, *supra* note 16, p. 6. For additional information on tritium, see European Commission (2007), "Emerging Issues in Tritium and Low Energy Beta Emitters", Proceedings of a scientific seminar held in Luxembourg on 13 November 2007, Directorate-General for Energy and Transport, Working Party on Research Implications on Health and Safety Standards of the Article 31 Group of Experts, Luxembourg.

ingested or absorbed through the skin.[20] Tritium has a short biological effective half-life in the human body of approximately ten days, which reduces long-term bioaccumulation.[21] By comparison, nuclear fission products in light water reactors include hundreds of different beta emitters, and many of these isotopes have short half-lives that produce large amounts of radiation. It is the intense, shorter half-life isotopes that make spent nuclear fuel so dangerous.[22]

Because the associated radioactive risks from tritium are also relatively low, estimated to be lower than the handling of radioisotopes for medical or industrial purposes,[23] two tokamak reactors that have burned tritium fuel have been treated as industrial users as opposed to more hazardous nuclear facilities. In the United Kingdom, the JET fusion facility is classified in the same category as an industrial user of radioactive material, and in the United States, the TFTR is classified as a Department of Energy hazard "Category 3" non-reactor nuclear facility.[24] The NIF facility, an inertial confinement system that uses small deuterium-tritium targets, is treated as even below a hazard "Category 3".[25] Similarly, the ITER magnetic confinement project, which will contain approximately three kilograms of tritium on-site, has been classified as a "Laboratory or Fuel Plant" type of nuclear facility (INB) rather than a full reactor.[26]

Key fusion designs also anticipate that a blanket of lithium surrounding the containment system will absorb neutrons and provide heat transfer.[27] Lithium is a

20. US Nuclear Regulatory Commission (February 2011), "Fact Sheet on Tritium, Radiation Protection Limits, and Drinking Water Standards", available at: www.nrc.gov/reading-rm/doc-collections/fact-sheets/tritium-radiation-fs.html.
21. The International Commission on Radiological Protection guides estimate a 10-day effective half-life. Studies for the effective half-life for workers at Korean Nuclear Power Plants have been found to be shorter than this standard. Kim, H.G., et al. (2011), "Analysis of Metabolism and Effective Half-life for Radiation Workers' Tritium Intake at Pressurized Heavy Water Reactors", *Nuclear Science and Technology*, Vol. 1, p. 545.
22. See generally, Knolls Atomic Power Laboratory (2010), *Nuclides and Isotopes: Chart of the Nuclides*, 17th ed.
23. Note provided by the European insurance committee: radiological risks associated with fusion reactors, *supra* note 16, p. 7.
24. El-Guebaly, L. et al. (August 2011), "Challenges of Fusion Power Plant Licensing: Differences and Commonalities with Existing Systems", *Fusion Science and Technology*, Vol. 60, p. 753. The hazard classification system is based on an evaluation of the consequences of unmitigated releases following a hazard analysis that involves a determination of material, system, process and plant characteristics that can produce undesirable consequences. Hazard Category 3 under this system means that the facility "[s]hows the potential for only significant localized consequences" and is the lowest level category of the three levels within the hazard classification system. US Department of Energy (2000), "Nonreactor Safety Design Criteria and Explosives Safety Criteria Guide for use with DOE O 420.1, Facility Safety", DOE G 420.1-1, p. ix.
25. El-Guebaly, L. et al. (August 2011), "Challenges of Fusion Power Plant Licensing: Differences and Commonalities with Existing Systems", *Fusion Science and Technology*, Vol. 60, p. 755. Below a hazard "Category 3" means that less than 16 000 Ci (1.6 grams) of tritium is allowed in the facility.
26. Rodriguez-Rodrigo, L., et al., "Licensing ITER in Europe: An Example of Licensing a Fusion Facility", available at: www-pub.iaea.org/MTCD/publications/PDF/P1250-cd/papers/ppca2-iii.pdf; see El-Guebaly, L. et al. (August 2011), "Challenges of Fusion Power Plant Licensing: Differences and Commonalities with Existing Systems", *Fusion Science and Technology*, Vol. 60, p. 755. For comparison purposes, some LIFE reactor design plans estimate less than one kilogram of tritium on site. Reyes, S. et al. (13 June 2013), "Developing the Safety Basis for Laser Inertial Fusion Energy", presentation to 25th Symposium on Fusion Engineering, San Francisco, California, slides 10, 11.
27. The lithium may be in the form of a lithium salt, a blanket that contains lithium as a liquid or a solid, or in a liquid wall of lithium.

light metal with good heat transfer properties and low neutron activation. Tritium can be absorbed and created in the lithium blanket, and then separated and stored.[28] This means that fusion installations will need to assess risks associated with a release of tritium. A report prepared by the OECD/NEA Secretariat considered a tritium leak from a tritium handling facility in a worst-case scenario in a fusion installation.[29] Under one scenario, one or two kilograms of tritium would be dispersed locally into the groundwater system. While such a release would be "well above the order of magnitude" of medical use and could contaminate water supplies for several days,[30] this would not be comparable in scope, for example, to well-known nuclear incidents, such as those at Chernobyl or Fukushima. In a "worst case" scenario with the release of tritium and activation products at a commercial-scale fusion facility, it is estimated that the highest dosage to individuals outside the site would be "well below" the level at which the European Commission recommendations would require evacuation.[31]

To reduce risks associated with tritium, the Laser Inertial Fusion Energy (LIFE) design, developed under the auspices of the US Department of Energy at the Lawrence Livermore National Laboratory, is expected to contain less than one kilogram of on-site tritium inventory, with each inertial fusion target containing less than one milligram of tritium.[32] However, lithium, which is a preferred candidate material for the blanket system in the LIFE design, reacts with water and oxygen. Partly for this reason, the LIFE design contemplates that the heat transfer will derive from a primary lithium loop to a secondary salt loop to minimise the potential for lithium and water interaction, and with the vast majority of the tritium held immobile in specialised storage systems that are designed to withstand fire.[33]

Although most of the expected nuclear fusion designs for power generation involve deuterium-tritium fuel, other fusion fuel cycles may be explored. Advanced fuels include deuterium-deuterium and deuterium-helium-3. The advantage of such fuels is that they would not use tritium and therefore would not require breeding.[34] Deuterium-helium, in particular, is advantageous from a radiological safety perspective since it does not contain tritium and exhibits only moderate neutron activation.[35]

2. Neutron emission and activation

Fusion results in the release of neutrons that irradiate the fusion chamber and requires shielding to protect workers in surrounding areas during plant operation. As compared to fission, fusion produces more neutrons per unit of energy and these neutrons have twice the energy.[36] Accordingly, the walls of a fusion chamber are subject to design requirements that consider neutron bombardment and the need

28. Reyes, S. et al. (August 2013), "LIFE Tritium Processing: A Sustainable Solution for Closing the Fusion Fuel Cycle", *Fusion Science and Technology*, Vol. 64, No. 2, pp. 187-193.
29. OECD/NEA Secretariat (2 October 1992), "Technical Scope of the Paris and Vienna Conventions: Fusion Reactors", *Report of the Standing Committee on Liability for Nuclear Damage*, SCNL/6/4, p. 120.
30. *Ibid.*
31. *Ibid.* However, it would be above the level at which shelter would be needed and a state should consider evacuation.
32. Developing the Safety Basis for Laser Inertial Fusion Energy, *supra* note 26, slide 11.
33. Reyes, S. et al. (June 2013), "LIFE: A Sustainable Solution for Developing Safe, Clean Fusion Power", *Health Physics Journal*, Vol.15, p. 644.
34. Zucchetti, M. and L. Sugiyama (2006), "Advanced Fuel Cycles for Fusion Reactors: Passive Safety and Zero-Waste Options", *Journal of Physics: Conference Series*, No. 41, p. 497.
35. *Ibid.*, p. 498.
36. Note provided by the European insurance committee: radiological risks associated with fusion reactors, *supra* note 16, p. 7.

for periodic replacement of components within the fusion chamber using remote handling devices.[37] The radiotoxicity of certain activated materials decreases rapidly at first and then more gradually over 100 years, meaning that most activated materials could be regarded as non-radioactive or recyclable after a suitable decay period.[38] Only a small amount of this activated material, if any, would require long-term disposal in a nuclear waste repository, and would not approach the requirements for geologic disposal required for high-level nuclear waste.[39] For example, estimates for the LIFE plant design are that the residual decommissioned material would qualify for Class C or significantly less radioactive low-level waste.

With respect to plant workers, occupational risks and radiation exposure will depend on the details of the installation design and operating practices, as shown by detailed studies that have been made for ITER. Focus areas will include hazards associated with vacuum pump systems, the tritium removal system, and exposure to electromagnetic fields (the latter for magnetic fusion facilities only).[40] In the United States, the Department of Energy Fusion Safety Standards provide limitations for worker exposures based on Title 10 of the Code of Federal Regulations (10 CFR) Part 20 or 10 CFR Part 835.[41] Further, the principle of "as low as reasonably achievable" (ALARA) is to be used in developing worker radiological exposure limits for such facilities.[42]

III. Nuclear liability regimes and fusion power

A. Nuclear liability generally

There are two primary international treaty regimes that regulate civil liability for damage caused by a nuclear accident.[43] The first is the Convention on Third Party Liability in the Field of Nuclear Energy of July 29, 1960, as amended, established under the auspices of the OECD/NEA and predominantly used in Europe.[44] It is supplemented by the Brussels Supplementary Convention to the Paris Convention on Third Party Liability in the Field of Nuclear Energy of January 31, 1963, as amended (the Brussels Supplementary Convention), which establishes additional monetary coverage for the Paris Convention.[45] The second nuclear liability treaty

37. See *Ibid*., p. 8. In a plasma facility, for example, it is estimated that activated particles on the plasma-facing components will have relatively high nuclear activity (0.1 to 0.4 TBq per gram except Carbon 14 and Tritium).
38. Neutron-activated material in a fusion installation will be regarded as non-active (with a contact dose rate lower than 0.001 mSvh-1 after 50 years) or recyclable (with a contact does rate lower than 20 mSvh-1 after 50 years). A Conceptual Study of Commercial Fusion Power Plants: Final Report of the European Fusion Power Plant Conceptual Study, *supra* note 14.
39. *Ibid*., pp. 19-20.
40. See, e.g., ITER Organization (2002), "ITER Plant Description Document, Chapter 5, Safety", G A0 FDR 1 01-07-13 R1.0, p. 25.
41. Safety of Magnetic Fusion Facilities: Requirements, *supra* note 13, p. 5.
42. *Ibid*.
43. The United States originally developed the first nuclear liability law in 1957, the Price-Anderson Act, which establishes many of the principles used in the current international nuclear liability conventions.
44. Paris 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 (Paris Convention), 1519 UNTS 329; Protocol to Amend the [Paris] Convention on Third Party Liability in the Field of Nuclear Energy (2004) (2004 Protocol), unofficial consolidated text available at: www.oecd-nea.org/law/Unofficial%20 consolidated%20Paris%20Convention.pdf.
45. Convention Supplementary to the [Paris Convention], concluded at Brussels, 31 January 1963, 1041 UNTS 358.

regime is the Vienna Convention on Civil Liability for Nuclear Damage of May 21, 1963, as amended (the Vienna Convention), established under the auspices of the International Atomic Energy Agency (IAEA) with a worldwide scope.[46] In 1988, after the Chernobyl accident, the Joint Protocol between the Paris and Vienna Convention was adopted to link the territorial scope of both conventions.[47] This was possible because both conventions are based upon similar key principles to address injury to the public: the operator of the nuclear installation is exclusively liable for nuclear damage, strict liability is imposed on the operator, exclusive jurisdiction is granted to the courts of one country, and liability is limited in amount and time.[48]

The purpose of both the Paris and the Vienna Conventions is to provide financial compensation to the public for damage resulting from the exceptional hazards present in certain uses of atomic energy. The conventions are limited: they are not intended to cover activities that do not involve high levels of radioactivity or hazards that do not concern the public at large. For example, factories such as those for the manufacture or processing of natural or depleted uranium, facilities for the storage of natural or depleted uranium or the transport of natural or depleted uranium do not fall within the scope of the Paris Convention since the level of radioactivity is low.[49] Similarly, installations with small quantities of fissionable material, such as research laboratories and particle accelerators, are not covered by the Paris Convention.[50] The 1963 Vienna Convention allows states to exclude certain small quantities of nuclear material from the Convention's application but does not contemplate allowing the exclusion, as permitted in the Paris Convention, of certain low-risk nuclear installations.[51] However, the 1997 Protocol to the Vienna Convention does also allow the exclusion of low-risk installations if they meet criteria established by the IAEA Board of Governors.[52]

To further expand the international nuclear liability regime, IAEA members also drafted the Convention on Supplementary Compensation for Nuclear Damage (CSC) in 1997. The CSC, which is not yet in force,[53] extends the principles and requirements of the Paris and Vienna Conventions to countries without nuclear reactors as well as the significant number of countries with nuclear reactors that remain outside of the Paris and Vienna Convention regimes. A state may ratify the

46. See Vienna Convention on Civil Liability for Nuclear Damage (1963), IAEA Doc. INFCIRC/500, 1063 UNTS 266 (1963 Vienna Convention); Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage (1997), IAEA Doc. INFCIRC/566, 2241 UNTS 302 (1997 Vienna Convention).
47. Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (1988), IAEA Doc. INFCIRC/402, 1672 UNTS 293.
48. IAEA (2004), "Overview of the Modernized IAEA Nuclear Liability Regime", GOV/INF/2004/9-GC(48)/INF/5 Annex, pp. 1-2.
49. OECD/NEA, Revised text of the *Exposé des Motifs* of the Paris Convention, approved by the OECD Council on November 16, 1982, sec. 9, available at: www.oecd-nea.org/law/nlparis_motif.html. Similarly, under the Vienna Convention, the definition of "nuclear material" excludes natural uranium and depleted uranium. 1997 Vienna Convention, Article I.1(h)(i).
50. *Exposé des Motifs*, *supra* note 49, secs. 9 and 10.
51. See, e.g., 1963 Vienna Convention, Article I.2. On September 11, 2007, the IAEA Board of Governors adopted a new resolution to establish maximum limits for the exclusion of small quantities of nuclear material from the Vienna Convention.
52. 1997 Vienna Convention, Article I.2(a).
53. The CSC will enter into force when instruments of ratification, acceptance or approval are deposited by at least five countries with at least 400 000 units of "installed nuclear capacity", a term of art that is defined in the CSC. Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 I.L.M. 1473, Article XX. The CSC is the only international liability convention that the United States has ratified.

CSC, even if it does not have nuclear power installations or is not a party to the Paris or Vienna Conventions, so long as the state's national laws meet certain CSC requirements. The goal of the CSC is to promote the safety and security of nuclear power plants through a broad, common international nuclear liability regime.[54]

As explained in more detail below, fusion energy facilities are not included in the definitions of key terms in the Paris and Vienna Conventions or the CSC. Examinations regarding whether fusion energy should be included within the scope of the definitions of the conventions have taken place on several occasions, including in 1992 and 2005.[55]

B. Paris Convention

Under Article 3 of the Paris Convention, an operator can be liable for certain damage (1) caused by a nuclear incident[56] in a "nuclear installation" or (2) involving "nuclear substances" coming from such installation. Fusion facilities are not specifically included in the Paris Convention's definition of "nuclear installation". Rather, the Paris Convention's definition specifically includes nuclear reactors other than those used in any means of transport, and, *inter alia*, factories for the manufacture or processing of nuclear substances and reprocessing of irradiated nuclear fuel.[57]

Fusion facilities also do not clearly involve "nuclear substances", which are defined in the Paris Convention as "nuclear fuel" (other than natural uranium and depleted uranium) and "radioactive products or waste".[58] Since tritium is not fissionable, pure fusion facilities do not contain "nuclear fuel", which is defined as fissionable material in the form of uranium metal, alloy or chemical compound;

54. See McRae, B. (1998), "The Convention on Supplementary Compensation for Nuclear Damage: Catalyst for a Global Nuclear Liability Regime," *Nuclear Law Bulletin*, No. 61, OECD/NEA, Paris, p. 17.
55. See, e.g. OECD/NEA Secretariat (1992), Note, "Extension of the Technical Scope of the Paris and Vienna Conventions: Fusion Reactors", OECD/NEA Doc. No. NEA/LEG/DOC(92)4; and OECD/NEA Secretariat (28 October 2005), Note, "Liability and Financial Security for Risks Posed by Nuclear Fusion Installations", OECD/NEA Doc. No. NEA/NLC/DOC(2005)4.
56. The Paris Convention defines "nuclear incident" as: any occurrence or succession of occurrences having the same origin which causes damage, provided that such occurrence or succession of occurrences, or any of the damage caused, arises out of or results either from the radioactive properties, or a combination of radioactive properties with toxic, explosive, or other hazardous properties of nuclear fuel or radioactive products or waste or with any of them, or from ionizing radiations emitted by any source of radiation inside a nuclear installation. Paris Convention, Article (1)(a)(i). The 2004 Protocol, which is not yet in force, simplifies the definition of "nuclear incident" to meaning "any occurrence or series of occurrences having the same origin which causes nuclear damage". 2004 Protocol, Article (1)(a)(i).
57. The full text of Article (1)(a)(ii) of the Paris Convention reads: "Nuclear installation" means reactors other than those comprised in any means of transport; factories for the manufacture or processing of nuclear substances; factories for the separation of isotopes of nuclear fuel; factories for the reprocessing of irradiated nuclear fuel; facilities for the storage of nuclear substances other than storage incidental to the carriage of such substances; and such other installations in which there are nuclear fuel or radioactive products or waste as the Steering Committee for Nuclear Energy of the Organisation (hereinafter referred to as the "Steering Committee") shall from time to time determine; any Contracting Party may determine that two or more nuclear installations of one operator which are located on the same site shall, together with any other premises on that site where radioactive material is held, be treated as a single nuclear installation. In turn, "nuclear fuel" is defined as "fissionable material" in certain forms. "Nuclear substances" is defined as "nuclear fuel (other than natural uranium and other than depleted uranium) and radioactive products or waste". Paris Convention, Article (1)(a).
58. *Ibid.*, Article (1)(a)(v).

plutonium metal, alloy, or chemical compound; and such other fissionable material as may be determined by the OECD Steering Committee for Nuclear Energy ("the Steering Committee").[59] Similarly, fusion facilities do not clearly contain "radioactive products or waste", which is defined as:

> any radioactive material produced in or made radioactive by exposure to the radiation incidental to the process of producing or utilizing nuclear fuel, but does not include (1) nuclear fuel, or (2) radioisotopes outside a nuclear installation which have reached the final stage of fabrication so as to be usable for any industrial, commercial, agricultural, medical, scientific or educational purpose.[60]

Although tritium can be produced via exposure to radiation incidental to nuclear fuel in fission reactors, pure fusion facility designs do not produce tritium through a process utilising nuclear fuel as defined in the Paris Convention. Additionally, the Paris Convention's definition of "radioactive products or waste" excludes radioisotopes outside of a nuclear installation that have reached their final stage of fabrication so as to be usable for commercial purposes, which could include tritium created in a fusion power-generating installation.[61]

The Paris Convention permits flexibility in some of its definitions. For example, it allows the Steering Committee to expand the definition of "nuclear installation" to include "other such installations in which there are nuclear fuel or radioactive products or waste …".[62] However, for the reasons described above, pure fusion facilities that use tritium fuel neither contain "nuclear fuel" nor clearly contain "radioactive products or waste". For this reason, the Steering Committee would have difficulty clearly expanding the definition of "nuclear installation" to encompass fusion power.[63] There is also an argument that fusion power could be covered by the Paris Convention by re-interpreting the meaning of the term "reactor". The Paris Convention uses the term "reactor" to define a nuclear installation: the definition of a "nuclear installation" means "reactors … and such other installations in which there are nuclear fuel or radioactive products or waste as the [Steering Committee] shall from time to time determine …".[64] However, statutory construction implies that a reactor must be an installation in which there is nuclear fuel or radioactive products or waste.[65] This would exclude a fusion reactor. Also, a 1967 interpretation of the Steering Committee determined that "… sub-critical assemblies should not be included in the term 'reactor' within the meaning of Article 1(a)(ii) of the Paris

59. *Ibid.*, Article (1)(a)(iii). For this reason, the ITER installation is excluded from the scope of the Paris Convention. See Grammatico-Vidal, L. (2009), "The International Thermonuclear Experimental Reactor (ITER) International Organization: Which Laws Apply to this International Operator?", *Nuclear Law Bulletin* No. 84, OECD/NEA, Paris, p. 111.
60. Paris Convention, Article (1)(a)(iv).
61. See *ibid*. This exclusion would apply assuming that the fusion facility does not otherwise fall within the definition of a "nuclear installation".
62. *Ibid.*, Article (1)(a)(ii).
63. A 2005 NEA report reached a similar conclusion, noting that it "might be possible … to use the discretion given to the NEA Steering Committee under Article 1(a)(ii) of the Convention to have such facilities added to the list of items covered by the definition if they can be classified as installations in which there is nuclear fuel or radioactive products or waste". Liability and Financial Security for Risks Posed by Nuclear Fusion Installations, *supra* note 55, p. 4.
64. Paris Convention, Article (1)(a)(ii) (emphasis added).
65. In statutory construction, the concept of *noscitur a sociis* means that a word is known by its associated words; i.e., where a word is ambiguous, its meaning may be determined by reference to other words. This rule of interpretation can be used to support the conclusion that facilities within the definition of a nuclear installation are qualified by the requirement that they contain nuclear fuel or radioactive products or waste.

Convention".[66] In a pure fusion facility, there are no critical facilities. But if the Steering Committee determines, in some fashion, that a "reactor" includes a fusion installation, the operator of a nuclear installation could then be liable, under Article 3 of the Paris Convention, for damage caused by a "nuclear incident" that occurred in such installation.[67] This is because a "nuclear incident" means any "occurrence … which causes damage, provided that such occurrence … arises out of or results either from … ionizing radiations emitted by any source of radiation inside a nuclear installation".[68] Persuading the Steering Committee to redefine "reactor" would require broad support and consideration.

In addition to liability from damage at the site of a nuclear installation, Article 4 of the Paris Convention expands liability to the operator of a "nuclear installation" under certain transport scenarios where damage is caused by a "nuclear incident" outside the installation and involves "nuclear substances". For the reasons described in examining the definitions above, the Paris Convention does not apply to damage associated with transport scenarios involving fusion facilities. Importantly, the Paris Convention excludes the liability of the operator of a nuclear installation for damage to or loss of any property at the nuclear installation itself or to any other nuclear installation on that same site, as well as any property on that same site which is used or to be used in connection with any such installation.[69] The purpose of this exclusion is to prevent the financial security required by the Paris Convention from being used primarily to compensate damage to the nuclear installation rather than the public.[70]

To close any lingering gaps regarding the interpretation of the Paris Convention and its applicability to fusion power, the *Exposé des Motifs* of the Paris Convention, regarded as the key interpretive source regarding the Convention's text, revised and approved by the OECD on 17 November 1982, explains that "… given that the possible applications of nuclear fusion are not yet clear, it does not seem possible or necessary to take this form of nuclear activity into consideration in the Paris Convention".[71]

C. Vienna Convention

Common Article II of the 1963 Vienna Convention and its 1997 Protocol (described here as the 1997 Vienna Convention) provides that the operator of a nuclear installation shall be liable for "nuclear damage" upon proof that such damage has been caused by a "nuclear incident", inter alia, in the operator's "nuclear installation".[72] Under the 1963 Vienna Convention, "nuclear incident" means any occurrence or series of occurrences having the same origin which cause nuclear damage.[73]

The definitions of "nuclear damage" in the 1963 and 1997 Vienna Convention texts differ but both require a specific and prerequisite nexus to a "nuclear

66. OECD/NEA (1990), *Paris Convention: Decisions, Recommendations, Interpretations*, OECD/NEA, Paris, p. 6 ("Definition of 'Reactor").
67. Paris Convention, Article (3)(a).
68. *Ibid*., Article (1)(a)(i) (emphasis added).
69. *Ibid*., Article (3)(a)(ii).
70. *Exposé des Motifs*, *supra* note 49, sec. 40.
71. *Ibid*., sec. 12.
72. 1963 Vienna Convention, Article II.1(a); 1997 Vienna Convention, Article II.1(a).
73. 1963 Vienna Convention, Article I.1(l). The 1997 Vienna Convention text uses a similar but expanded definition of "nuclear incident": any "occurrence or series of occurrences having the same origin which causes nuclear damage *or, but only with respect to preventive measures, creates a grave and imminent threat of causing such damage*". 1997 Vienna Convention, Article I.1(l) (emphasis added).

installation". For example, "nuclear damage" under the 1963 Vienna Convention means, inter alia:

> loss of life, any personal injury or any loss of, or damage to, property which arises out of or results from the radioactive properties or a combination of radioactive properties with toxic, explosive or other hazardous properties of nuclear fuel or radioactive products or waste in, or of nuclear material coming from, originating in, or sent to, a nuclear installation ...[74]

Similarly, the 1997 Vienna Convention defines nuclear damage as, inter alia, "loss of life or personal injury" and "loss of or damage to property", to the extent that the loss or damage arises out of or results from ionizing radiation (1) emitted by any source of radiation inside a "nuclear installation", or (2) emitted from nuclear fuel or radioactive products or waste in, or of nuclear material coming from, originating in, or sent to, a "nuclear installation".[75]

A "nuclear installation" in the 1963 and 1997 Vienna Conventions means, inter alia: (i) any "nuclear reactor", (ii) any factory using "nuclear fuel" for the production of nuclear material or any factory for the processing of nuclear material and (iii) any facility where "nuclear material" is stored, other than storage incidental to the carriage of such material.[76] In addition, the 1997 Vienna Convention adds an additional element to the definition of "nuclear installation": (iv) other such installations in which there are "nuclear fuel or radioactive products or waste as the Board of Governors of the [IAEA] shall from time to time determine".[77] Both the 1963 and 1997 Vienna Conventions define a "nuclear reactor" as any structure containing "nuclear fuel" in such an arrangement "that a self-sustaining chain process of nuclear fission can occur therein without an additional source of neutrons".[78] Additionally, both the 1963 and 1997 Vienna Conventions define "nuclear material" as (i) "nuclear fuel", other than natural uranium and depleted uranium, capable of producing energy by a self-sustaining chain process of nuclear fission outside a nuclear reactor, either alone or in combination with some other material; and (ii) "radioactive products or waste".[79] Both the 1963 and 1997 Vienna Convention texts define "nuclear fuel" as any material which is capable of producing energy by a "self-sustaining chain process of nuclear fission".[80] In turn, both the 1963 and 1997 Vienna Convention texts define "radioactive products or waste" as any "radioactive material produced in, or any material made radioactive by exposure to the radiation incidental to, the production or utilization of nuclear fuel, but does not include radioisotopes which have reached the final stage of fabrication so as to be usable for any scientific, medical, agricultural, commercial or industrial purpose".[81]

Accordingly, there are several reasons why pure nuclear fusion installations are not within the definition of "nuclear installation" and therefore do not contain the requisite nexus required to be covered under the Vienna Convention. First, a pure nuclear fusion installation is not a "nuclear reactor" because it neither contains "nuclear fuel" nor contains "nuclear material" in such an arrangement that a "self-sustaining chain process of nuclear fission ..." can occur.[82] Second, a nuclear fusion installation is not a factory using "nuclear fuel" for the production of nuclear

74. 1963 Vienna Convention, Article I.1(k)(i) (emphasis added).
75. 1997 Vienna Convention, Article I.1(k).
76. 1963 Vienna Convention, Article I.1(j)(i-iii); 1997 Vienna Convention, Article I.1(j)(i-iii).
77. 1997 Vienna Convention, Article I.1(j)(iv).
78. 1963 Vienna Convention, Article I.1(i); 1997 Vienna Convention, Article I.1(i).
79. See 1963 Vienna Convention, Article I.1(h); see also 1997 Vienna Convention, Article I.1(h).
80. 1963 Vienna Convention, Article I.1(f); 1997 Vienna Convention, Article I.1(f).
81. 1963 Vienna Convention, Article I.1(g); 1997 Vienna Convention, Article I.1(g).
82. See 1963 Vienna Convention, Article I.1(i); see also 1997 Vienna Convention, Article I.1(i).

material or a factory for the processing of nuclear material.[83] Third, a nuclear fusion installation is not a facility where "nuclear material" is stored. This is because pure fusion installations do not contain "nuclear fuel" capable of a self-sustaining chain process of nuclear fission, and do not clearly contain "radioactive products or waste" because although tritium is radioactive, in a pure fusion facility it would not be made radioactive by exposure to radiation incidental to the production or utilisation of nuclear fuel.[84] Additionally, under the 1997 Vienna Convention, the IAEA Board of Governors would be unable to determine that a fusion facility would constitute a nuclear installation because it does not contain "nuclear fuel" and does not clearly contain "radioactive products or waste".

As with the Paris Convention, the Vienna Convention excludes the operator's liability for nuclear damage to the nuclear installation itself and to property on the site which is used or to be used in connection with that installation.[85] Additionally, like the Paris Convention, the Vienna Convention applies to certain transport scenarios. But as with the Paris Convention, the scope of the Vienna Convention is limited to nuclear material transported from or sent to the "nuclear installation".[86] For the reasons described above, the Vienna Conventions' definition of "nuclear installation" effectively excludes coverage for third parties harmed by damage caused by a nuclear incident during transport from a pure fusion facility. As explained by interpretive literature regarding the 1963 Vienna Convention, the drafters did not intend for the Convention to apply to damage caused by nuclear fusion installations, in part because fusion's hazardous implications were not sufficiently known at the time.[87]

D. Convention on Supplementary Compensation

Like the Paris and Vienna Conventions, the CSC is structured as a standalone international instrument. Among other things, it obligates states that are not parties to the Paris or Vienna Conventions to ensure that their national legislation is consistent with requirements set forth in the Annex to the CSC.[88] Under Article 3 of the CSC Annex, which applies to states that are not parties to the Paris or Vienna Conventions but that have national legislation consistent with the CSC Annex, the operator of a nuclear facility will be liable for nuclear damage that has been caused by a nuclear incident with a nexus to a "nuclear installation".[89] The definition of

83. See 1963 Vienna Convention, Article I.1(j); see also 1997 Vienna Convention, Article I.1(j).
84. See 1963 Vienna Convention, Article I.1(g),(h); see also 1997 Vienna Convention, Article I.1(g),(h).
85. See, e.g. 1963 Vienna Convention, Article IV.5; see also Paris Convention, Article 3(a)(ii). The 1997 Vienna Convention more clearly expanded the exclusion for liability of the operator to include not only the nuclear installation itself but also any other nuclear installation, including a nuclear installation under construction, on the site where the installation is located. 1997 Vienna Convention, Article IV.5(a).
86. See, e.g. 1963 Vienna Convention, Article II.1(b),(c).
87. IAEA (2007), "The 1997 Vienna Convention and the 1997 Convention on Supplementary Compensation for Nuclear Damage Explanatory Texts", IAEA International Law Series No. 3, Vienna, p. 9.
88. Convention on Supplementary Compensation, Annex Preamble. The CSC is designed to be compatible with the Paris and Vienna Conventions. A party to the 1960 Paris or 1963 Vienna Conventions would be required to enact revisions to their national law, though such revisions would only be necessary to reflect the CSC provisions that apply to all member states. These provisions include: ensuring the availability under their national law to meet the minimum compensation available of SDR 300 million; participation in the international fund; implementing revisions to the expanded and supplemented definition of "nuclear damage"; and extending coverage to all member states. See Explanatory Texts, *supra* note 87, p. 3.
89. See CSC Annex, Article 3.1.

"nuclear installation" in the CSC Annex is the same as the 1963 Vienna Convention, meaning (1) any nuclear reactor, other than one with which a means of sea or air transport is equipped for use as a source of power, and, inter alia, (2) any factory using nuclear fuel for the production of nuclear material, or any factory for the processing of nuclear material and (3) any facility where nuclear material is stored, other than storage incidental to the carriage of such material.[90] So, as with the Paris and Vienna Conventions, fusion installations are not included within the definition of "nuclear installation". Other applicable definitions in the CSC that could be used to expand the applicability of fusion power within the nuclear liability regimes, including those for "nuclear damage", "nuclear incident" and "radioactive products or waste" are also materially consistent with definitions in the Paris and Vienna Conventions.[91]

IV. Looking forward: Considerations in the applicability of fusion power under nuclear liability regimes

A. Should fusion power fall within the international nuclear liability framework?

Whether fusion power should fall within the scope of the international nuclear liability framework can be considered in light of the regime's original purpose. The international civil nuclear liability framework was developed to enable adequate compensation for damage to third parties because certain nuclear activities were recognised as more dangerous than ultra-hazardous activities.[92] As the NEA's *Exposé des Motifs* of the Paris Convention explains:

> A special régime for nuclear third party liability is necessary since the ordinary common law is not well suited to deal with the particular problems in [the civil nuclear] field. Indeed, if the ordinary law were applied, there are several different persons who might be held liable for damage caused by a nuclear incident and victims would, in all likelihood, have great difficulty in establishing which of them was, in fact, liable. Moreover, that person would have unlimited liability without being able to obtain complete insurance cover. The prime objective of this special régime is to ensure the adequate compensation of damage caused to persons and to property by a nuclear incident.[93]

One of the principles of the international nuclear liability regime is to focus financial liability exclusively on the operator of the nuclear installation. Without this principle, nuclear suppliers of services, materials and equipment could be required to retain redundant layers of tiered insurance, increasing premiums and thereby

90. *Ibid.*, Article 1.1(b). The definition differs from the 1997 Vienna Convention, which adds an additional element to the definition of "nuclear installation": (4) other such installations in which there are "nuclear fuel or radioactive products or waste as the Board of Governors of the [IAEA] shall from time to time determine". 1997 Vienna Convention, Article I.1(j)(iv).
91. *Compare* CSC Article I(f) ("nuclear damage"); Article I(i) ("nuclear incident"); CSC Annex Article 1.1(e) ("radioactive products or waste") *with* Vienna Convention Article I.1(k) ("nuclear damage"); Article I.1(l) ("nuclear incident"); Article I.1(g) ("radioactive products or waste") *with* Paris Convention Article 3 (regarding nuclear "damage"); Article (1)(a)(i) ("nuclear incident"); and Article (1)(a)(iv) ("radioactive products or waste").
92. Explanatory Texts, *supra* note 87, p. 5.
93. *Exposé des Motifs* of the Paris Convention, *supra* note 49, sec. 2.

overhead costs without benefitting those who are affected by a nuclear incident.[94] Additionally, the nuclear liability regime also has the effect of focusing claims within a single court. Without this principle, there could be a need to bring a legal action against many potential defendants who could greatly increase the cost and complexity of obtaining compensation. Thus, this principle may expedite recovery for those who are affected and simplifies potentially lengthy, cross-jurisdictional legal disputes. The regime also imposes strict liability on the operator of the nuclear installation. The rationale for strict liability in the nuclear context is analogous to the philosophical underpinning used in the context of ultra-hazardous activities: the nuclear operator will be in a better position to avoid risk of loss, and negligence is difficult to prove in a complex, interoperable nuclear power unit. Finally, a principle of the nuclear liability regime is that liability is limited in amount and time. Limitation of liability in time helps to promote closure and finality to legal and financial exposure, and limitation of liability in amount is critical to ensure the availability of proper financial security in the event of a nuclear incident.

The international nuclear liability regime is carefully tailored – it provides protection for damage resulting from the unique hazards associated with civil nuclear power, including radiological hazards involving transboundary risks. To accomplish this, a primary limitation of the regime is that damage requires a nexus to certain nuclear facilities that qualify as a "nuclear installation". The following chart illustrates specific facilities defined as a "nuclear installation" under the conventions:

<table>
<tr><th>Paris Convention[95]</th><th>Vienna Convention and CSC[96]</th></tr>
<tr><td>Reactors, other than those comprised in any means of transport</td><td>Nuclear reactor other than one with which a means of sea or air transport is equipped for use as a source of power</td></tr>
<tr><td>Factories for the manufacture or processing of nuclear substances</td><td rowspan="3">Factory using nuclear fuel for the production of nuclear material, or any factory for the processing of nuclear material, including for the re-processing of irradiated nuclear fuel</td></tr>
<tr><td>Factories for the separation of isotopes of nuclear fuel</td></tr>
<tr><td>Factories for the reprocessing of irradiated nuclear fuel</td></tr>
<tr><td>Facilities for the storage of nuclear substances (other than storage incidental to carriage)</td><td>Facility where nuclear material is stored (other than storage incidental to carriage)</td></tr>
<tr><td>Installations for the disposal of nuclear substances (2004 Protocol to the Paris Convention)</td><td></td></tr>
<tr><td>Reactor, factory or facility that is in the course of being decommissioned (2004 Protocol to the Paris Convention)</td><td></td></tr>
<tr><td>Other installations in which there are nuclear fuel or radioactive products or waste as determined by the Steering Committee</td><td>Other installations in which there are nuclear fuel or radioactive products or waste as determined by the IAEA Board of Governors (1997 Vienna Convention)[97]</td></tr>
</table>

94. The operator of a nuclear installation (or the ultimate financial guarantor, including insurance companies), in turn, can allocate recourse against suppliers through contract to reallocate the risk in certain limited circumstances. *See, e.g.* Paris Convention, Article (6)(f)(ii) (*inter alia*, the operator shall have a right of recourse "if and to the extent that it is so provided expressly by contract").
95. Paris Convention, Article (1)(a)(ii), 2004 Protocol, Article (1)(a)(ii). Unless otherwise specified, the facilities included in the definition of "nuclear installation" are only included in the Paris Convention but not the 2004 Protocol.
96. 1963 Vienna Convention, Article I.1(j); 1997 Vienna Convention, Article I.1(j); and CSC Annex, Article 1.1(b). Unless otherwise specified, the facilities included in the definition of "nuclear installation" are only included in the 1963 Vienna Convention and CSC.

The nuclear liability regime is designed to protect the public from injury arising from these locations – e.g. where a criticality accident with transboundary effects can occur. In addition to covering the facilities listed above, the conventions cover, in certain circumstances, damage that occurs during the transport of nuclear material to or from a "nuclear installation". Such coverage, then, ranges from transport between conversion and enrichment facilities on the front end of the fuel cycle to reprocessing and final storage installations on the back end of the fuel cycle. The conventions place the burden of liability during transport on the operator of the nuclear installation rather than the carrier since, in part, the carrier will not be able to verify the precautions made in packing the shipments for transport.[98] Additionally, channelling this cost to the operator reduces the higher insurance premium that would otherwise be required of a carrier. The regime covers the transport of nuclear material because transport implicates the public by proximity and because transport can involve transboundary risks as the material crosses national borders.

In contrast, some facilities are not specifically covered by the conventions, including factories for the manufacture or processing of natural or depleted uranium.[99] They do not generally involve levels of radioactivity that implicate the unique hazards requiring coverage. Additionally, the conventions do not cover facilities where radioisotopes have reached their final stage of manufacture and are outside of a nuclear installation, where they are used in industrial, commercial, agricultural, medical, scientific or educational purposes.[100]

Even facilities that qualify as "nuclear installations" can be excluded from coverage under the nuclear liability regime. For example, the Paris Convention permits the Steering Committee to exclude any nuclear installation from the application of the Convention if the "small extent of risks so warrant".[101] Based on a 1990 decision by the Steering Committee, parties can exclude certain nuclear installations that are in the process of decommissioning where operations have permanently ceased and the installation does not contain certain levels of radionuclides.[102] Additionally, the Steering Committee has permitted the exclusion of certain small quantities of nuclear substances from the application of the Paris

97. The 1963 and 1997 Vienna Convention texts do not specifically include waste disposal facilities or installations in the process of decommissioning. In 2005, the International Expert Group on Nuclear Liability (INLEX) concluded that it was premature to specifically expand the definition of "nuclear installation" to include waste disposal facilities and decommissioning facilities because the definition of "nuclear installation" in all of the instruments includes operating reactors and facilities containing nuclear material. Explanatory Texts, *supra* note 87, p. 27, fn. 80.
98. See *Exposé des Motifs*, *supra* note 49, sec. 22; *see also* 1997 Vienna Convention, Article II.1.
99. See, e.g. Paris Convention, Article (1)(a)(v) (definition of "nuclear substances"); 1997 Vienna Convention, Article I.1(h)(i) (definition of "nuclear material"); and *Exposé des Motifs*, *supra* note 49, sec. 9.
100. *Exposé des Motifs*, *supra* note 49, sec. 10; see, e.g., Paris Convention, Article (1)(a)(v) (definition of "radioactive products or waste") and 1997 Vienna Convention, Article I.1(g) (definition of "radioactive products or waste").
101. See, e.g. Paris Convention, Article (1)(b).
102. Paris Convention: Decisions, Recommendations, Interpretations, *supra* note 66, pp. 8, 22.

Convention.[103] The OECD/NEA noted that France's Commissariat à l'énergie atomique had identified that the radiological risks associated with fusion installations were relatively low, but that it would not object if fusion systems were included within the scope of the Paris Convention.[104]

In determining whether fusion installations should be incorporated into the international nuclear liability regime, the NEA Secretariat's 2005 analysis conducted for the ITER project before construction began in France is informative.[105] The analysis examined, among other things, whether the conventions would be appropriate for fusion installations based on the major principles of the nuclear liability regime. Regarding the application of strict liability, the report found that although the relative risks associated with fusion power are low, a strict liability system would be appropriate: like a fission accident, fault will be difficult to establish in the event of a fusion accident, as it is in many other types of accidents.[106] With respect to channelling, the report found that although legal channelling would simplify the claims procedure process, the insurance industry would need to provide advice regarding whether economic channelling is needed.[107] This is because the risk associated with fusion power is lower and economic channelling in fission facilities is often justified on the basis that insurance capacity is insufficient to provide coverage. Regarding the application of liability limits and mandatory financial security, the report found that including fusion power within the scope of the Paris Convention "may not" be appropriate because of the differential between the low risks associated with fusion power and the high liabilities imposed on nuclear operators.[108] The report also noted that while there is no point in including fusion installations under the conventions if accidents have no transboundary effects, assessing risk is difficult since the degree of risk will depend on future designs and the degree to which nuclear substances (such as tritium and radioactive waste) are transported across national boundaries.[109]

Since 2005, scientific progress in fusion research, including the completion and operation of the National Ignition Facility and the continued development of the ITER facility, supports the exclusion of fusion power from the civil nuclear liability regime. The known radiological risks associated with fusion, which stem from tritium and neutron-activated materials, do not correspond with the significant risks associated with a transboundary fission criticality accident that the current civil nuclear liability regime is designed to protect against. Risks at facilities included in the definition of "nuclear installation" in the conventions, i.e. those locations where a criticality accident could occur, remain materially distinct from known and reasonably anticipated risks associated with pure fusion facilities. This is not only because of the lower degree of known dangers associated with a fusion accident but also because the need for tritium may also reduce the need for transboundary shipments. The fission-based civil nuclear industry is highly international, and the

103. Decision of the Steering Committee on the Exclusion of Small Quantities of Nuclear Substances from the Application of the Paris Convention, OECD/NEA Secretariat (21 September 2007), Note, "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", OECD/NEA Doc. No. NEA/NE(2007)8 and OECD/NEA (2007), "Minutes of the 115th session of the Steering Committee for Nuclear Energy held on 18-19 October 2007", OECD/NEA Doc. No. NEA/NE/M(2007)2, p. 7.
104. Liability and Financial Security for Risks Posed by Nuclear Fusion Installations, *supra* note 55, p. 5.
105. *Ibid.*
106. *Ibid.*, at p. 6.
107. *Ibid.*
108. *Ibid.*
109. *Ibid.*

nuclear liability regime's coverage for nuclear material transport enables this highly interconnected network to remain commercially viable. In contrast, the fusion fuel industry may require less international transport because tritium would likely be bred in the fusion power installation itself.

B. Legal options for fusion power

Although the anticipated risks associated with fusion power differ from fission power reactors, countries will be challenged as they develop an appropriate regime that protects the public from risk while enabling the deployment of fusion technologies. Either on an individual basis or with international co-ordination, countries can consider the development of a model law that provides international consistency regarding protections provided to fusion power.[110] Additionally, because transboundary issues exist, states can consider developing an international framework for specific fusion-related transport issues or consider incorporating fusion requirements into relevant conventions, potentially including the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.[111]

If fusion technologies are to be protected under the umbrella of the existing international nuclear liability regime, careful amendments revising the definitions in the conventions will likely be needed. Although certain definitions in the relevant conventions can be revised with the approval of the NEA Steering Committee or IAEA Board of Governors for the Vienna Convention, such revisions may not be easily achieved to include fusion power. It would be difficult, for example, to simply re-define "nuclear installation" or "reactor" in the Paris Convention, as explained in Section III.B, or "nuclear installation" in the Vienna Convention, as explained further in Section III.C of this note, to provide coverage.

C. Fission-fusion power

Although this note has focused on pure fusion power installations, the future of fusion power may include hybrid systems. For example, laser inertial fusion energy designers, particularly those outside of the United States, have considered hybrid fusion-fission designs that incorporate fertile or fissionable material into the lithium blanket.[112] The hybrid design can be composed of either a fertile or fissionable fuel in either a solid form cooled by a liquid lithium fluoride and beryllium fluoride mixture, or a molten form dissolved in a similar molten salt mixture.[113] The fuel blanket could be uranium or thorium; the fissionable element could derive from mixed oxide fuel.[114]

While less difficult than pure fusion designs, hybrid fission-fusion nuclear installations do not fit simply within the coverage of the existing nuclear liability conventions. For example, under the 1997 Vienna Convention, a "nuclear installation" includes a "nuclear reactor", which in turn is defined as any structure "containing nuclear fuel in such an arrangement that a self-sustaining chain process

110. The German Atomic Energy Act, for example, specifically establishes liability to the facility operator for fusion facilities. German Act on the Peaceful Utilization of Atomic Energy and the Protection Against its Hazards (German Atomic Energy Act), sec. 26, paras. (1), (2).
111. 1673 UNTS 126 (entered into force 5 May 1992).
112. Kramer, K. J. et al. (2011), "Fusion-Fission Blanket Options for the LIFE Engine", *Fusion Science and Technology*, Vol. 60, p. 72.
113. Peterson, P. F., E. Blandford and C. Galvez (2009), "Overview of Fission Safety for Laser ICF Fission Energy", *Fusion Science and Technology*, Vol. 56, No. 2, pp. 641-46.
114. Fusion-Fission Blanket Options for the LIFE Engine, *supra* note 112, p. 75.

of nuclear fission can occur therein without an additional source of neutrons".[115] In fusion-fission designs, the fissile or fertile elements generally require neutron bombardment and are not self-sustaining, and accordingly would not fit within the Convention's scope. Similarly, as described earlier, a 1967 interpretation of the Paris Convention Steering Committee determined that sub-critical assemblies should not be included in the term "reactor" within the meaning of Article 1(a)(ii) of the Paris Convention.[116] However, as described previously in an analogous context in Section III.B, because the Paris Convention does not define "reactor", potentially the convention could be re-defined.[117] Additionally, for example, the 1997 Vienna Convention permits the IAEA Board of Governors to determine that certain installations with radioactive products be included within the definition of the Convention in accordance with Article I.1(j)(iv).[118]

Since the risks associated with a hybrid fission-fusion nuclear installation are different from either pure fusion or pure fission designs, hybrid fission-fusion nuclear installations should be separately evaluated. Since the construction of a hybrid fission-fusion nuclear power installation is not currently under consideration, there is time to evaluate potential developments and assess the need for a modified nuclear liability regime similar to that provided by the Paris or Vienna Conventions.

V. Conclusion

As scientists pursue technological advancements in fusion power, the international legal community can consider the appropriate legal framework to balance its relevant benefits and risks. The current civil nuclear liability regime developed over the past 50 years has resolved many potentially intractable issues and provided a foundation for enabling the public to recover damages in the event of a fission-based nuclear incident. But as examined in this note, the current liability regime does not presently cover fusion power facilities. The *sui generis* nature of the current civil nuclear liability regime instead points the legal community towards developing a more tailored legal solution for fusion power.

115. 1997 Vienna Convention, Articles I.1(j),(i).
116. Paris Convention: Decisions, Recommendations, Interpretations, *supra* note 66.
117. For example, under the Paris Convention if the Steering Committee determines that a "reactor" includes a facility with certain fusion-generated, neutron-induced sub-critical elements, under Article 3 the operator of a nuclear installation shall be liable for certain damage caused by a "nuclear incident" in such installation or involving nuclear substances coming from such installation. Under Article 1, a "nuclear incident" means any "occurrence or succession of occurrences having the same origin which causes damage, provided that such occurrence or succession of occurrences, or any of the damage caused, arises out of or results either from the radioactive properties, or a combination of radioactive properties with toxic, explosive, or other hazardous properties of nuclear fuel or radioactive products or waste or with any of them, or from ionizing radiations emitted *by any source of radiation* inside a nuclear installation". Paris Convention, Article (1)(a)(i) (emphasis added).
118. 1997 Vienna Convention, Article I.1(j)(iv).

Nuclear energy and Indian society: Public engagement, risk assessment and legal frameworks

Third annual meeting of the Nuclear Law Association of India

1 March 2014, India Habitat Centre, New Delhi

Summary of the proceedings[1]

The third annual meeting of the Nuclear Law Association, India (NLAI) was held on 1 March 2014 in New Delhi. This year's overarching theme was "Nuclear energy and Indian society: Public engagement, risk assessment and legal frameworks".

Several of the papers presented will be published in the *Journal of Risk Research* in early 2015 as part of the *Special Issue on Nuclear Energy and Indian Society: Public Engagement, Risk Assessment and Legal Frameworks*.[2]

Inaugural session

Welcome address: Dr. M.P. Ram Mohan, President, Nuclear Law Association India and Fellow, The Energy and Resources Institute (TERI)

Dr. Ram Mohan, President of the NLAI and Fellow at TERI, welcomed 75 participants to the Third Annual Meeting of the NLAI. In his address, Dr. Mohan announced the launch of the "Centre for Nuclear Risk Analysis", a dedicated research centre within NLAI, which will undertake wide-ranging research covering all subjects relating to civil nuclear energy development in India and its engagement with the wider world. The Centre for Nuclear Risk Analysis will provide an opportunity for experts and researchers from all disciplines to closely interact and undertake nuclear energy risk studies.

Presidential address: Ambassador Rakesh Sood, Prime Minister's Special Envoy for Disarmament and Non-Proliferation[3]

Following Dr. Mohan's welcome address, Ambassador Sood provided the presidential address, speaking about nuclear energy's place in the broader context of India's Integrated Energy Policy (IEP).[4] The IEP was the first comprehensive document linking energy policy with sustainable development, covering all sources of energy, their use and supply, access and availability, affordability and pricing, environmental concerns, and energy security.

1. This summary was prepared by Els Reynaers Kini, Partner, MV Kini & Co. and General Secretary, NLAI; Dipankar Bandyopadhyay, Partner, Verus Advocates and Member, NLAI; and Bhanudey Kanwar, Associate, PXV Law Partners. The proceedings of the Nuclear Law Association, India Third Annual Meeting are available at: www.nlain.org and http://nuclearlaw.wordpress.com.
2. Additional information regarding the *Journal of Risk Research* is available at: www.tandfonline.com/loi/rjrr20.
3. The complete version of Ambassador Sood's Presidential Address is available at: www.nlain.org.
4. The Integrated Energy Policy was released in 2006 and formally adopted in 2008. It is available at: http://planningcommission.nic.in/reports/genrep/rep_intengy.pdf.

Ambassador Sood also referred to the reality in India where nearly a quarter of the population lacks access to electricity, and energy poverty has been identified as a hindrance to economic development. The IEP identified energy security as a key element in its policy framework. Ambassador Sood referred to the fact that the fuel mix for power generation in 2035 would remain fairly similar to what it is today, with fossil fuels being the dominant resource; this implies, in turn, a growing import dependency. Nuclear energy currently only accounts for approximately 1% of energy consumed in India. In terms of power generation, with an installed capacity of 4.8 GW, nuclear accounts for slightly over 2% of the total installed capacity, which is estimated at 225 GW and includes thermal power, hydro and renewable energy sources. Therefore, even though nuclear energy will remain a small part of the overall energy mix, it is a critical part in addressing India's energy challenges, mitigating carbon emissions and enhancing energy security by reducing dependence on foreign energy sources.

After providing a historical perspective of India's nuclear trajectory, Ambassador Sood described the current status of nuclear energy in India. He explained that it was only after 2008, when the civilian side of the nuclear sector was separated from the weapons and military side and more facilities were brought under International Atomic Energy Agency (IAEA) safeguards, that the civilian programme started responding to the growing public scrutiny and demand for accountability. This has been a major change in India, but it is still a "work-in-progress". However, while transparency and accountability of the nuclear establishment is essential to develop public support and confidence, Ambassador Sood pointed out that it is equally important that one refrains from falling into either the "anti-nuclear trap" or the traditional criticisms of the last 30 years, when even the civilian aspect of the programme was classified. Today, while there is a strong case to be made out for nuclear power both in terms of energy security and mitigating carbon emissions, concerns over safety aspects, as well as cost effectiveness, will have to be satisfactorily addressed. Therefore, public engagement and risk assessment become important. Ambassador Sood firmly stated that "our citizens must have confidence in the regulatory processes".

Lastly, Ambassador Sood touched upon the concerns raised *vis-à-vis* India's nuclear liability law. Ambassador Sood explained that in the 1950s, only the US had a nuclear industry and the US private sector needed liability protection to establish a global market. However, he observed that today the situation is different and there is a growing feeling that this exclusive channelling is no longer helpful. The Indian law, in this regard, may not be consistent with existing practice but it is much more consistent with the spirit of the times. He further stated that the "idea of some measure of supplier liability is an idea that can no longer be bypassed", but what needs be ensured is that it does not become "infinite" or "open ended". Therefore, in the future, Ambassador Sood felt that there should be a "genuine effort to address the concerns of the suppliers' community so that their liability is not ambiguous and open ended but can be quantified in a manner that does not raise costs to prohibitive levels". He concluded by stating that such an approach would actually advance international nuclear liability law.

Inaugural address: Shri S.A. Bhardwaj, former Chairman & Managing Director, Nuclear Power Corporation of India Limited (NPCIL), and Director (Technical), NPCIL[5]

Shri Bhardwaj gave the inaugural address, and began by touching upon the notion of risk assessment and human efforts to reduce both the magnitude of the potential harmful consequence of an accident happening, as well as the probability of that accident happening. He emphasised how nuclear scientists and technologists

5. The complete version of Shri Bhardwaj's inaugural address is available at: www.nlain.org.

work to ensure the safety of nuclear power plants (NPPs) and minimise their risk by making improvements in new designs and backfitting improvements in older plants. Shri Bhardwaj proudly shared that India's 20 operating units recorded a combined 370 years of safe operating performance, which is a testament to the care taken in all areas of design, construction and operation.

That said, Shri Bhardwaj acknowledged that the public does not share his confidence in nuclear energy. This lack of confidence arises in part because the application of nuclear technology was first visible to the public only as an instrument of war. Only later has nuclear technology come to be known for other uses, such as a source of energy to produce electricity. This first impression of nuclear as a destructive means has continued and embedded itself deep in the general public's psyche. Specifically, the public at large in India indicates that their two main concerns relate to: (1) personal safety and (2) waste management. Shri Bhardwaj, however, emphasised that safety is given highest priority in India during all stages of the fuel cycle and that regulatory limits for radiation exposure for protection of workers, public and the environment are set at conservative low levels. These limits are set by the Atomic Energy Regulatory Board (AERB) and are in line with international norms specified by the International Commission on Radiological Protection (ICRP).

Following Shri Bhardwaj's assurance of India's commitment to safety, he elaborated in detail India's response to the public's genuine concern regarding radioactive waste management. While explaining the issues associated with the radioactive isotope decay process, Shri Bhardwaj provided examples from India's own nuclear plants. He then discussed the Department of Atomic Energy's (DAE) facility for embedding the 3% of spent fuel waste that is not recyclable as fuel material in vitrified form in glass matrix for safe storage. Shri Bhardwaj announced that research and development on further separation of these long-lived minor actinides during fuel reprocessing has recently been completed and it will now be possible to partition the waste to separate these minor actinides. These can be "transmuted" or burnt and could practically get eliminated by inducing fission in fast breeder reactors or other reactors of second and third stage of India's nuclear power programme.[6] He added that the thorium-based fuels of the third stage will produce negligible minor actinides. Importantly, the vitrified high-level volumes currently stored in the Vitrified Waste Storage Facility are very small in the country. The partitioning of waste and burning it will further bring down high-level waste (HLW). The remaining waste will have a half-life of about 30 years and would decay in 300 years.

As a result of the Indian public's general lack of confidence in nuclear power, Shri Bhardwaj discussed the tools adopted in India to reach out to the public. Nuclear power stations in particular are actively involved in carrying out regular public awareness programmes for people living in the vicinity of nuclear power plants. People are invited and taken on guided tours of the nuclear power stations and provided information about the basics of radiation protection, safety practices and the "dos and don'ts" during a nuclear emergency. The station authorities also visit the surrounding villages and population centres to provide the same

6. A succinct overview of India's three-stage nuclear programme is available at: www.npcil.nic.in/main/faq.aspx#1.

information.[7] Shri Bhardwaj emphasised that "our experience is that a continuous engagement to educate the people about the beneficial aspects of nuclear radiation and to remove their misgivings about it is very necessary".

Shri Bhardwaj concluded his remarks by quoting a paragraph from the recent Supreme Court judgment, which stated that:

> Power generation through a nuclear plant set up after following all safety standards, rules and regulations, is for the welfare of the people and for the economic growth of the country, which is the object and purpose of the Atomic Energy Act. Nuclear energy assumes as an important element in India's energy mix for sustaining economic growth of natural and domestic use which in future has to replace a significant part of fossil fuel like coal, oil, gas etc. Electricity is the heart and soul of modern life, a life meant not for the rich and famous alone but also for the poor and down trodden. ... Power generation with the traditional means, through hydro, thermal electric project, coal etc. are not effective substitution to the power generation through Nuclear Plant. ... Energy tariff is also increasing, nuclear power in the long run will be much cheaper than other forms of energy.[8]

Special address: Shri Gourab Banerji, Additional Solicitor General, Supreme Court of India

In his special address, Shri Gourab Banerji reported on the most recent Supreme Court cases pertaining to the nuclear sector. Shri Banerji first noted that the Writ Petition, which directly challenges the constitutionality of the Civil Liability for Nuclear Damage Act, 2010, has not yet been heard by the Supreme Court.[9]

Next, Shri Banerji discussed the judgment delivered on 6 May 2013 by the Supreme Court of India in *G. Sundarrajan v. Union of India & Others*.[10] This case arose out of an appeal filed against the 31 August 2012 Madras High Court order, which dismissed the Writ Petition seeking to declare as null and void the 28 August 2012 AERB clearance allowing the initial fuel loading and first approach to criticality of the Kudankulam Nuclear Power Plant (KKNPP) unit 1. The Madras High Court displayed an apparent reluctance to interfere in policy matters and highly technical matters in which it felt it had no expertise.

Shri Banerji appeared in the matter and shared in detail how the Supreme Court sought to arrive at a fine balance between non-intervention in policy-related matters and close scrutiny of technologies where safety is of paramount importance to the public at large. The judges were determined to understand as much as possible all of the relevant technical aspects of the case, which led to very interactive hearings where the judges directly sought clarifications from the technical experts at the

7. The NPCIL web page has an open invitation to people who want to know more about nuclear power, either through visits to power stations or providing responses to their questions. For example, over 63 000 visitors in 1 234 groups visited nuclear power plants last year. Rural outreach was enhanced during the year and more than 100 000 villagers reached out through various initiatives. For instance, Fatehpur in Haryana is a new site where NPCIL is initiating construction of two units of 700 MWe. A large scale programme has been going on at and around this site. The major programmes were an "Exhibition on Wheels" (mobile vans), "Farmers Integration Programmes" around the Haryana site in association with a local university and the Indian Council of Agricultural Research and street plays for rural outreach among other activities.
8. G. Sundarrajan v. Union of India & Ors., Civil Appeal No. 4440 of 2013, 6 May 2013, para. 182, available at: http://judis.nic.in/supremecourt/imgs1.aspx?filename=40374.
9. Common Cause & Ors. v. Union of India & Ors., Writ Petition (Civil) No. 464 of 2011.
10. G. Sundarrajan v. Union of India & Ors, Civil Appeal No. 4440 of 2013, 6 May 2013, *supra* note 8.

hearings. Though the petitioners had made it clear that they were not inherently opposed to nuclear energy *per se*, the judges made sure that "every 'i' was dotted and every 't' was crossed".

The lead judgement essentially consists of three parts: (1) an introduction and general preamble; (2) the first part of the judgement, which focuses on safety and security issues; and (3) the second part of the judgement, which addresses environmental aspects. The introduction offers a summary of the legislative history of the various enactments in India pertaining to the nuclear sector, as well as India's national policy on atomic energy, and an overview of the 20 operating nuclear power reactors in India as part of the implementation of this overarching nuclear energy policy adopted for the "welfare of the people and for other peaceful purposes".[11] Although the Supreme Court firmly reiterated that it "is not for Courts to determine whether a particular policy or a particular decision taken in fulfilment of a policy, is fair", the court felt its attention was warranted on other aspects raised by way of appeal, including safety and security, as well as environmental concerns.[12]

The first part of the judgement, on safety and security, addresses a long list of policy-related issues[13] and then further delves into the essence of "radioactive material", its regulation, actions and safety assessments undertaken in India post-Fukushima. Importantly, the Supreme Court closely scrutinised the government's response to "people's resistance" against the production of nuclear energy, as well as against the commissioning of the KKNPP. The Court also dedicated many pages to the disaster management plans, related guidelines, public awareness efforts undertaken, along with emergency exercises (on- and off-site) being undertaken in India. Finally, the first part looks into the Corporate Social Responsibility (CSR) obligations resting on all central public sector enterprises, and more specifically, how this CSR obligation was implemented for the people living in the vicinity of the KKNPP, where the Supreme Court reiterated the need for there to be "an effective and proper monitoring and supervision of the various projects undertaken under CSR, to the fullest benefit of the people who are residing in and around the NPP".[14] In Shri Banerji's opinion, the first part of the judgment reads like a "wide-ranging policy paper" given the diversity of issues addressed by the Court, upon which it also offered its view and recommendations.

The second part of the judgement specifically addressed the issue of Environmental Impact Assessment (EIA) Regulations, taking into account the fact that the Environmental Clearance granted for KKNPP units 1 and 2 in 1989 by the Ministry of Environment & Forests (MoEF) pre-dated the 1994 EIA Notification, as later amended in 2006, which also contained a detailed public hearing process to be followed.[15] However, the Environmental Clearances for units 3-4 were granted in 2008 and for units 5-6 in 2012. The Supreme Court also addressed, in some detail, the manner in which the desalination plant was being approached under the latest amended Coastal Regulation Zone (CRZ) Notification. It ultimately concluded that:

11. See *ibid.*, para. 11.
12. *Ibid.*
13. For example, the judgement touches upon the status of international and bilateral treaties; AERB safety codes; the role of the IAEA; the KKNPP project itself; nuclear spent fuel (NSF) and how it is regulated in India; NSF and management of waste in India; NSF waste and transportation, along with India's "closed fuel cycle" approach and reprocessing capabilities; as well as deep geological repository (DGR) options in India where the Supreme Court even went so far as to caution that the Union of India "should find out a place for a permanent DGR" as "[s]toring of SNF at NPP site will, in the long run pose[] a dangerous, long term health and environmental risk". See *ibid.*, para. 66.
14. See *ibid.*, para. 107.
15. See *ibid.*, paras. 108-190.

> all the expert teams are unanimous in their opinion of the safety and security of the KKNPP both to life and property of the people and the environment, which includes marine life. Court has to respect national nuclear policy of the country reflected in the Atomic Energy Act and the same has to be given effect to for the welfare of the people and the country's economic growth and it is with these objectives in mind that KKNPP has been set up.[16]

With regard to the constitutionally guaranteed "right to life", Mr. Justice K.S.P. Radhakrishnan went even further by stating that:

> While balancing the benefit of establishing KKNPP Units 1 to 6, with right to life and property and the protection of environment including marine life, we have to strike a balance, since the production of nuclear energy is of extreme importance for the economic growth of our country, alleviate poverty, generate employment etc. While setting up a project of this nature, we have to have an overall view of larger public interest rather than smaller violation of right to life guaranteed under Article 21 of the Constitution.[17]

Mr. Justice Dipak Misra concurred, essentially stressing the paramount importance of safety. That is, while he acknowledged that "safety of the State is the supreme law and in case of any conflict, an individual must yield to the collective interest",[18] he nevertheless added that "it should not be done at the cost of safety" and that at all times "sincere efforts are to be made to maintain and sustain the safety of the people".[19]

Shri Banerji concluded by observing that the Supreme Court clearly acknowledged that nuclear energy is here to stay for the long-term in India (and it will not question that policy choice), but the court will closely scrutinise the compliance and safety record. As a result, the nuclear establishment will have to become even more proactive about public scrutiny, as well as the detailed (and even technical) scrutiny by the courts.

Panel Session 1: Public engagement, consultation and acceptance of nuclear projects

- Chair: Siddharth Varadarajan, Senior Journalist and Fellow, Centre for Public Affairs and Critical Theory

Following the Inaugural Session, the first panel session was held. Panel Session 1 covered "Public engagement, consultation and acceptance of nuclear projects" and was chaired by Siddharth Varadarajan, a Senior Journalist and Fellow at the Centre for Public Affairs and Critical Theory. Five diverse speakers participated on the panel, representing academia, government and industry.

At the outset, Mr. Varadarajan observed that the very existence of the Nuclear Law Association of India is a sign of the "coming of age" of nuclear issues in India and a reflection of the fact that nuclear energy is likely to play a larger role in the country's energy mix. He described the broad challenges faced by the nuclear energy sector in the face of the country's nuclear weapons programme and the international sanctions that remained in place until 2008. As a result, India was constrained to undertake indigenous research and development on nuclear energy. The Indo-American Civil Nuclear Cooperation Agreement (popularly known as the "123 Agreement") and the exemption obtained by India from the restrictive

16. *Ibid.*, para. 190.
17. *Ibid.*, para. 175.
18. *Ibid.*, para. 216.
19. *Ibid.*

guidelines of the Nuclear Suppliers Group marked a watershed moment in the development in the sector.

Mr. Varadarajan said the separation of India's civil and military nuclear programmes will not only allow the former to expand on the basis of international co-operation but should also facilitate greater transparency, accountability and scrutiny because the nuclear establishment can no longer hide behind the veil of "national security".

Since India is on a path of rapid nuclear energy expansion, there is bound to be greater public scrutiny, and even public opposition, he said. Given his long-standing experiences as a journalist, Mr. Varadarajan observed that even the media in India is not really used to asking probing questions relating to the nuclear sector. Mr. Varadarajan further conceded, as did other speakers in the inaugural session, that nuclear energy has its risks and limitations, even if these may not be as dramatic as some of its opponents claim. What this means is that the government and the nuclear establishment need to actively and openly engage with the public on their plans for building new plants. People's fears, even if we think they are baseless, need to be addressed properly. Only in this way will nuclear power win acceptability.

Mr. Varadarajan strongly condemned the treatment meted out to those opposed to the establishment of nuclear power plants by the state and police authorities in some states. He expressed his concern for the manner in which the government has at times used strong-arm and coercive tactics to deal with opposition it faces for promoting its civil nuclear programme. He concluded by emphasising the need for public engagement and scrutiny of all nuclear projects for the overall success of India's civil nuclear programme.

- Mahesh Kamble, Tata Institute of Social Sciences, Mumbai

The panel's first speaker was Mahesh Kamble, an expert in the field of disaster management and governance and policy relating to disaster management. Mr. Kamble has conducted extensive research and surveys, including looking into the extent of public engagement and awareness of the Jaitapur Power Plant in Ratnagiri district in Maharashtra. As such, primarily addressing Jaitapur, Mr. Kamble spoke about the *perception* of risk being a guiding factor for the opposition, stating that the opposition to the setting up of the nuclear power project stems from the misguided understanding or lack of information giving rise to the higher perception of risk. Providing an example, Mr. Kamble stated that the opposition to the Jaitapur project stems from the loss of faith and trust in the government and the operator, NPCIL. Mr. Kamble stated that the loss of public trust in the proponents of the project is the single largest factor for the opposition being faced at Jaitapur and he suggested that the proponents of a project where risk is perceived ought to undertake steps well in advance to ensure that there is no opposition.

Mr. Kamble stated that not clearing the air about the project and its establishment, and by providing no response to the queries raised by the public, especially those living in the vicinity of the project, however misguided the queries may be, led to a feeling of loss of trust and victimisation at the hands of the proponents, resulting in the opposition. With specific regard to the Jaitapur project, Mr. Kamble provided the audience with instances of how the acts or behaviour of the NPCIL or instrumentalities of the government resulted in widespread opposition to the project:

- NPCIL changed its stance regarding earthquake zoning for the site of the nuclear power plant, from zone 4 to zone 3. Specifically, an NPCIL representative stated that zone 4 ends about 3 km away from the site; however, such a statement cannot be true as it is not yet possible to conduct

micro-zoning of the earthquake zones. Further, even if it is possible, such micro-zoning was not carried out at Jaitapur.

- The public hearing was conducted without affording adequate time and notice to the public to review the EIA report.
- A single copy of the EIA report was made available at the office of the district collector, where the public was afforded access only in a queued manner for a very small period time considering the nature and contents of the EIA report.
- The NCPIL did not accept a request by those affected by the nuclear power plant to re-schedule the public meeting with the Chief Minister. The meeting was scheduled to be held on the day of a very important local festival and, as a result, the genuine concerns of the affected parties could not be addressed. Moreover, the meeting was held in Mumbai and it was not feasible for the people residing around the nuclear power plant to travel to Mumbai. Therefore, family members living in Mumbai represented the residents of Raitapur, though they expressed very different concerns, and some were even interested in their family's land being sold.
- Instances arose of activists and people opposing the project being threatened with arrest. Further, there were reports of constant monitoring by the local police of the activities of those critical of the project.

Mr. Kamble also pointed out that the EIA and Social Impact Assessment (SIA) that were performed for the Jaitapur project were not proper. In summary, Mr. Kamble stated that the public's lack of information in combination with NPCIL's lack of effort to provide the information and create awareness, as well as the oppressive manner in which any opposition or criticism of the project has been handed by the proponents, have left the local population disdainful of the project. Thus, as a result of the proponents' policies, there is lack of public participation, engagement and awareness of the Jaitapur project and this, in turn, has resulted in the opposition for the same.

Mr. Kamble concluded his presentation by stating that there is a growing need for adopting a sensitive and a more targeted approach for public engagement by the government (state and central), NPCIL and other proponents of the project.

In a question and answer session, Mr. Kamble observed that in its 6 January 2014 order, the Supreme Court reiterated its previous order of 2011 that the central government should set up a national regulator for evaluating projects and enforcing environmental conditions for approvals, and to impose penalties on polluters.[20] The Supreme Court in January 2014 concluded that the current EIA Notification from 2006, with regard to processing, appraisals and approvals of the projects for environmental clearances, is deficient as of now and "what is required is a Regulator at the national level having its offices in all the States which can carry out an independent, objective and transparent appraisal and approval of the projects for environmental clearances and which can also monitor the implementation of the conditions laid down in the Environmental Clearances".[21] Dr. Rastogi, a panelist in Panel 3, added that in the 2011 *Lafarge Umiam Mining Private Limited v. Union of India & Ors.* matter, the Supreme Court had also directed that the MoEF should prepare a panel of accredited institutions from which alone the project proponent should

20. T.N. Godavarman Thirumulpad v. Union of India & Ors., Writ Petition (Civil) No. 202 of 1995, 6 January 2014, para. 1, available at: http://supremecourtofindia.nic.in/outtoday/WC2021995.pdf.
21. *Ibid.*, para. 7.

obtain a "Rapid EIA" and the Terms of Reference (TOR) were to be formulated by the MoEF only, rather than the project proponent, to increase the credibility of these EIA reports.[22] The MoEF has been closely following these directions since 2011. Moreover, Dr. Grover, Chair of Panel 2, referred to the fact that the DAE seeks the assistance of local universities to ensure the independence of the report findings and that there are very rigorous on-site environmental monitoring laboratories that functioned even well before these regulations or directions.

In response to a different question, Mr. Kamble observed that in the context of energy consumption, perhaps insufficient thought is dedicated to the distinction between energy "need" and energy "demand" or greed and, in a country such as India, there should be much more equitable distribution of electricity as all too often the areas around NPP sites may not necessarily benefit themselves from the energy generated.

- S.K. Malhotra, Outstanding Scientist & Head, Public Awareness Division, DAE

Panel 1's second presenter was Mr. S.K. Malhotra, Head of the Public Awareness Division of the DAE. Mr. Malhotra began his presentation by citing a paragraph from the 6 May 2013 KKNPP judgement[23] to show that it is possible to craft a judicious decision that presents an amicable balance, taking into account a wide range of opinions. In response to Mr. Kamble, Mr. Malhotra conceded that the manner of public hearings will require efforts to be taken from both sides, with both the proponents and opponents engaged in a healthy discussion. While observing the current manner in which public hearings are held, Mr. Malhotra stated that it is not as conducive to open dialogue between the two parties as it should be. The general purpose of public hearing is lost as most of the hearings result in long, drawn-out speeches made sometimes by the proponents and mostly by the opponents of the project. The concerns of the public ought to be generally recorded and no decision can and should be taken *during* the public hearing. Mr Malhotra refuted some of Mr. Kamble's claims, stating that public hearings are more often than not disrupted because of instigation by "professional activists". At times, such activists deliberately give misguided information to the public and instil a sense of fear and uncertainty regarding the project, especially amongst those in the vicinity of the projects, thereby fuelling the opposition. For instance, during a test of the pressure system, certain steam had to be let out, which caused an alarming sound. The "professional activists" wrongly, and with questionable intentions, instigated the people in the vicinity by stating that after the plant commences operations such noises will be a daily occurrence, whereas it was absolutely exceptional.

While discussing the need for public engagement, Mr. Malhotra mentioned the public awareness initiatives conducted by the Public Awareness Division of the DAE. Mr. Malhotra explained that he personally worked to change the name of the division from the "Publicity Division" to the "Public Awareness Division", thereby changing the underlying perception of the division and outlining the new role it was carving out for itself. As part of this new role, Mr. Malhotra elaborated upon the rural awareness programme initiated by the Public Awareness Division in the areas where projects have been proposed to be commenced, such as in Fatehabad in Haryana. Street plays are being performed to create awareness and inform the public to combat the perception of risk associated with establishing nuclear plants in the area. Moreover, it has now been made easier for one to visit any nuclear power plant

22. See *ibid*., para. 5, quoting Lafarge Umiam Mining Private Limited v. Union of India & Ors., 2011, 7 SCC 338, para. 122.
23. See G. Sundarrajan v. Union of India & Ors., Civil Appeal No. 4440 of 2013, 6 May 2013, *supra* note 8, para. 184.

so that the public can have a first-hand opportunity to see for themselves nuclear power plant operations.

Speaking in his personal capacity, rather than on behalf of the Indian government, Mr. Malhotra stated that he is not in favour of television advertisements. He stated that although the proponent may be able to book slots and broadcast their advertisements during prime time on national television, the advertisements that precede and follow cannot be controlled by the proponents. Therefore, Mr. Malhotra explained that if the public does not have faith in the claims of the advertisements close in time to the proponents' advertisement, this has the danger of spilling over to the proponents' *bona fide* claims.

Mr. Malhotra expanded upon the benefits of public engagement, stating that the public engagement efforts relating to nuclear power plants are highest in France; as a result, far more people are in favour of setting up new nuclear power plants than are opposed. Citing a study, Mr. Malhotra stated that the general population can be classified into four groups on an x-y plane denoting knowledge and participation. These groups are: low knowledge-low activity, high knowledge-low activity, low knowledge-high activity and high knowledge-high activity. Citing a multi-country survey conducted by the BBC in 2011 in the wake of the Fukushima disaster, he stated that in India the group with low knowledge-low activity is in the majority (38%). The anti-nuclear activists invariably take advantage of the limited knowledge of this group and provoke them by instilling undue fear about nuclear power. Therefore, there is a growing need to communicate to this "low-low" group.

Based on his experience, Mr. Malhotra conceded that the best way to engage the public is on a "one-on-one" basis. The proponents need to be able to empathetically address each member's concerns, to build their trust and take the time to address all of their issues. On a personal note, he added that he believes this is necessary even if it would mean taking the time "to share a meal with them at their house". Further, Mr. Malhotra elaborated upon the expectations of the Indian people that the government will improve their living conditions. Because the public equates the operator of nuclear facilities with the government, they expect that with the advent of the nuclear project, there would be better roads, water supply and electricity supply. Therefore, because there are large differences in the infrastructure available within the premises of the site and infrastructure (or the lack of infrastructure) in the vicinity of such nuclear power plants, steps must be taken to develop the infrastructure and improve the general living conditions around the project site as well. In response to a question about this, Mr. Malhotra explained that army "cantonment" areas could be used as a model. All too often, NPP construction reduces land values; however, this is not the case in cantonment areas. Developing the entire neighbouring community will go a long way and will probably address 90% of all the reluctance against the construction of nuclear power plants.

Mr. Malhotra also addressed the observations made by several participants that disaster management drills do not appear to be undertaken as regularly as required. Further, Mr. Malhotra mentioned that drills are sometimes simply not effective because local people refuse to participate. Often, opponents of the project have made them believe that if they take part in the drills and the mock evacuations that the government will not bring them back. Hence, there are many challenges to be overcome.

- R.K. Mishra, Superintendent (Environment), Uranium Corporation of India Ltd (UCIL)

Mr. Mishra added to the public perception and acceptability debate by providing insights into the experiences from the uranium mining industry. In his experience, he has found that public perception is more favourable in areas where UCIL has been present for a while, as opposed to in new locations. This extends even to

workers, with first generation workers in and around the mines generally more sceptical and tending to oppose the expansion projects. But, for second generation workers, mining is a source of livelihood, and they have a higher sense of attachment to the project, and do not perceive any risks associated with the project. Thus, their acceptance levels for expansion projects are quite high.

Mr. Mishra stated that UCIL has not been able to undertake expansion projects in newer areas due to public opposition and the failure to conduct public hearings. This issue stems in part from lack of awareness on the part of the public and also because of the difficulty encountered with scheduling hearings so that they do not conflict with public holidays. Further, after the Fukushima Daiichi nuclear power plant accident, Mr. Mishra has noted that there is an increased risk perception associated even with uranium mining. Mr. Mishra gave instances of how "professional activists" incited the public and directly compared the Fukushima Daiichi disaster with mining activities. Sometimes the risk perceptions in the villages are coloured by local myths and legends (e.g. animals being born without tails).

Mr. Mishra observed, however, that the most significant cause for public opposition is rooted in the compensation owed by the government for the acquisition of their land. Indeed, most of the public demands during hearings are not related to the environmental impact of the project; rather, the most common demands are for jobs, drinking water, electricity, medical facilities, improved infrastructure, education and training. The failure of the local government to satisfy these creates conflicts with the proponents of projects, though a proactive approach under CSR may prove to be an excellent tool to enable public acceptance.

- Ashok Chauhan, Executive Director, NPCIL

Shri Chauhan decided to respond to the day's discussions to address the public awareness efforts undertaken by NPCIL at various levels, rather than giving his prepared speech. Importantly, Mr. Chauhan reflected on how "democracy" in India functions rather well and at multiple levels, and that NPCIL engages on all these levels to address public interest concerns. More specifically, Mr. Chauhan gave an overview of the various public bodies to which NPCIL is answerable and accountable:

a) the regulatory bodies, including AERB; the various State Pollution Control Boards (SPCB); and the MoEF at the time of obtaining the prerequisite clearances;

b) the parliament; the parliamentary committees, which it informs about the safety aspects of the plant; and the public at large at the time of setting up, testing and commencement of, and during, plant operations;

c) when defending cases before the High Courts and Supreme Court, making the case for the government lawyers, i.e. the Additional Solicitor General, Advocate General, Advocate General and others;

d) during extensive cross examination by the counsel of the opposing party;

e) when answering the questions raised by the judges in court as to the clearances, safety features and cost-benefit analysis;

f) at media appearances and on news shows; and

g) at public lectures in localities, colleges and schools and any other public forum.

Because of NPCIL's efforts, it is simply incorrect to state that NPCIL fails to address public concerns, merely because some protesters remain unconvinced or are simply against the project, whatever their reasons, or even misconceptions, may be.

Shri Chauhan concluded that NPCIL, as the operator, historically always looked at its mandate towards the public in terms of creating public awareness, but it has to wake up to new demands where it is also asked to go further and arrive at public acceptance. Although NPCIL may have had less focus in this regard, it is committed to keep engaging with the public, adopting more suitable models in this regard, as it strives to reach a high level of accountability.

- Arjyadeep Roy and Piyush Singh, law students, Hidayatullah National Law University, Raipur

At the outset, Mr. Roy, who presented on behalf of his co-author Mr. Piyush Singh, concurred with Mr. Mishra's observation that the opposition to any government project most often stems from the people's concern about government compensation for the acquisition of their land. Further, Mr. Roy explained that the government ought to provide adequate and practical measures for rehabilitation and resettlement. Mr. Roy stressed that the new Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 ("Land Acquisition Act, 2013"),[24] which entered into force on 1 January 2014, has provided a welcome provision of mandatory EIAs and SIAs for any proposed project to be set up or for any public purpose. But, Mr. Roy expressed his deep concern over the exemption of 16 statutes covering large infrastructure projects, including the Atomic Energy Act, from the purview of the Land Acquisition Act, 2013, as per section 105. As a result, the true intent and purpose of the Land Acquisition Act, 2013, may not be fully achieved. Section 105(3) does, however, provide the opportunity for the government to make applicable to any of the 16 statutes the provisions relating to the determination of compensation (First Schedule) and rehabilitation and resettlement (Second and Third Schedules). Thus, it remains to be seen how the government will act in the future.

Mr. Roy also expressed concern over the quality of the EIA and the competency of the organisations engaged in conducting EIA studies. For example, Mr. Roy stated that often the quality and veracity of the reports is not sufficiently cross-checked, nor is the MoEF's review of EIA Reports relating to government projects sufficiently independent. Mr. Roy explained that an independent or external review mechanism may have to be devised in such situations to avoid a conflict of interest regarding government projects, or projects undertaken by government companies.[25] Mr. Varadarajan, Chair of Panel 1, concluded this session by stating that Mr. Roy raised some valid questions about conflict of interest, something that has been raised in the context of the current nuclear regulatory regime as well and which to a large extent is the reason behind the recent proposal to set up an independent Nuclear Safety Regulatory Authority (NSRA), although the bill has still not been adopted by parliament.[26]

24. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, *Gazette of India* No. 40, Part II (26 September 2013), available at: http://indiacode.nic.in/acts-in-pdf/302013.pdf.
25. Mr. Roy provided, as an example, the Report prepared by the Indian Institute of Technology, Delhi, on "Scope, Structure and Processes of National Environment Assessment and Monitoring Authority (NEAMA)" for the MoEF, which concluded, *inter alia*, that: "the presence of MoEF in both the appraisal and approval processes leads to a perception of conflict of interest". "Draft Report: Scope, Structure & Process on NEAMA – Vol. 1, Executive Summary", p. iii, available at: http://moef.nic.in/downloads/public-information/exec-summ-NEMA.pdf.
26. The status of the NSRA Bill, 2011, can be tracked online at the PRS Legislative Research website, available at: www.prsindia.org/billtrack/the-nuclear-safety-regulatory-authority-bill-2011-1980.

Panel Session 2: Values, attitudes and acceptability: experiences from other countries

- Chair: Dr. R.B. Grover, Homi Bhabha Chair Professor, DAE and Director, Homi Bhabha National Institute (HBNI)

Dr. Grover shared opening thoughts in introducing Panel Session 2. First, he noted that a bill has been introduced in Parliament to set up a NSRA as an independent regulator. Since elections have been announced, the bill has lapsed though there is a demand for the next government to respond to the issue improving the independence of the regulatory body.

Second, Dr. Grover stated that Mr. Kamble's observation about energy "need" versus "demand" is valid, but the issue is who decides the reference point for need. One person cannot impose his views on the other person. About a decade ago, the common wisdom was that household electricity demand in India would be less than the household demand in countries having a temperate climate, but the situation today is different. It is relevant in this context to compare India with countries with similar weather conditions (higher demand for air conditioning as opposed to the higher demand for heating in other countries, for example, such as Singapore and Malaysia). In that context, the energy shortage will be acute and must be addressed. Perhaps, gone is the lifestyle of a generation ago where all grew up in a household with just one fan in the main living-room, particularly when comparing it with the urban/middle-class demands for air conditioning units in practically every room of a house or office space. Although India's per capita energy consumption is low, it is bound to increase and this must be addressed.

Third, Dr. Grover reiterated the importance of the research breakthrough announced by Shri Bhardwaj regarding the partitioning of high-level nuclear waste to separate long-lived minor actinides that can be transmuted in a fast reactor by converting it to fuel. India is proud to move forward in this direction, but Dr. Grover also referred to similar experiences in France.

- Erwan Hinault, Chairman and Country Managing Director, AREVA India

To begin Panel Session 2, Mr. Hinault proposed to address four issues based on the experience in France: (1) the choice and support for nuclear energy, (2) the reaction since the Fukushima Daiichi accident, (3) the public engagement model and (4) HLW.

Mr. Hinault began with a history of public support for nuclear energy in France, which dates back to the oil crisis of 1973. Because of the country's severe dependence on oil in the absence of any other significant energy source, energy independence and security became viewed as of paramount importance. Further, the public realised that the price of electricity is cheap, in fact lower than any other European Union country, because of nuclear energy generated within France. Later, in the 1990s, an additional advantage of nuclear energy was the fact that it is a non-CO_2 or greenhouse gas-emitting source, which addresses the public's strongly-held climate change-related concerns. As a result, public support in France has been constant and breaks down along the following lines: (a) 50% pro-nuclear energy, (b) 40% against nuclear energy and (c) 10% without any strong opinions either way.

In the immediate aftermath of the Fukushima Daiichi accident, polls indicated that negative sentiment against nuclear energy increased up to 50%. However, French authorities went out of their way to undertake stress tests at their facilities and share the information with the public. As a result, within a year after the Fukushima Daiichi accident, polls returned to the previous breakdown.

That said, the main concerns of the French public remain: (1) safety and (2) waste management. Like India, France has a closed fuel cycle and plans are taking shape

towards the final waste disposal site. The design work on the "Cigéo" (*Centre industriel de stockage géologique*) facility started in 2011. Although Cigéo will be designed to accommodate the wastes permanently, conditions governing the reversibility of disposal will be determined by law before the repository licence is granted. This reversibility clause also seeks to strengthen public confidence because public concerns will at all times be heard. It is expected that the construction of Cigéo will commence in 2019 and be operational by 2025.

There are many other tools that have been adopted in France to strengthen public dialogue and transparency to maintain the high level of acceptance for this energy choice. For instance, on 13 June 2006, France adopted its law on nuclear transparency and safety.[27] This law also established the ASN (*Autorité de sûreté nucléaire*), an independent administrative authority tasked with regulating nuclear safety and radiation protection. The ASN informs the public and other stakeholders (e.g. local information committees, environmental protection associations) about its activities and the state of nuclear safety and radiation protection in France.

Importantly, the local information committees (or "CLIs" as they are known) also received a legal basis under the 2006 Nuclear Transparency and Safety Act,[28] though they had been in existence since the early 1980s. The CLIs are an essential link in consultation and transparency at a local level. They are crucial, because at all sites comprising one or more "basic nuclear installations" (INB), a CLI has to be set-up. It is mandatory to set up a CLI once an INB is authorised, even if the INB has not yet been commissioned. CLIs play an important role and:

- can conduct independent epidemiological studies, measurements and analysis;
- must receive from the licensee or the state all necessary information and documents;
- must be informed of any incident or accident;
- is consulted for any project relating to an INB;
- is expected to widely disseminate the results of its work in a form accessible to the greatest number of stakeholders; and
- is responsible for providing any citizen information requested.

As can be seen, CLIs are very active and play a large role in gaining public trust and acting as an effective intermediary between the various government bodies, but also between the operator and the public.

In addition, AREVA has adopted a policy of ensuring that information is shared widely through such avenues as tours of facilities, media briefings, conferences at schools, teaching at universities and engineering schools and regular meetings with mayors and local communities where AREVA sites are located. In response to a question about AREVA's global outreach policy, Mr. Hinault clarified that from a company perspective, the same approach is adopted worldwide as in France, though the mandatory requirements may differ from country to country.

27. Loi No. 2006-686 du 13 juin 2006 relative à la transparence et à la sécurité en matière nucléaire, *Journal Officiel*, No. 136 (14 June 2006), Text 2, p. 8946.
28. *Ibid.*, Article 22.

- Patrick Reyners, former Head of Legal Affairs, OECD/NEA and IAEA consultant

Mr. Reyners began his remarks by focusing on the various enabling principles and provisions contained in selected international instruments, which emphasise the importance of public consultation, engagement and access to information, all of which ultimately contribute to a higher likelihood of public acceptance of nuclear energy and also to better governance.

Starting with Principle 10 of the Rio Declaration on Environment and Development, which was adopted at the United Nations Conference on Environment and Development in June 1992, Mr. Reyners read the following important quote: "States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided".[29] The 1998 Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters ("Aarhus Convention"),[30] is the only legally binding international instrument that specifically puts Principle 10 into practice. Although it was adopted within the framework of the United Nations Economic Commission for Europe (UNECE), the Aarhus Convention is open for global accession.

The same is true for the Convention on Environmental Impact Assessment in a Transboundary Context, adopted in Espoo in 1991 ("Espoo Convention"), which sets out the obligations of parties to assess the environmental impact of certain activities at an early stage of planning.[31] It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries.[32] Nuclear power projects fall within the ambit of the Espoo Convention. The Espoo Convention has been supplemented by the 2003 Kiev Protocol on Strategic Environmental Assessment, which requires its parties to evaluate the environmental consequences of their official draft plans and programmes.[33]

Further, the 1994 Convention on Nuclear Safety (CNS), to which India is a party, requires in Article 17 on "Siting" that "Each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and

29. "Report of the UN Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992", UN Doc. A/CONF.151/26/Rev. 1, available at: www.un.org/documents/ga/conf151/aconf15126-1annex1.htm.
30. Arhus Convention (1998), 2161 UNTS 447, available at: http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-13&chapter=27&lang=en. For more on the Aarhus Convention, see United Nations Economic Commission for Europe, web page on "Public Participation", available at: www.unece.org/env/pp/welcome.html.
31. Espoo Convention (1991), 1989 UNTS 309, available at: http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-4&chapter=27&lang=en. For more on the Espoo Convention, see United Nations Economic Commission for Europe, web page on "Introduction to Espoo Convention", available at: www.unece.org/env/eia/eia.html. See also Rio Declaration Principle 17: "Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority."
32. See also Rio Declaration Principle 19: "States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith".
33. Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context, available at: www.unece.org/fileadmin/DAM/env/eia/documents/legaltexts/protocolenglish.pdf.

implemented" to undertake a multi-faceted safety evaluation of the proposed nuclear installation and for consultations with, and provision of information to, those in the vicinity of the proposed nuclear installation.[34]

The 1997 Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management ("Joint Convention"), to which India is not party, contains provisions corresponding to those in the CNS with respect to siting.[35] However, it is even more far-reaching in its treatment of EIAs. The obligations with respect to the safety of spent fuel and radioactive waste management are largely based on the principles contained in the 1995 IAEA Safety Fundamentals document "The Principles of Radioactive Waste Management". Importantly, the Joint Convention imposes obligations on contracting parties in relation to the transboundary movement of spent fuel and radioactive waste based on the concepts contained in a 1990 IAEA "Code of Practice on the International Transboundary Movement of Radioactive Waste".[36] Apart from establishing a standard practice of undertaking safety and environmental assessments even before the construction of a radioactive waste management facility or disposal facility, the Joint Convention creates a constructive framework for neighbouring country consultations when undertaking these types of activities. Although historically such agreements have been bilateral (such as between Germany-Switzerland and France-Luxembourg), the Joint Convention seeks to move this practice beyond the bilateral sphere.

There has been ample experience regarding EIAs in domestic legislation as well. For example, the Canadian Environmental Assessment Act, 2012,[37] which updated and modernised Canada's approach, placed the responsibility for conducting an EIA for nuclear projects with the Canadian Nuclear Safety Commission. Similarly, the National Environmental Policy Act (NEPA) of the United States requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.[38] To meet NEPA requirements, federal agencies prepare a detailed statement known as an Environmental Impact Statement (EIS), which the US Environmental Protection Agency (EPA) will review.[39]

The United Kingdom High Court Judgment of 15 February 2007 showed that public consultation will be taken seriously by many courts. In the judgment, Justice Sullivan agreed with Greenpeace that the review process regarding new generation of nuclear power plants in the United Kingdom did not adequately consult the public as the government had proclaimed and found the review process to be "seriously flawed" and even "manifestly inadequate" because insufficient information had been made available by the government for the consultees to make an intelligent

34. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293, available at: www.iaea.org/Publications/Documents/Infcircs/Others/inf449.shtml.
35. 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, available at: www.iaea.org/Publications/Documents/Infcircs/1997/infcirc546.pdf. For more information, see IAEA Nuclear Safety & Security, web page on the Joint Convention, available at: www-ns.iaea.org/conventions/waste-jointconvention.asp.
36. Published as INFCIRC/386 on 13 November 1990, available at: www.iaea.org/Publications/Documents/Infcircs/Others/inf386.shtml.
37. S.C. 2012, c. 19, s. 52. An overview of the Canadian Environmental Assessment Act, 2012, is available at: www.ceaa-acee.gc.ca/default.asp?lang=en&n=16254939-1.
38. National Environmental Policy Act of 1969, 42 USC 4321 et seq.
39. For additional information about NEPA compliance, see US EPA, web page on "National Environmental Policy Act (NEPA)", available at: www.epa.gov/compliance/nepa/.

response.[40] As a result, in May 2007, the government launched a major consultation exercise on the future of civil nuclear power in the United Kingdom.[41]

Mr. Reyners concluded by echoing Mr. Hinault's observations about the CLIs in France and their important and active part in the public debate about nuclear energy.

- Tyson R. Smith, Partner, Winston & Strawn LLP, United States

Mr. Smith commenced by stating that public trust, acceptance and public involvement in nuclear regulatory decisions are critical to any successful nuclear power programme. In the United States, the US Nuclear Regulatory Commission (NRC) has, over the years, evolved its mechanisms to ensure it takes up its regulatory responsibilities in an open and transparent manner. Transparency is reflected in the regulator's efforts to make the agency's positions known through various mechanisms, including the availability of records, so that a clear nexus can be established between regulatory requirements and its goals. The NRC ensures openness by providing the necessary opportunities for meaningful public input and open channels of communication, so that the reasons behind its decisions can be fully appreciated. Mr. Smith stressed that it is of prime importance that a regulator should not be seen as an "isolated regulator". The NRC engages with the various stakeholders in different manners. For instance, the NRC will make almost all documents available on its website, including, but not limited to policy papers, meeting transcripts, regulatory issue summaries, information notices, inspection manuals, inspection reports, enforcement actions and safety and environmental review documents. The NRC also makes active use of social media such as Twitter, its YouTube channel and the NRC blog to keep the public abreast of developments, meetings and other issues. Moreover, all meetings with the licensee are public, except when addressing security or safeguards related issues. All relevant notifications relating to the NRC's activities and project proposals, phases and studies are announced in the *Federal Register*, which is the daily journal of the US government.

All these efforts have clearly led to increased public confidence, as there is less scope for misinformation. In the United States, about 67% of the public tends to be in favour of nuclear energy. Interestingly, just as in the French context, about one year after the Fukushima Daiichi nuclear power plant accident, this favourable public perception was at about the same percentage. What has been noticed over the years, and which is similar to Mr. Mishra's observation in the context of uranium mining in India, is that the acceptability and support levels for nuclear energy are actually highest in the areas immediately around nuclear facilities, where the direct benefits seem to be most tangible and knowledge of nuclear power greatest, and this holds true for areas where new build projects are sited. Mr. Smith added that the regulator did extensively reach out to the public after the Fukushima Daiichi accident. For instance, the NRC held about 150 meetings in Washington, DC and areas around nuclear power plants to share information with the public. Moreover, it held about seven public meetings per month in areas where new build projects were underway. Mr. Smith did comment that these meetings are not widely attended, but it seems to

40. R. (Greenpeace Ltd) v. Secretary of State for Trade and Industry, [2007] All E.R. (D) 192 [H.C. (Admin)].
41. See Department of Energy and Climate Change, Office for Nuclear Development, "Evaluation of BERR's engagement of the public and other interested parties in the future of civil nuclear power in the UK, Final report", October 2009, available at: http://webarchive.nationalarchives.gov.uk/20121205174605/http://decc.gov.uk/assets/decc/what%20we%20do/uk%20energy%20supply/energy%20mix/nuclear/consultations/1_20091008115759_e_@@_nuclearevaluationreport.pdf.

make a difference to the public that they know that they could attend such meetings, if interested.

Mr. Smith further stated that the NRC has established a number of different methods for stakeholders and other members of the public to participate directly in its regulatory and licensing activities. In 1989, the NRC went through a major regulatory overhaul to increase regulatory efficiency by adopting three new regulatory approval approaches for new reactors: (1) standard design certifications, (2) early site permits (ESP) and (3) combined licenses (COL). Design certifications are highly technical in nature; public participation consists primarily of an opportunity to comment on the proposed rule to approve the design. However, there are a number of opportunities for public participation in the review of an ESP or COL application, especially the NEPA process. With regard to environmental issues, the NRC will conduct a public "scoping" meeting in the vicinity of the proposed project shortly after the application is filed. During the scoping meeting, members of the public can raise issues which it feels should be taken into account during the NRC's environmental review. For a typical new reactor licence application, the NRC receives between 50-100 scoping comments. Thereafter, the NRC issues a Draft Environmental Impact Statement (DEIS) for comment by the appropriate federal, state and local agencies, as well as the public. At that time, the NRC will hold another public meeting in the vicinity of the proposed plant inviting comments on the DEIS. Only afterwards will the NRC issue a Final Environmental Impact Statement (FEIS), which will address all comments submitted by the public.

The Atomic Energy Act of 1954[42] also provides a more formal hearing process for a person, or a group of people, who is "directly affected" to raise specific technical or environmental concerns emanating from the licence application for an ESP or COL. This hearing process is more "legalistic" in that it requires a higher threshold to be met as the public must present concrete evidence and testimony by experts on the issues it raises as part of this hearing process. These "contentions" raised by the "intervenors" will be evaluated by administrative law judges from the Atomic Safety and Licensing Board (ASLB). The ASLB will scrutinise whether a proposed contention is: (1) specific, (2) adequately supported and (3) material to the licensing proceedings. If so, a hearing will be held. Hence, the decision to grant a request for hearing by a member of the public permits active participation by public stakeholders in the agency decision-making process. The ASLB ultimately issues a written decision evaluating the sufficiency of the application and supporting material provided by the applicant. The ASLB's decision must be based on the evidence and testimony in the record of the proceeding. Decisions of the ASLB can be appealed to the Commission, and Commission decisions can be appealed directly to the US Courts of Appeals. Moreover, in addition to hearings on issues raised by intervenors (i.e., "contested" hearings), the Atomic Energy Act requires that a public hearing be held before a COL is issued. At this mandatory or "uncontested" hearing, the ASLB or the Commission reviews the adequacy or sufficiency of the NRC Staff's review of the application.

While reflecting on the various outreach activities undertaken by the NRC, as well as the public comment opportunities, and the more formal hearing process that can be granted to a person with the necessary standing, and taking into account the high level of public support in the US for nuclear energy, Mr. Smith concluded that there is a clear link between public involvement and public acceptance of nuclear energy. He recognised that it may not be possible to achieve universal

42. The Atomic Energy Act of 1954, as amended, 42 USC 2011 et seq., along with other key US legislation pertaining to the nuclear sector, is available at: www.nrc.gov/about-nrc/governing-laws.html#aea-1954.

understanding of regulatory decision making regarding nuclear power, much less universal acceptance of the decision itself. But, he thought that striving to help stakeholders become aware of and understand agency decisions regarding nuclear power would build public acceptance of the regulatory process and nuclear power in general.

Following his presentation, Mr. Smith was asked for his opinion about whether the United States is considering the option of reprocessing of spent fuel. Mr. Smith stated that in his view, for the foreseeable future, given the overarching economic considerations, the option of reprocessing spent fuel will not be taken up by the US government on a priority basis.

Question and Answer Session

At the conclusion of Panel 2, Ambassador Sood asked the panel why within Europe there is such a different public reaction towards nuclear energy (comparing, for example, France and Germany), given that the mere low tariffs on electricity from nuclear energy do not appear to be sufficient to convince the majority of people in Germany. In response, the panel acknowledged that France had taken a very strong and consistent position towards nuclear energy in reaction to the 1973 oil crisis after which it stressed that its energy independence as a nation was of prime importance.[43] The historical and political situation in Germany, with its coalition governments and Green Party, has been less uniform vis-à-vis nuclear energy and driven by different concerns.[44] Interestingly, France has 58 nuclear power plants, whereas Germany at the time of its phase-out decision had 17 operating reactors.

Panel Session 3: Legal framework for a safe and secure nuclear energy programme

- Chair: Mohit Abraham, Partner, PXV Law Partners

Mr. Abraham, a Partner at PXV Law Partners, chaired Panel Session 3. He stressed the importance of public participation and the difficulties faced in India pertaining to the public consultation process as prescribed under the EIA Notification, 2006.[45] Such public resistance, livelihood concerns and demands for information are observed throughout India whenever large infrastructure projects are undertaken and are therefore not unique to the nuclear energy sector in India.

Mr. Abraham further set the tone by pointing out that lack of an unambiguous legal framework may be slowing down the progress of the nuclear industry in India. He pointed out that given the divergent views about nuclear projects and principles of liability, a convergence must take place on terms that are not only acceptable but also clear to all stakeholders, as was earlier pointed out by Ambassador Sood. He further drew attention to the fact that India's Prime Minster, Shri Manmohan Singh, recently rated the signing of the nuclear deal with the US as the best moment of his 10-year term as India's Prime Minister. This clearly shows the determination of the Indian government to find an acceptable solution to the current impasse, given the diplomatic efforts that had been put into bringing India to this very stage. On the

43. Other interesting historical and cultural arguments are put forward in the article by Palfreman, J., "Why the French Like Nuclear Energy", Frontline, Public Broadcasting Service, available at: www.pbs.org/wgbh/pages/frontline/shows/reaction/readings/french.html, accessed 2 June 2014.
44. For a viewpoint on cultural and political aspects that could explain Germany's stance on nuclear energy, see, e.g. Hockenos, P. (10 May 2012), "Why Germans Are So Skeptical About Nuclear Energy", World Policy Blog, available at: www.worldpolicy.org/blog/2012/05/10/why-germans-are-so-skeptical-about-nuclear-energy.
45. Environmental Impact Assessment Notification, 2006, was published in the *Gazette of India*, Extraordinary, pt. II, sec. 3(ii) (14 September 2006) and is available at: http://envfor.nic.in/legis/eia/so1533.pdf.

other hand, Mr. Abraham pointed out that one cannot overlook the importance of finding a mechanism where citizens also feel that justice would be meted out in the event of such worse case scenarios. Recent class action law suits brought before both the courts in Japan,[46] as well as in New York,[47] highlight the need to adopt a fair approach.

- S. Harikumar, Operating Plants Safety Division, AERB

Mr. Harikumar, the introductory speaker in Panel 3, started by providing an overview of the existing legal framework and the rules and regulation that provide legal authority to the AERB to issue safety codes and standards. He pointed out that the AERB is a regulatory body consisting mainly of scientific and technical professionals. It has a well-established process for developing and issuing regulatory requirements as safety codes and standards.

Mr. Harikumar informed the audience that the safety requirements for nuclear power plants are based on the principle of defence-in-depth, by which the approach is to provide multiple levels of protection, both physical and organisational. Another key feature in the regulatory requirements is the role of operating experience, by which the safety requirements are reviewed and revised based on the experience available from the field, both nationally and internationally, on the incidents at nuclear installations and the current state of the art in the field of nuclear safety and technology.

In India, it is a key feature of the regulatory practice for nuclear power plants to undergo a periodic review every five years and a renewal of the operating licence, unlike the one-time licensing approach followed by many countries. This Periodic Safety Review (PSR) assesses plants against the current safety requirements and practices, rather than against the ones under which the plant was originally licensed. Following this approach, a number of safety upgrades have been implemented in the Indian nuclear power plants, particularly in the older facilities.

Indian nuclear power plants must also maintain emergency preparedness and response plans, including for the off-site domain, to protect people from unacceptable radiation exposure, in the unlikely event of an accident. Further, all operating nuclear power plants are required to conduct off-site emergency exercises every two years.

The Fukushima Daiichi accident was a watershed event. It has changed some of the assumptions that were governing the nuclear power plant safety requirements previously and consequently the safety expectations worldwide. The thrust earlier was on protection against events that were internal to the plant. The Fukushima Daiichi accident has shown that the external initiators can have a devastating impact on the safety of nuclear power plants and the protection against events caused by external factors needs to be assured as much as against internal events. The accident has also shown that multi-unit accidents can occur and that there should be provisions for managing such situations. Moreover there is a new expectation that even in case of a severe accident in a nuclear power plant(s), it should not cause long-term evacuation or resettlement of people from the vicinity of the plants. These changes in the safety expectations are governing the review and revision of safety requirements for nuclear power plants by most of the nuclear

46. See, e.g. Pamintuan-Lamorena, M. (13 March 2014), "Thousands More Join Lawsuit Against Nuclear Suppliers of Fukushima", *Japan Daily Press*, available at: http://japandailypress.com/thousands-more-join-lawsuit-against-nuclear-suppliers-of-fukushima-1345731/.
47. Warmerdam, E. (12 March 2014), "If Successful, Fukushima Could Wipe Out GE", Courthouse News Service, available at: www.courthousenews.com/2014/03/12/66052.htm.

safety regulators internationally. The revision of safety requirements being considered by AERB will address these new expectations.

In response to a question regarding the role the AERB in the event of a nuclear disaster, Mr. Harikumar clarified that the AERB has a very limited role to play in the event of an accident and that its role would not extend to determination of fault for the purpose of liability.

Mr. Harikumar asserted that the Indian regulatory board has the right mix of technical competence, resources and practical experience to effectively discharge its functions as the regulator. In this connection he pointed out that AERB has initiated the process for an international peer review of its regulatory process by the IAEA, which will be taken up in the near future.

- Evelyne Ameye, Of Counsel, Gomez-Acebo and Pombo Abogados SLP, Spain

Ms. Ameye started by providing a flavour of the existing international legal framework in the field of nuclear liability. She suggested that nuclear law tends to be an exception to regular tort law due to initial fears stemming from the use of nuclear weapons, as well as of catastrophic accidents. But, Ms. Ameye believes that nuclear energy law should be "demystified" and that such an exception is no longer justified 60 years after the nuclear power sector first started emerging as an industry. Producing energy in nuclear power plants is commonplace and backed by multinational (re-)insurance corporations.

A key exception provided by nuclear law to regular tort law is that only the operator can be held legally liable by victims of an accident. Thus, there can be no civil suits initiated against any other party, such as suppliers, designers, constructers, or transporters. This is called "legal channelling". She mentioned that although legal channelling is broadly accepted by the international nuclear liability conventions and most of the countries, there are some countries that have deviated from this international principle in their national interest, like India and the United States, which operate under an "economic channelling" regime. Thus, in both the United States and India, suppliers and designers of defective reactors can be held legally liable in the event of a nuclear accident, but the economic consequences of a nuclear accident still channel to the liable nuclear operator.

Ms. Ameye noted that the principle of exclusive operator liability emerged for economic reasons because US companies supplying nuclear technology and expertise to Europe's emerging nuclear businesses in the early 60s wanted to ensure that "hold harmless" clauses were inserted in their agreements, so that they would not bear any liability for their exports and would not face claims by potential victims or operators in Europe. A similar approach was later adopted by Western European companies when exporting nuclear material to Eastern European countries after the fall of the Berlin Wall in 1989: Western European manufacturers, which had just witnessed the gap in the liability regime reflected by the Chernobyl accident in 1986, required the former Soviet bloc countries to adhere to the 1963 Vienna Convention on Civil Liability for Nuclear Damage and, hence, introduce legal channelling in their domestic laws. However, Ms. Ameye is of the opinion that such a principle need not continue unless it is proved to be more beneficial for the victims of an accident. Allowing a right of recourse towards suppliers and designers still allows for a one-stop shop for the victims, who can limit their action to suing the operator. Moreover, it allows the operator to turn to more pockets and sue nuclear equipment suppliers and designers, typically huge multinational corporations with a solid financial structure, possibly also reducing his own risk of going bankrupt. For an operator, with its own limited means, it would be very important to be able to seek indemnification from such a large supplier for the money it has paid to the victims. Thus, both Indian and US law, in Ms. Ameye's view, are better-suited to protect victims in case of a nuclear accident.

Also, reflecting back on the major nuclear accidents at the Three Mile Island, Chernobyl and Fukushima Daiichi nuclear power plants, there were in each instance design-related concerns as well, or at least instances in which the suppliers failed to sufficiently train or inform the operator's staff on the usage and design of some of its equipment. Therefore, Ms. Ameye pointed out that making suppliers, including designers, subject to liability rules makes all the more sense now because the operation of the new nuclear power plant technologies – Generation III and Generation IV installations – are even more design-centred and fully rely upon a correct understanding of their complex design features.

In the context of Indian law, Ms. Ameye was of the view that the United States is perhaps bringing diplomatic pressure on India to sign the 1997 Convention on Supplementary Compensation for Nuclear Damage (CSC), while taking the benefit of the grandfather provision in the CSC. For her, this represents something of a paradox, as the United States in its nuclear trade approaches insists that other countries strictly adhere to the legal channelling principle, whereas the United States itself has not adopted such a model either domestically (its economic channelling allows a right of recourse by the operator) nor when dealing with the outside world (the United States asked for an exception to the legal channelling provisions under the CSC by means of the grandfather clause). Hence, the stalemate in which the United States and India find each other currently is not entirely logical in Ms. Ameye's view, given that both countries have in effect domestically adopted similar approaches, where at least suppliers and designers are not completely shielded from liability. They have more in common than what would meet the eye, and their respective domestic approaches in fact are a "gateway to justice" for the victims and could actually herald a new era in the nuclear legal field.

She also referred to the results of European Union-wide stakeholder consultations regarding public perceptions on the nuclear liability regimes as they currently stand and which were shared by the European Commission in a conference in Brussels in January 2014.[48] Out of 147 stakeholders, more than 50 were in favour of the idea to suppress legal channelling and enable economic channelling instead. These stakeholders were mostly citizens, whereas the more than 60 in favour of maintaining legal channelling were mainly operators, public authorities and insurers. Ms. Ameye was asked whether in her opinion there is a single-window compensation model or multiple-window compensation model emerging, especially in light of the Fukushima Daiichi accident. Ms. Ameye stated that given that harmonisation has proved to be extremely difficult at the EU level, where a possible legislative action has been pending for several years, she doubts that any single-window or "one-stop shop" could be achieved in the short run at world-wide level.

- Aishwarya Saxena, SNDT Women's University Law School, Mumbai, law student

Ms. Saxena focused her remarks on India's Civil Liability for Nuclear Damage Act (CLND Act) and opened by referring to Section 8 of the CLND Act, which mandates the operator to take out an insurance policy or other financial security to cover the amount of liability set out in the CLND Act.[49] Since no nuclear liability insurance product is currently available in India, the operator is currently left to rely on a bank guarantee, which blocks his assets and the contingent liability thereunder is

48. For further information on the stakeholder consultations, see European Commission, web page on "Nuclear energy: Public consultation", available at: http://ec.europa.eu/energy/nuclear/consultations/20130718_powerplants_en.htm.
49. Civil Liability for Nuclear Damage Act, No. 38 of 2010, 47 *Gazette of India*, pt. II, sec. 1 (New Delhi, 21 September 2010), available at: www.prsindia.org/uploads/media/Nuclear%20Rules/The%20Civil%20Liability%20for%20Nuclear%20Damage%20Act.pdf.

ultimately a charge thereon. The supplier too, though not under a legal obligation, understandably seeks to cover its risk resulting from the unusual right of recourse enforceable by the operator for which again no insurance product is available anywhere in the world.

Ms. Saxena's major concern about the reliance on bank guarantees by NPCIL is that if a bank guarantee is invoked, NCPIL will ultimately still have to repay the full amount to the bank from its own account. In that sense, Ms. Saxena argued, a bank guarantee is not truly a payment security in a situation where NCPIL does not have funds in the first place to meet its liability. Contrast this with an insurance structure whereby an operator pays premiums at regular intervals, but in the event of a nuclear incident the insurance company would pay the entire compensation amount with no further payments by the operator, NPCIL, to the insurance company.

Ms. Saxena, while referring to Sections 4(3) and 6 of the CLND Act, further clarified that operator liability is capped at INR 15 billion (Indian rupee) for each nuclear installation, not all installations combined. Section 4(3) clearly states that "where several nuclear installations of one and the same operator are involved in a nuclear incident, such operator shall, in respect of each such nuclear installation be liable to the extent of liability specified under sub-section (2) of Section 6".[50] India currently operates seven nuclear installations.[51] This means, a seven-fold multiple of INR 15 billion. Therefore, Ms. Saxena stressed that only insurance for nuclear power utilities could provide a credible payment security mechanism in case of nuclear disaster. She suggested that Indian insurance companies could consider a "floater policy"[52] to effectively insure nuclear plants. A floater policy that covers all installations seems to be a feasible option for NPCIL at this moment.

Moreover, Ms. Saxena referred to the fact that the insurance industry the world over has responded to capacity difficulties by the formation of market-wide national pools. There are now 26 such market pools, yet even with these it is still not possible to provide full insurance coverage for all nuclear operators' exposure to risk. Yet, in India, the idea of insuring nuclear power plants is comparatively new and both the nuclear and the insurance industry in India are coming to terms with its options.

Ms. Saxena then turned her attention to the lack of worldwide supplier insurance. Yet, a solution has to be found for suppliers to address their risk exposure based on the right of recourse provision embedded in Section 17(b) of the CLND Act. Therefore, she proposed an omnibus coverage to be created for the operator that also encompasses the suppliers' liability. She suggested that alternatively, the suppliers need to be organised into a single legal entity such as a "consortium of suppliers" with insurable interest to which a single umbrella policy can be issued for

50. *Ibid.*, p. 5. Indian legislation, rules and other materials relating to the nuclear sector are available at: www.nlain.org/resources.

51. This includes Kudankulam NPP in addition to Tarapur Atomic Power Station, Rajasthan Atomic Power Station, Madras Atomic Power Station, Kaiga Generation Station, Narora Atomic Power Station and Kakrapar Atomic Power Station. For details about all plants under operation, see NPCIL, web page on "All Plants", available at: http://npcil.nic.in /main/AllProjectOperationDisplay.aspx. For details about all plants under construction, see NPCIL, web page on "Plants Under Construction", available at: http://npcil.nic.in/ main/ProjectConstructionDisplay.aspx.

52. Floater means that a single sum insured can cover all the installations in a single policy and the sum insured is available for any one installation or to all at one point in case of any eventuality during the terms of the policy. However, the claim should not exceed the amount insured. A floater policy is easier to manage than an individual plan and also financially plausible. New installations can be added in the same policy as and when they are constructed.

the maximum liability of INR 15 billion. This will help narrow the undefined scope of coverage. Also it is true that not all suppliers and sub-contractors have contract values as high as INR 15 billion and therefore, taking a separate policy individually would be uneconomical. The premium paid by this consortium can be internally shared by all the members in the ratio of the value of their respective contracts. Another plausible alternative for the suppliers may be to devise a Mutual Compensation Support System based upon the Japanese Facilitation Act, 1961 as amended in 2011. This may require some out-of-the-box thinking, but is the way forward in her view.

Following her presentation, Patrick Reyners commented that he appreciated Ms. Saxena's novel ideas and suggestions, but that the idea of a consortium between suppliers, or particularly between the supplier, contractor and operator as suggested may be difficult to implement as the interests between all these parties are so divergent. Moreover, the nuclear insurers do not usually cover multiple persons' liabilities.

- Dr. P.B. Rastogi, Director (Impact Assessment and Nuclear Projects), Ministry of Environment and Forests

Dr. P.B. Rastogi started by describing the MoEF procedure for granting approval of nuclear projects, which require a mandatory EIA. Nuclear projects are appraised and evaluated by an Expert Appraisal Committee (EAC) comprised of 13 expert members. An "application" for a nuclear project is submitted by the project proponent to the MoEF. The application contains a Prefeasibility Report along with draft TOR and is placed before the EAC (Nuclear) for consideration for the award of the TOR. The EAC finalises the TOR within 30 days and communicates the decision in the next 30 days for the preparation of a draft EIA and to carry out public consultation, which has to be conducted by the concerned SPCB within 45 days. The final EIA, which incorporates the views of the public consultation, is submitted to the MoEF and is placed before the EAC again for consideration of the proposal for the grant of environmental clearance. Therefore, Dr. Rastogi observed that a minimum of 60 days is required for the award of the TOR and 105 days for the grant of environment clearance per EIA Notification, 2006.

Dr. Rastogi emphasised that every stage of the environmental approval is backed by well-documented literature and actual experience gained in implementation of other nuclear projects. For example, the MoEF stipulates several environmental safeguards that must be followed in their approval of projects. He also said that project proponents are asked to honour commitments made to the public during the consultation process thorough one of the conditions stipulated in the environment clearance letter. These conditions and safeguards are monitored by several agencies including the Regional Office of the MoEF, the Central Pollution Control Board (CPCB) and the SPCB besides the project proponent and the AERB and the DAE thereafter. Moreover, Dr. Rastogi referred to the discussion earlier in the day as part of the first panel session and reiterated that the preparation of an EIA by the accredited consultants was started by the MoEF as early as in 2009,[53] even before the directions issued by the Supreme Court.[54]

Interestingly, Dr. Rastogi pointed out that the MoEF has been very particular that as part of environmental approval, the MoEF requires that a part of the project's revenues are spent on CSR to develop the neighbourhood. As such, the MoEF has

53. MoEF (2009) Accreditation of EIA Consultants by the Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET). Office Memo no. J-11013/77/2004-IA-II (I) dated 2 December, 2009.
54. See Lafarge Umiam Mining Private Limited v. Union of India & Ors., (2011) 7 SCC 338, available at: http://indiankanoon.org/doc/1725193/.

been imposing a CSR commitment on the project proponents since 2005, well before the Companies Act, 2013 attracted visibility to the notion of CSR in India.[55] Following the presentation, Mr. Kamble asked Dr. Rastogi to elaborate upon how the MoEF ensures compliance with its conditions for approval, whether there is a compliance report for the Jaitapur project and if the MoEF has enough competent people to monitor compliance. Dr. Rastogi shared that the MoEF has a defined procedure, and therefore compliance can be checked and monitored. If the public consultation fails, the process has to start *de novo*. Further, if accredited consultants do not perform, they are removed from the roster. Lastly, Dr. Rastogi stated that there is no need to question the competence of the staff at MoEF as they are all extremely qualified in their respective technical fields.

55. The Companies Act, 2013, which replaces the Companies Act, 1956, entered into force on 1 April 2014. Its new section 135 requires that large companies (with certain net worth or net profit thresholds) must set up a CSR Committee and requires that such companies spend in every financial year at least 2% of the average net profits of the company made during the three immediately preceding financial years, in pursuit of its CSR Policy. The Companies Act, 2013 was published in the *Gazette of India*, No. 27, Pt. II (30 August 2013), p. 1, and is available at: http://indiacode.nic.in/acts-in-pdf/182013.pdf.

Case law

Germany

Federal Administrative Court confirms the judgments of the Higher Administrative Court of the Land Hesse: The shutdown of nuclear power plant Biblis blocks A and B based on a "moratorium" imposed by the Government was unlawful

As a consequence of the 2011 Fukushima nuclear accident the German Federal Government decided to phase-out the use of nuclear energy for electricity generating purposes. Relevant legislation was enacted.[1] On 15 March 2011, and thus prior to the entry into force of this legislation on 6 August 2011, the Federal Government and the Prime Ministers of the *Länder,* where nuclear power plants were being operated, agreed to shut down the seven oldest nuclear power plants. On 16 March 2011, the Federal Minister for the Environment requested the *Länder* involved to stop the operation of the nuclear power plants concerned for a period of three months (moratorium). Based on this request, the regulatory body of the *Land Hesse* on 18 March 2011, without giving the operator an opportunity to be heard, ordered a three-month suspension of the operation of the Biblis nuclear power plant block A and ordered the operator not to restart the operation of block B, which at that time was not in operation. The regulator expressed its view that the right of the operator to a prior formal hearing could be disregarded because the facts were well-known and had already been commented upon by the operator in the public media.

The operator of Biblis, RWE Public Limited Company, filed an administrative suit against the *Land Hesse* seeking a declaratory judgment that the order to shut down the plant was unlawful. The Higher Administrative Court of the *Land Hesse* in Kassel *(Verwaltungsgerichtshof – VGH)*, by judgments of 27 February 2013, granted that request and ruled that the shutdown was unlawful.[2] According to the court ruling, the decision of the regulatory body of the *Land Hesse* was unlawful regarding both its procedural and its substantive aspects.

The decision was unlawful for procedural reasons, in the court's view, because the claimant was not given an opportunity to be heard prior to the decision. It was unlawful also for substantive reasons. The administrative decision was based on Section 19, paragraph 3, of the Atomic Energy Act,[3] although the prerequisites of this provision were not met. The defendant could not explain how the continuation of the operation of the plant would constitute hazards as described in Section 19, paragraph 3 sentence 1, requiring action as specified in sentence 2 of the Act. Furthermore, the regulatory body could not simply rely on the request of the Federal

1. 13th Act to Amend the Atomic Energy Act of 31 July 2011, Bundesgesetzblatt 2011 I, p. 1704. See *Nuclear Law Bulletin*, No. 88, OECD/NEA, Paris, pp. 78-79.
2. VGH Kassel judgment of 27 February 2013 – 6 C 824/11.T, available at: http://tisrv09.kohlhammer.de/doev.de/download/Portale/Zeitschriften/Doev/Leitsaetze_Volltexte_2012/E_0822.pdf. This judgment concerned Biblis block A, the operation of which was suspended by the administrative decision. A second identical judgment of 27 February 2013 – 6 C 825/11.T – concerned the administrative decision prohibited the resumed operation block B, which was not in operation at the time.
3. An unofficial English translation of the Act is available at: www.bfs.de/de/bfs/recht/rsh/volltext/A1_Englisch/A1_08_13_AtG_0114.pdf.

Ministry for the Environment to suspend operation but had the duty to use its own discretion in the decision to order the shutdown. Finally, the regulatory body did not sufficiently balance the potential risks of a continuing operation of the nuclear power plant against the consequences of the shutdown for the operator and thus failed to give due attention to the principle of proportionality.

The court did not allow an appeal (*Revision*) against the judgments. However, it allowed an objection (*Beschwerde*) against this part of the ruling. The *Land* Hesse objected to the non-admission of the appeal at the Federal Administrative Court (*Bundesverwaltungsgericht – BVerwG*). That court rejected the objection by orders of 20 December 2013 and confirmed the judgments of the VGH Kassel.[4]

The Federal Administrative Court dealt particularly and in great detail with the significance of the fact that the operator was not heard prior to the decision of the regulatory body. It stressed that granting of the right to be heard prior to the issuance of an administrative action involving a burden on a person is an integral part of the administrative procedure. This applies also to those cases where – like in the implementation of the Atomic Energy Act – the administration of the *Land* is executed on behalf of the Federation *(Bundesauftragsverwaltung)* because the execution of decisions against the licensee remains with the *Land (Wahrnehmungskompetenz)*. As a consequence, the relevant provisions of the administrative procedure law of the *Land Hesse* have to be applied, which mandatorily require a prior hearing of the licensee. This process can neither be replaced by reference to the request for a moratorium by the Federation nor by reference to the fact that the licensee had already knowledge of the planned moratorium which would make the hearing superfluous. The court emphasized that a political decision cannot abrogate the right to be heard, which is a fundamental principle of administrative law. Even if the Federation, according to its rights under the *Bundesauftragsverwaltung*, had issued a formal directive regarding the shutdown, the *Wahrnehmungskompetenz* resting with the *Land Hesse* would carry the obligation for the *Land* to use discretion of its own in executing that directive vis-à-vis the operator.

The confirmation of the judgments of the VGH Kassel by the Federal Administrative Court now opens the door for RWE to request compensation from the *Land Hesse* for the economic loss suffered from the moratorium. According to recent press reports, RWE is preparing an action; with the damage to be claimed valued at roughly EUR 200 million.[5]

List of lawsuits in the nuclear field

On request of the Parliamentary Party *Bündnis 90/Die Grünen* the Federal Government has prepared a comprehensive list of those lawsuits in the nuclear field which are currently pending in Germany and the subject-matter of which concern nuclear installations or other nuclear activities in which the Federation or the *Länder* are engaged in. The list is published in the Parliamentary Document *Bundestags-Drucksache* 18/442 of 5 February 2014.[6]

4. BVerwG Order (Beschluss) of 20 December 2013 – 7 B 18.13 – concerning Biblis block A, accessible at: www.bverwg.de/entscheidungen/entscheidung.php?ent=201213B7B18.13.0. Biblis block B is covered by the identical Order of 20 December 2013 – 7 B 19.13.
5. See *Frankfurter Allgemeine Zeitung* No. 68 (21 March 2014), p. 4.
6. The document is accessible at: http://dip21.bundestag.de/dip21/btd/18/004/1800442.pdf.

Slovak Republic

Further developments in cases related to the challenge by Greenpeace Slovakia to the Mochovce nuclear power plant

The last issue of the *Nuclear Law Bulletin*[7] provided substantial background information on the litigation initiated by Greenpeace Slovakia with respect to the Mochovce nuclear power plant in the Slovak Republic. The case stems from the Nuclear Regulatory Authority's (NRA) administrative decision No. 246/2008 of 14 August 2008 on the approval of modifications to construction prior to the completion of the Mochovce nuclear power plant units 3 and 4 which were requested by *Slovenske elektrarne*, the builder of these two units. As a result of the Supreme Court's judgment of August 2013 that overturned a district court, the NRA was obliged to renew the administrative proceedings on Greenpeace's appeal against the decision No. 246/2008, in which the NRA had approved the construction modifications for Mochovce units 3 and 4.

The NRA had reopened the administrative proceedings and issued a first, but not a final, decision (No. 761/2013) on 21 August 2013 that, based on the article 55(2) of the Administrative Procedure Code, denied the suspensory effect of the Greenpeace appeal on NRA's 2008 decision. The NRA reasoned that the denial of such effect was warranted by an urgent public interest and with the threat of irretrievable loss on the part of a participant to the proceedings. Greenpeace submitted a protest on 18 September 2013 against decision No. 761/2013 to the Attorney General and objected to the alleged unlawfulness of the NRA's decision by which the suspensory effect was denied. The Attorney General denied the protest. On 24 October 2013, Greenpeace filed a claim in court requesting review of the lawfulness of the NRA's decision No. 761/2013 denying the suspensory effect. NRA has responded with its statement to the claim and has requested the court to hold a hearing in this case. The case remains pending.

In connection with this litigation, the licensee *Slovenske elektrarne* filed a constitutional claim on 27 September 2013 with the Slovak Constitutional Court in which it objected to the denial of its basic rights by the Supreme Court judgment in the court proceeding, because its rights were directly affected by the Supreme Court judgment without *Slovenske elektrarne* being afforded opportunity to participate and defend its interests. The Slovak Constitutional Court has not yet accepted the claim, but in the case of its acceptance, the case may influence the renewed administrative proceedings being conducted by the NRA.

Developments in relation to the disclosure of information concerning the Mochovce nuclear power plant

As also reported in the last issue of the *Nuclear Law Bulletin*, litigation has been pending that originated in Greenpeace Slovakia's demand that NRA release the text of the preliminary safety report on Mochovce units 3 and 4 in accordance with the Freedom of Information Act, as amended, Act No. 211/2000 Coll. The NRA dismissed Greenpeace's request in its decision No. 39/2010 of 1 February 2010. Although a district court initially found in favour of the NRA in a decision issued in October 2011, the Supreme Court in August 2012 reversed and remanded the case to the district court. On 19 June 2013, the district court overturned NRA decision No. 39/2010 and remanded the case to the NRA. The NRA submitted an appeal against the district court decision to the Supreme Court on 2 July 2013, which is still pending.

7. *Nuclear Law Bulletin*, No. 92, OECD/NEA, Paris, p. 89.

In the meantime, the NRA provided to the public in October and November 2013 the safety documentation for Mochovce nuclear power plant units 3 and 4, except for information designated sensitive pursuant to the article 3(14) and (15) of the 2004 Atomic Act, as amended, which was redacted. Disclosure of the safety documentation was made as part of the renewed administrative proceedings on licensing of the modifications to the construction of Mochovce units 3 and 4. Public participants allowed access to all documentation except those portions containing sensitive information.

United States

Judgment of the Nuclear Regulatory Commission resuming the licensing process for the Department of Energy's construction authorisation application for the Yucca Mountain high-level radioactive waste repository

On 13 August 2013, the US Court of Appeals for the District of Columbia Circuit issued a decision granting a writ of mandamus and directing the Nuclear Regulatory Commission (NRC) to resume the licensing process for the construction authorisation application (application) for the Department of Energy's (DOE) Yucca Mountain high-level waste repository.[8] In response to the court's direction, the NRC invited all participants to the adjudicatory proceeding on the high-level waste repository construction authorisation to "provide their views as to how the agency should continue with the licensing process." Nearly 20 participants accepted the NRC's invitation and provided their views as to how the NRC should continue with the licensing process.

After receiving and reviewing the participants' views, the NRC issued an order on 18 November 2013 setting forth an incremental course of action for resumption of the licensing process consistent with the court's decision and the resources available to the NRC.[9] This order instructed the NRC staff to complete the remaining volumes (volumes 2 through 5) of the Safety Evaluation Report (SER) for the proposed repository at Yucca Mountain. It further instructed the NRC staff to work to complete the remaining volumes concurrently but issue the volumes upon their respective completion to ensure transparency of the NRC staff's activities.

The November order also addresses the documents that were previously available on the Licensing Support Network (LSN), an electronic database that contained documents relevant to the licensing of the Yucca Mountain repository. The LSN, which was maintained by the NRC, was shut down in 2011. Before it was shut down, the participants captured the document collection available via the LSN on various external media devices and transmitted those devices to the NRC Secretary. In the November order, the NRC instructed its Secretary to load those documents into the non-public Agencywide Documents Access and Management System (ADAMS) promptly for use by the NRC staff in completing the SER.

In its November order, the NRC also requested that DOE complete the Environmental Impact Statement (EIS) supplement for consideration and potential adoption by the NRC staff. In making this request, the NRC noted that "[t]he Nuclear Waste Policy Act, Section 114(f) directs the NRC to adopt the DOE EIS to 'the extent practicable.'"

8. In re Aiken County, 725 F.3d 255 (DC Cir. 2013), rehearing en banc denied (28 October 2013).
9. US Department of Energy (High-Level Waste Repository), CLI-13-08, 78 NRC __ (18 November 2013).

Finally, the Commission declined in the November order to resume the contested adjudication. Thus, the adjudication remains suspended at this time.

The State of Nevada filed a petition for clarification in response to the November order, and five additional participants – Nye County, Nevada; the State of South Carolina, the State of Washington; Aiken County, South Carolina; and the National Association of Regulatory Utility Commissioners – filed a motion for reconsideration of the November order. The NRC issued an order on 24 January 2014, denying both the petition for clarification and the motion for reconsideration.[10]

The January order also noted that USD 2.2 million of previously obligated, unexpended Nuclear Waste Fund appropriations are now de-obligated, and thus the NRC staff would be provided further instruction on the use of those funds to make the LSN collection publicly available in ADAMS. However, in a parallel Staff Requirements Memorandum, the Commission emphasised that completion and issuance of the supplemental EIS and SER remained the Commission's highest priority. Thus, the NRC staff was directed to allocate the recently de-obligated funds only after the staff has collected three months of additional data on actual project expenditures. The Commission noted that if actual costs run consistent with estimates in the initial months, the staff should notify the Commission and should allocate an appropriate portion of the recently de-obligated funds to the activities necessary to make LSN documents available in public ADAMS.

By letter dated 28 February 2014, DOE declined the NRC's request to complete the EIS supplement. Instead, DOE committed to providing "the NRC an updated version of the report it provided to the NRC on 30 July 2009, entitled *Analysis of Postclosure Groundwater Impacts for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*." According to DOE, this updated report will provide the NRC with the information necessary for the NRC to complete the EIS supplement in lieu of DOE completing it.

Judgment of the Licensing Board in favour of Shaw AREVA MOX Services regarding the material control and accounting system at the proposed MOX Facility

In furtherance of a US treaty with Russia to reduce both countries' nuclear weapons, the United States Department of Energy (DOE) plans to use the Mixed Oxide Fuel Fabrication Facility ("MOX Facility") currently under construction at the DOE's Savannah River Site to extract plutonium from nuclear weapons and convert it to mixed oxide (MOX) fuel, which can be used as fuel in civilian nuclear power reactors.[11]

The NRC issued a Construction Authorization for the MOX Facility in 2005. In 2006, Shaw AREVA MOX Services ("Applicant") filed a License Application with the NRC for possession and use of strategic special nuclear material (SSNM), byproduct and source material at the MOX Facility. Included in the application was the Applicant's Fundamental Nuclear Material Control Plan (FNMCP).

This proceeding arose out of Nuclear Watch South, Blue Ridge Environmental Defense League and Nuclear Information and Resource Service's (together, "Intervenors") challenges to the FNMCP. The Intervenors raised three challenges to the ability of the Applicant's proposed automated material control and accounting (MC&A) system, which is described in its FNMCP, to satisfy certain NRC requirements for the control and accounting of special nuclear material. In

10. US Department of Energy (High-Level Waste Repository), CLI-14-01, 79 NRC __ (24 January 2014).
11. Shaw AREVA MOX Services, LLC (Mixed Oxide Fuel Fabrication Facility Possession and Use License), LBP-14-01, 79 NRC __ (27 Feb. 2014 as redacted per Order of 21 May 2014).

particular, the Intervenors challenged the Applicant's ability to comply with 10 CFR 74.55(b)(1), which requires licensees to "verify on a statistical sampling basis, the presence and integrity of SSNM items" with "at least 99 percent power of detecting item losses that total five kilograms or more, plant-wide". A second contention challenged the Applicant's ability to comply with 10 CFR 74.57(b), which requires licensees to "resolve the nature and cause of any MC&A alarm within approved time periods". And a third contention challenged the Applicant's ability to comply with 10 CFR 74.57(e), which requires licensees to "provide an ability to rapidly assess the validity of alleged thefts".

After conducting two evidentiary hearings, the Atomic Safety and Licensing Board issued its Initial Decision on 27 February 2014. The Board held that the proposed automated MC&A system complies with 10 CFR 74.55(b)(1). According to the Board, a daily comparison of the information stored in two computer systems, the Manufacturing and Management Information System (MMIS), which generates the Perpetual Inventory Report, and the Programmable Logic Controllers (PLC), which control item movements locally, as supported by various accuracy-related programmes and the verification procedure, provides reasonable assurance that it can verify the presence of all SSNM items in storage within the 30- and 60-day timeframes required by 10 CFR 74.55(b)(1). The Board further found that the Applicant can verify the integrity of all SSNM items in storage within the required timeframes by confirming that the physical boundaries of SSNM storage locations, which would be sealed and designed to be tamper-safe or equivalent, have not been breached.

The Board further found that the Applicant provides reasonable assurance that it can normally resolve an alarm within three days, as proposed in the FNMCP, satisfying 10 CFR 74.57(b), which does not require any particular timeframe but only that a time period be approved by the NRC staff. Additionally, the Licensing Board found that:

> [u]sing its MMIS and PLC mapping, [the] Applicant has the capability to locate one SSNM item in eight hours, and all SSNM items in vault storage in 72 hours. Therefore, [the] Applicant provides reasonable assurance of its ability to rapidly assess the validity of an alleged theft, satisfying the requirements of 10 CFR 74.57(e) and Applicant's commitments in the FNMCP.

In sum, the Board resolved each of the outstanding contentions in favour of the Applicant, paving the way for approval of the use of an automated MC&A system.

The Intervenors appealed the Board's Initial Decision to the five-member Commission. The outcome of this appeal is currently pending.

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[12]

Plaintiffs in this lawsuit are members of the US military who allege that they were injured by exposure to radiation when they were deployed on US military vessels near the Fukushima Daiichi nuclear power plant after the March 2011 accident. The plaintiffs claimed that TEPCO conspired with the Japanese government to create the impression that radiation emitted from the plant was at levels that would not cause a threat to human health and safety and TEPCO failed to notify the US Navy and the public of the actual danger. The plaintiffs filed suit on the basis of several common law claims of negligence, fraud, strict liability,

12. Cooper v. Tokyo Electric Power Co., Case No. 12CV3032-JLS-WMC (Southern District of California, 26 November 2013).

nuisance, and intentional infliction of emotional distress. The plaintiffs seek compensatory damages, including the establishment of a USD 1 billion medical monitoring fund, punitive damages and attorneys' fees.

TEPCO moved to dismiss the suit on jurisdictional and substantive grounds. The court granted TEPCO's motion to dismiss on jurisdictional grounds only, but without prejudice to the plaintiffs filing an amended complaint. In granting the motion, the court ruled that the complaint as originally filed with the court was barred as non-justiciable under the political question doctrine. The doctrine excludes from judicial review controversies which revolve around policy choices committed to the executive or legislative branches under the US Constitution. The court agreed with TEPCO that the plaintiffs' claims would require the court to delve into the basis for discretionary judgements made by military commanders and into veracity of the Japanese government's communications with the US government regarding the accident at the Fukushima Daiichi plant. On the latter point, the court noted that it would be required to pass judgment on a foreign government's communications in a manner that would interfere with the Executive Branch's conduct of diplomacy and foreign relations.

The court allowed the plaintiffs additional time to file an amended complaint, which they did on 6 February 2014.

National legislative and regulatory activities

Belarus

International co-operation

Bilateral agreements for co-operation signed in 2013

Several agreements for co-operation were signed by the Government of the Republic of Belarus with the Russian Federation in 2013, as well as between state authorities. The first and most important Agreement on co-operation in the field of nuclear safety (signed in Minsk, 1 February 2013), came into force on 4 July 2013. The other agreements signed were: an Intergovernmental Agreement on early notification of a nuclear accident and radiation safety co-operation (in Moscow, 13 December 2013) and an Agreement on co-operation in the field of nuclear and radiation safety supervision in the peaceful uses of nuclear energy between the Ministry for Emergency Situations of the Republic of Belarus and the Federal Environmental, Industrial and Nuclear Supervision Service (*Rostechnadzor*) of the Russian Federation (in Minsk, 20 December 2013).

Further, on 14 September 2013, an Agreement came into force between the Government of the Republic of Belarus and the Government of the Republic of Armenia (signed in Erevan, 13 May 2013) on the exchange of information and co-operation in the field of nuclear safety and radiation protection. An Agreement on co-operation between the Ministry for Emergency Situations of the Republic of Belarus and the State Nuclear Regulatory Inspectorate of the Ukraine was also concluded in Kiev on 5 September 2013.

Organisation and structure

Amendments to acts about regulatory infrastructure

The President of the Republic of Belarus approved Decree No. 510, "On Improvement of Inspection (Supervision) Activities in the Republic of Belarus", on 16 October 2009. This document contains the list of indicators for inspections, as well as the list of penalties to the inspection authorities and administrative procedures in cases of improper or unlawful conduct during inspections. According to Presidential Decree No. 332, "On Certain Measures for Improvement of Inspection (Supervision) Activities in the Republic of Belarus", signed 26 July 2012, however, supervision of nuclear and radiation safety during construction of the first Belarussian nuclear power plant are not regulated by Decree No. 510. Instead, the basis for the supervision over observance of applicable requirements related to nuclear and radiation safety is derived from the scope of the requirements and limitations of the general order on inspection activities.

State supervision of nuclear and radiation safety is carried out by the Gosatomnadzor (the Department for Nuclear and Radiation Safety) through scheduled and unscheduled inspections at each stage of engineering, siting, construction, manufacture, commissioning, operation and decommissioning of nuclear facilities. Presidential Decree No. 565, signed on 12 November 2007, established Gosatomnadzor as a separate sub-division of the Ministry for Emergency Situations with the functions of state oversight and monitoring of compliance in the field of nuclear safety and radiation protection. According to a Presidential decision,

since 1 July 2013, the staff of the Gosatomnadzor has increased from 43 to 82 persons with the creation of a unit at the nuclear power plant site. Another sub-division of the Ministry for Emergency Situations, Gospromnadzor, was separately created in 2007 also. Gospromnadzor is responsible for the state supervision of industrial safety (including nuclear power plants) and safety of dangerous goods transportation.

The methods of inspection are determined by the Ministry for Emergency Situations. The periodicity of inspections for high risk categories (activities in the field of atomic energy and radiation source management, radioactive waste management, design and production of technological equipment and radiation protection techniques, expert activities under an appropriate licence) is not more often than once a year. The next inspection may be designated not earlier than two years later if the result of the current inspection does not reveal violations of safety requirements.

On 30 December 2011, the Council of Ministers of the Republic of Belarus issued Resolution No. 1791, "On creation of a working group to coordinate the implementation of State inspection (surveillance) over the construction of a nuclear power plant". This resolution created the Inter-Departmental Commission to co-ordinate the supervision of the construction of the Belarusian nuclear power plant, to be headed by the First Deputy Minister for Emergency Situations. The main tasks of the working group are to co-ordinate the interaction of inspection bodies during the organisation and implementation of state inspection over the construction of the nuclear power plant and consideration of problems during the inspection. In Belarus, the types of inspection (surveillance) required during the construction of the nuclear power plant are exercised by different state authorities, so the creation of an interagency working group ensures a more effective and co-ordinated organisation of state inspection (surveillance).

Licensing and regulatory infrastructure

Presidential decision on construction of nuclear power plant

The President of the Republic of Belarus approved Decree No. 499 "On the construction of the Belarusian nuclear power plant" on 2 November 2013. According to the Law "On the Use of Atomic Energy",[1] this document is the final decision authorising nuclear power plant construction. The Belarussian nuclear power plant is to be located in the Grodno Region. The plant's construction was authorised in accordance with project documentation with due regard for the results of the environmental impact assessment, which included the results of consultations with stakeholders and the state ecology expertise within the Ministry of Natural Resources and Environmental Protection.

Nuclear safety and radiological protection

Development of organisational and technical regulations for nuclear safety

Additional national regulations have been approved since 2011, in particular related to physical protection for nuclear facilities, requirements for quality assurance programmes and general arrangements for technical support organisations of the regulatory body, as the Technical Codes of Practice (TCP):

- TCP 356-2011 "System of physical protection of nuclear materials and facilities. Instruction on organization of design";

1. Law No. 426-Z (30 July 2008), unofficial translation reprinted in *Nuclear Law Bulletin*, No. 82, OECD/NEA, Paris, p. 135.

- TCP 357-2011 “Main rules on safety and physical protection for nuclear materials transportation”;
- TCP 358-2011 “System of physical protection of nuclear materials and facilities. Design requirements”;
- TCP 359-2011 “Requirements to the quality programme for systems of physical protection of nuclear facilities”;
- TCP 360-2011 “General requirements to the systems of physical protection of nuclear facilities”;
- TCP 361-2011 “The procedure for determining the level of physical protection of nuclear facilities”;
- TCP 389-2012 “Rules on physical protection of ionizing radiation sources”;
- TCP 426-2012 “Rules on physical protection of nuclear facilities and nuclear materials in their use and storage”;
- TCP 476-2013 “Quality assurance programme for investigation nuclear facilities. Rules of structure, design and content”;
- TCP 501-2013 "Rules and order of preparation for safety analysis report of nuclear materials storage facilities";
- TCP 503-2013 "Rules of siting for storage facilities of nuclear materials and radioactive substances";
- TCP 502-2013 "Organizing of technical support for regulatory body. General requirements";
- TCP 505-2013 "Order of interaction in physical protection systems of nuclear facilities".

Development of sanitary regulations for radiation safety

The Ministry for Public Health of Republic of Belarus approved and enacted the sanitary standards, rules and hygienic standards entitled “Hygienic requirements for engineering and operation of nuclear power plants”, which were approved by Resolution No. 39 of 31 March 2010. This document establishes hygienic requirements for radiological safety of the personnel, the population and environment during siting, engineering, construction, commissioning and nuclear power plant operation with VVER reactors.

Sanitary standards and rules “Requirements for Radiation Safety”, the Hygienic Standard “Criteria of an assessment of radiation influence”, were adopted by Resolution No. 213 of the Ministry of Health dated 28 December 2012. This document defines the requirements for radiation safety in different types of ionising radiation, establishes quantitative and qualitative values of human exposure to ionising radiation of artificial or natural origin in different exposure situations, and harmonises requirements in accordance with IAEA General Safety Requirement, “Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards – Interim Edition General Safety Requirements Part 3”.

Sanitary standards and rules 2.6.1.8-8-2002 “Main Sanitary Rules for Radiation Safety (OSP-2002)” were cancelled as of 1 March 2014. The Ministry of Health approved the new sanitary standards and rules “Requirements to Radiation Safety of personnel and population in the use of atomic energy and radiation sources management” by Resolution No. 137 of 31 December 2013.

France

Nuclear safety and radiological protection

Decree of 27 November 2013 on companies working within sites undertaking nuclear activities and temporary employment agencies affected by these activities[2]

Article R. 4451-122 of the Labour Code states that companies carrying out maintenance work, repair work or using equipment emitting ionising radiation may only carry out activities shown on a list stipulated by decree if they have first obtained a qualification certificate justifying their ability to perform work involving ionising radiation. Pursuant to these provisions, the Decree of 27 November 2013 defines the activities or categories of activities for which such certificates are required. The activities or categories of activities covered by this obligation include any maintenance or repair work or work using equipment emitting ionising radiation, including in specially regulated or prohibited areas.

These certificates are required for these activities or categories of activities if they are carried out within the boundaries of a basic nuclear installation or in an individual installation included within the boundaries of a secret basic nuclear installation.

The decree also defines the list of companies subject to this certification requirement if they are involved in the above-mentioned activities, irrespective of their position in the subcontracting chain, i.e.:

- external companies;
- companies carrying out earthworks, construction, installation, demolition, maintenance, repair or cleaning work, or any associated operations and all other work affecting buildings; and
- temporary employment agencies providing workers to perform the relevant activities.

Finally, this decree defines the scope of the certificate, methods and conditions for certifying companies which are subject to the certification requirement and methods and conditions for accrediting organisations responsible for certification. The activities in question may only be performed by a company holding the certificate by 1 July 2015 at the latest.

Decree of 6 December 2013 on procedures for training competent radiological protection officers and certifying training organisations[3]

This decree, issued on the favourable advice of the *Autorité de sûreté nucléaire* (French Nuclear Safety Authority) (ASN), specifically reviews all training measures for competent radiological protection officers (PCR in French) established by the Decree of 26 October 2005 on procedures for training competent radiological protection officers and certifying trainers. From now on the training objectives for competent radiological protection officers will be proportionate to the nature and scope of the radiological hazards in question. Training covers three levels based on the sources of ionising radiation and is provided over a period ranging from 21 hours for Level 1 (scenarios with low radiological risks) up to 90 hours for Level 3 (scenarios with high radiological risks).

2. Journal Officiel Lois et Decrets (Official Journal of Laws and Decrees) No. 288, (12 December 2013), Text No. 20, p. 20233 (hereafter JO).
3. JO No. 298 (24 December 2013), Text No. 53, p. 21227.

This decree came into force on 1 July 2014.

National Emergency Response Plan: Major nuclear or radiological accident. No. 200 /SGDSN/PSE/PSN. (February 2014 edition)[4]

Following the Fukushima disaster on 11 March 2011, the government decided to draw up a national emergency response plan to set down the responses to all kinds of emergency situations. This National Emergency Response Plan for dealing with a major nuclear or radiological accident is in addition to existing mechanisms to address nuclear accidents. The aim of this plan is to provide a non-regulatory tool covering a variety of exceptional circumstances, and also to assist the various parties involved in managing the emergency in the decision-making process. This plan is not in any way binding.

There are two parts to this national emergency response plan, which was drawn up in consultation with all stakeholders, public authorities and licensees (operators):

- The first part defines the situations under consideration, how the response will be organised and the emergency management strategy. It specifies the responsibilities of the various stakeholders.
- The second part is a decision-making guide for those in charge.

This new plan was tested during a large-scale exercise simulating an accident in a nuclear power plant. Feedback from the exercise demonstrated the plan's usefulness and provided an opportunity to publicise the plan.

Radioactive waste management

Decree No. 2013-1304 of 27 December 2013 in accordance with Article L. 542-1-2 of the Environment Code and establishing the specifications of the National Radioactive Materials and Waste Management Plan[5]

In accordance with Article L. 542-1-2 of the Environment Code, this decree, issued on the favourable advice of the ASN, defines the specifications of the National Radioactive Materials and Waste Management Plan (PNGMDR) for the period 2013-2015. This decree covers aspects of the new edition of the PNGMDR, as presented by the Ministry of Ecology, Energy and Sustainable Development and the ASN in April 2013 (see *Nuclear Law Bulletin* No. 92, Vol. 2013/2).

2013 Amended Finance Act, Law No. 2013-1279 of 29 December 2013[6]

The 2013 Amended Finance Act (Article 58 I) establishes a special contribution in favour of the *Agence nationale pour la gestion des déchets radioactifs* (Andra) (National Radioactive Waste Management Agency) payable up to the date of the construction permit for the deep geological repository (CIGEO) and no later than 31 December 2021. This contribution is payable by licensees (operators) of basic nuclear installations from construction of the installation until it is decommissioned. This new contribution will be collected by the ASN.

4. Issued by the Secretariat General for Defence and National Security, available at: www.sgdsn.gouv.fr/.
5. JO No. 304 (31 December 2013), Text No. 54, p. 22347.
6. JO No. 303 (30 December 2013), Text No. 2, p. 21910.

Environmental protection

Decree No. 2014-220 of 25 February 2014 on the greenhouse gas emission quota exchange system (2013-2020) and extension of this system to equipment and facilities in certain basic nuclear installations[7]

This decree defines the rules for the greenhouse gas emission quota exchange system as they apply to equipment and facilities in basic nuclear installations, as provided in the first sub-paragraph of Article L. 593-3 of the Environment Code, notably those required to operate a basic nuclear installation and located within the boundaries of said installation. In particular, it adapts the corresponding provisions of the Environment Code with regard to the scope of application, allocation and issuing of quotas or information in the event of proposed or effective changes, and defines the responsibilities of the ASN where applicable.

Liability and compensation

Act No. 2014-308 of 7 March 2014 authorising the approval of the Joint Protocol relating to the application of the Vienna Convention and the Paris Convention[8]

The principles of the international civil liability regime for nuclear damage are embodied:

- in the Paris Convention on Third Party Liability in the Field of Nuclear Energy adopted on 29 July 1960 under the aegis of the Organisation for Economic Co-operation and Development (OECD); and
- in the Vienna Convention on Civil Liability in the event of a nuclear accident, adopted on 21 May 1963, under the auspices of the International Atomic Energy Agency.

The Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention is intended to establish a link between the two above-mentioned conventions by extending the regime of civil liability for nuclear damage to all countries which have signed either of the conventions and the Joint Protocol. This also ensures that just one of these conventions will apply in the event of a given nuclear accident.

The Act of 7 March 2014 authorises the approval of the Joint Protocol which was signed by France on 21 June 1989. With the deposit of its instrument of ratification on 30 April 2014, France became a party to the Joint Protocol.

International co-operation

Decree No. 2014-140 of 17 February 2014 publishing the protocol amending the convention between the Government of the Republic of France and the Swiss Federal Council on extension of the site of the European Organisation for Nuclear Research into French territory as concluded on 13 September 1965 (with one annexe), signed in Geneva on 18 October 2010[9]

In relation to the law applicable to the site of the European Organisation for Nuclear Research, the principle of territoriality has been retained by the Convention in respect of the Extension into French Territory of the Site of the European Organisation for Nuclear Research, signed in Geneva on 18 October 2010 (referred to below as "the Convention").

7. JO No. 48 (26 February 2014), Text No. 26, p. 3479.
8. JO No. 58 (9 March 2014), Text No. 4, p. 5024.
9. JO No. 43 (20 February 2014), Text No. 1, p. 2889.

Applying this principle brought to light problems relating to the day-to-day management of the European Organisation for Nuclear Research's (the Organisation) activities, making it necessary to define more operations-based regulations for the activities of companies working on the Organisation's site in connection with the provision of services of a transnational nature.

A protocol amending the Convention was thus signed on 18 October 2010 to define the means of applying the principle which states that the law applicable to companies providing such services on the Organisation's site must henceforth be determined on the basis of the location, either on the French or Swiss part of the Organisation's site, of the anticipated majority of the services to be provided.

The Decree of 17 February 2014 publishes this amending protocol.

Decree No. 2014-141 of 17 February 2014 publishing the agreement between the Government of the Republic of France, the Swiss Federal Council and the European Organisation for Nuclear Research on the law applicable to companies working on the organisation's site with a view to carrying out services of a transnational nature, signed in Geneva on 18 October 2010[10]

The purpose of this decree is to publish the co-operation agreement signed between the Republic of France and the Swiss Federal Council in Geneva on 18 October 2010 on the law applicable to companies working within the European Organisation for Nuclear Research. This Agreement applies to service contracts of a transnational nature concluded by the Organisation with calls for tenders issued after 18 January 2014 (the date on which the Agreement came into force).

Hungary

General legislation

In 2013, the Hungarian Parliament passed legislation, Act CI, which amended Act CXVI of 1996 on Atomic Energy.

Radioactive waste management

Transposition of European Council Directive 2011/70/Euratom

On 19 July 2011, the European Council adopted Directive 2011/70/Euratom on "Radioactive waste and spent fuel management",[11] which asks member states to present national programmes, indicating when, where and how they will construct and manage final repositories guaranteeing the highest safety standards. In accordance with the Directive's requirement that member states bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 23 August 2013, the Hungarian Parliament passed legislation in 2013, Act CI, which transposed this Directive by amending Act CXVI of 1996 on Atomic Energy. Hungary's Act CI established a community framework for the responsible and safe management of spent fuel and radioactive waste.

In conformance with Council Directive 2011/70/Euratom, Act CI does the following:

- Article 3 – Definitions – the definitions of the following terms were modified: interim storage, spent fuel management, radioactive waste management, reprocessing and final disposal. The definition of spent fuel was modified to clearly express that it is a different category from radioactive waste. Further,

10. JO No. 43 (20 February 2014), Text No. 2, p. 2891.
11. *Official Journal of the European Union* (OJ) L 199, 2.8.2011, p. 48.

the definition for nuclear facility was completed with a new element added for "nuclear fuel examination laboratory".

- Article 4 – Basic principles – the ultimate responsibility for the management of spent fuel and radioactive waste generated in Hungary and for the safe and responsible disposal of spent fuel or radioactive waste shipped for processing or reprocessing to a European Union member state or a third country rests with Hungary. Radioactive waste shall be disposed of in Hungary insofar as it was generated in Hungary, unless at the time of shipment there exists an agreement of legal force between the member state concerned and another member state or a third country to use a disposal facility in one of them. Prior to shipment to a third country, Hungary through the Hungarian Atomic Energy Authority (HAEA) shall inform the European Commission of the content of any such agreement and take reasonable measures to be assured that: the country of delivery has concluded an agreement with the European Community covering spent fuel and radioactive waste management or is a party to the Joint Convention, the country of delivery has radioactive waste management and disposal programs with objectives representing high levels of safety, the disposal facility in the country of delivery is authorized for the radioactive waste to be shipped, is operating prior to the shipment, and is managed in accordance with the requirements set down in the radioactive waste management and disposal program of that country of delivery.

- Article 4 – National policy – the national policy on spent fuel and radioactive waste management will be proposed by the Public Limited Company for Radioactive Waste Management (PURAM), elaborated by the Minister, and adopted by the Parliament. This will occur by 31 October 2014. In accordance with the general principles outlined in Directive 2011/70, the national policies specified in Act CI are based upon these principles:

  the generation of radioactive waste shall be kept to the minimum which is reasonably practicable, both in terms of activity and volume, by means of appropriate design measures and of operating and decommissioning practices, including the recycling and reuse of materials;

  the interdependencies between all steps in spent fuel and radioactive waste generation and management shall be taken into account;

  spent fuel and radioactive waste shall be safely managed, including in the long term with passive safety features;

  implementation of measures shall follow a graded approach;

  the costs for the management of spent fuel and radioactive waste shall be borne by those who generated those materials;

  an evidence-based and documented decision-making process shall be applied with regard to all stages of the management of spent fuel and radioactive waste.

- Articles 5, 6, 7 and 8 – National framework, regulatory body and licence holder – the functional separation for the competent regulatory authority is specified, making clear that it is independent of any other body or organization concerned with the promotion or utilisation of nuclear energy or radioactive material.

- Article 12 – National programme – the national programme will be proposed by PURAM, elaborated by the Minister, and adopted by the Government. This

will occur by 31 March 2015. In accordance with Article 11 of Directive 2011/70, PURAM will be responsible for reviewing and updating the National Programme.

New responsibilities for the HAEA

New competences were added to HAEA's work. For example, it is now required that the nuclear safety licensing requirements for the siting of nuclear facilities extend to the examination, assessment and also determination of parameters and appropriateness of the site. Also, HAEA will now be responsible for:

- designation and re-examination of the exclusion zone for the radioactive waste disposal and interim storage facility;
- licensing and inspection of site selection, construction, operation, modification and putting out of operation of the radioactive waste disposal and interim storage facility; and
- estimation and re-examination of the design basis threat and in various applications of atomic energy licensing and inspection of the physical protection system on the basis of the physical protection plan.

Central Nuclear Financial Fund

The Central Nuclear Financial Fund (CNFF) was established to finance the construction and operation of radioactive waste disposal facilities and of spent nuclear fuel storage and disposal facilities, and to finance the decommissioning (dismantling) of nuclear facilities. Annual payments are made into the CNFF from nuclear power plants, though indirectly from the users of atomic energy. As originally implemented in the Atomic Act of 1996, the HAEA was the technical administrator of the CNFF, while the minister supervising the HAEA made disbursements from the Fund. Act CI, however, transferred the management of the CNFF from HAEA to the Ministry of National Development. It also adjusted the payment contribution system.

Nuclear security

Drug and alcohol policy

In compliance with Act CXVI, MVM Paks Nuclear Power Plant (the licensee) has in place a policy regarding drugs and alcohol. Under this policy, the licensee has implemented a programme for an alcohol and drug free workplace and has designed and implemented a detailed procedure for checking compliance with the alcohol- and drug-free condition. The key components of the policy are:

- alcohol checks (random selection, targeted checking and self-checking, among others);
- checking the drug-free condition of the staff (pre-employment medical fitness test, inspections, management request, suspicion and random selection, among others); and
- alcohol and drug abuse prevention programme.

Ireland

Nuclear safety and radiological protection (including emergency planning)

Radiological Protection Act 1991 (Responsibility and Safe Management of Radioactive Waste) Order 2013[12]

The above order was adopted as Statutory Instrument No. 320 of 2013. The order transposes Ireland's obligations in relation to Directive 2011/70/EURATOM.[13] The objective of the directive is to cover all aspects of radioactive waste and spent fuel management, from generation through long-term disposal. The directive stipulates the prime responsibility of generators and the ultimate responsibility of each member state for the management of waste generated on its territory by ensuring that appropriate national arrangements are taken to guarantee a high level of safety to protect workers and the general public against the risks arising from ionising radiation. The directive also formally establishes the responsibility of each member state for the management of its radioactive waste and regulates export conditions for the disposal of the waste.

The Radiological Protection Institute of Ireland has been deemed the competent authority for the purpose of implementation of the above matters.

Lithuania

Licensing and regulatory infrastructure

New requirements for management of construction of nuclear facilities

New Nuclear Safety Requirements BSR-1.4.2-2014 "Management of Construction of Nuclear Facility" were approved by the Head of the State Nuclear Power Safety Inspectorate (VATESI) in Order No. 22.3-22, 29 January 2014.[14] The order establishes requirements for the licence holder's quality management system for construction of safety-related structures, systems and components of nuclear facilities during the phases of construction, operation, and decommissioning of nuclear facilities and for surveillance of closed radioactive waste repositories. The requirements will come into force on 1 May 2014.

Moldova

Nuclear safety and radiological protection

In January 2014, the Republic of Moldova adopted revisions to 2008 regulations related to registration of authorised individuals and legal entities with the National registry with respect to sources of ionising radiation.[15] The regulations were revised

12. Notice was published in the official Irish state gazette, *Iris Oifigiúil* No. 69, p. 1043 (27 August 2013).
13. 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, 2.8.2011, p.48.
14. The document is available at: www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=465237&p_tr2=2 (in Lithuanian only).
15. Government Decision No. 1017, published in *Monitorul Oficial* (Official Monitor) No. 169-170, article no. 1025 (9 September 2008), as modified by Government Decision No. 54 of 24 January 2014, published in Official Monitor No.24-26, article 64 (31 January 2014).

in the light of the new Law on Safe Deployment of Nuclear and Radiological Activities adopted in 2012.[16]

Portugal

Radioactive waste management

New rules for management of spent fuel and radioactive waste

In November 2013, the Portuguese Government adopted Decree-Law No. 156/2013, of 5 November, which establishes the legal framework for the responsible and safe management of spent fuel and radioactive waste and transposes Directive 2011/70/Euratom of 19 July 2011.[17]

This law centralises competencies in the recently created Regulatory Commission for the Safety of Nuclear Facilities (*Comissão Reguladora para a Segurança das Instalações Nucleares* – COMRSIN). However, given COMRSIN's lack of staff and own facilities, the Higher Institute of Technology (*Instituto Superior Técnico*), a branch of the University of Lisbon (*Universidade de Lisboa*), successor to the Nuclear Technological Institute, will continue to be responsible for the retrieval, storage and elimination of radioactive waste in Portuguese territory.

The new law also revoked Decree-Law No. 311/98, as amended by Decree-Law No. 139/2005, thereby eliminating the Independent Commission for Radiological Protection and Nuclear Safety.

Nuclear safety and radiological protection

New rules for the licensing of private health units using ionising radiation

In February 2014, the Portuguese Government adopted Ministerial Orders No. 33/2014, 34/2014 and 35/2014, of 12 February.[18] These ministerial orders set out the minimum requirements for the licensing and operation of private health units in the fields of nuclear medicine, radiotherapy and radiology.

As a consequence of the adoption of these Ministerial Orders, the licensing and functioning of these health units will no longer be governed by Decree-Law no. 492/99, of 17 November 1999. While still subject to Decree-Law no. 180/2002, of 8 August (which applies to both public and private sector), these private clinics and hospitals shall now be subject to Decree-Law no. 279/2009, of 6 October, as amended by Decree-Law no. 164/2013, of 6 December, and as implemented by the above mentioned ministerial orders.

16. Law No. 132 of 8 June 2012, published in Official Monitor No. 229-233, article no. 739 (2 November 2012).
17. *Decreto-Lei no. 156/2013, de 5 de novembro, que estabelece o quadro legal e regulador para a gestão responsável e segura do combustível irradiado e dos resíduos radioativos e transpõe a Diretiva n.º 2011/70/EURATOM, do Conselho, de 19 de julho de 2011*, Diário da República (DR) I no. 214, 5.11.2013, p. 6373 (Official Journal).
18. *Portarias no. 33/2014, 34/2014 e 35/2014, de 12 de fevereiro, que estabelecem os requisitos mínimos relativos à organização e funcionamento, recursos humanos e instalações técnicas para o exercício da atividade das unidades de saúde de medicina nuclear, de radioterapia/radioncologia e de radiologia*, DR I no. 30, 12.2.2014, p. 1336.

Slovak Republic

Radioactive waste management

During 2012-2013, the Nuclear Regulatory Agency (NRA) had prepared and submitted to the Government a draft amendment to the 2004 Atomic Act to transpose the Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.[19] On 21 May 2013, the parliament adopted Act No. 143/2013 Coll.[20] In addition to the transposition of the Directive 2011/70/Euratom, the NRA had addressed other issues in the draft legislation, including higher nuclear liability limits for nuclear damage; the cancellation of the time limits for the operational licences, including the existing valid licences which previously been issued for a maximum of 10 years validity; and the increase of contributions from the holders of construction authorisations for a nuclear power plant and from holders of an operating authorisation.

The Amendment Act No.143/2013 to the 2004 Atomic Act entered into force on 1 August 2013, except for the provisions concerning the increase in amount of the nuclear operator´s liability limits for nuclear damage caused by each nuclear incident, which entered into force only as of 1 January 2014.

Liability and compensation

As noted above, the provisions of the Amendment Act No.143/2013 to the 2004 Atomic Act related to the increase in the nuclear operator´s liability limits for nuclear damage caused by each nuclear incident entered into force as of 1 January 2014. The increased nuclear liability limits are set as follows:

a) For a nuclear installation with the nuclear reactor or nuclear reactors for purposes of producing energy, during commissioning and operation, the limit is set up to EUR 300 million, which is four times greater than the limit set under the 2004 Atomic Act.

b) For other nuclear installations during their commissioning and operation, shipments of the radioactive materials, and all nuclear installations in the decommissioning stage, the limit is set up to EUR 185 million, which is 3.7 times higher than the limit set under the 2004 Atomic Act.

Concerning the international liability regime under the 1963 Vienna Convention and the recent EU Council Decision adopted on 15 July 2013,[21] the Slovak Republic is now considering the merits of its ratification of the 1997 Protocol amending the Vienna Convention on Civil Liability for Nuclear Damage. The NRA initiated and co-ordinated the co-operation of the relevant ministries in the Interdepartmental Working Group for the Civil Liability for Nuclear Damages that provided NRA with

19. 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, 2.8.2011, p. 48.
20. Act No. 143/2013 Coll. of 21 May 2013, amending and supplementing Act No. 541/2004 Coll., on the peaceful use of nuclear energy (the Atomic Act) and on the amendments and supplements to some acts as amended by later acts, and amending and supplementing the Act No. 238/2006 Coll., on the National Nuclear Fund for decommissioning of nuclear facilities and for management of spent fuel and radioactive waste (the Nuclear Fund Act) and on the amendments and supplements to some acts as amended by later acts.
21. Council Decision 2013/434/EU of 15 July 2013 authorising certain Member States to ratify, or to accede to, the Protocol amending the Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963, in the interest of the European Union, and to make a declaration on the application of the relevant internal rules of Union law, OJ L 220, 17.8.2013, p. 1.

support in developing the "Analysis of the advisability of accession of the Slovak Republic to the Protocol amending the 1963 Vienna Convention on the Civil Liability for Nuclear Damages caused by the Nuclear Incidents as fulfilment of the Council Decision 2013/434/EU". The analysis was intended to be submitted to the Government in March 2014 to provide the government with the information and expected impacts of ratification. If the Slovak Government decides on the accession of the Slovak Republic to the 1997 Protocol, NRA will develop and submit material on accession to the 1997 Protocol to the Government, and, based on the Plan of the Legislative Tasks of the Slovak Government for the 2014, NRA will prepare and submit a draft act on the civil liability for nuclear damage to implement the provisions of the 1997 Protocol. Alternatively, if the Slovak Government does not approve the accession to the 1997 Protocol, the draft act on civil liability for nuclear damage will cover only the 1963 Vienna Convention.

Spain

Radioactive waste management

Royal Decree 102/2014 of 21 February on the responsible and safe management of spent nuclear fuel and radioactive waste[22]

Royal Decree 102/2014 on the responsible and safe management of spent nuclear fuel and radioactive waste transposes into national law those aspects of the Directive 2011/70/Euratom[23] which were not yet covered in Spanish law, or for which further development of regulation has been deemed necessary. Many of the principles of the directive were already present in the Spanish legal system before the enactment of this royal decree. The royal decree updates the contents and derogates the prior Royal Decree 1349/2003 of 31 October on the governance of activities performed by the *Empresa Nacional de Residuos Radiactivos,* S.A. (ENRESA) and their financing.

The new royal decree, like the directive, regulates the management of spent nuclear fuel and radioactive waste that result from civilian activities at all stages from generation to disposal, in the following terms:

- It establishes a set of general principles based on Article 4 of the Directive 2011/70/Euratom, which must be observed and which are complementary to the principles already set in the Law 25/1964 of 29 April on Nuclear Energy.
- It prescribes the process for the drafting, approval and revision of the General Radioactive Waste Plan (GRWP), in accordance with Article 12 of the Directive.
- It regulates some aspects concerning the financing of the activities foreseen in the GRWP. In particular, it sets up the principles that govern the management of the fund for financing these activities and the composition and functions of the Fund Monitoring and Control Committee, which were already present in the now derogated Royal Decree 1349/2003. The financing of these activities, was were subject of a wide amendment in 2009, is governed in Spain by the Law of the Electricity Sector 54/1997, particularly in its Sixth Additional Provision.

22. *Boletín Oficial Del Estado* (Official State Bulletin) No. 58 (8 March 2014), pp. 22069-82.
23. 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, 2.8.2011, p. 48.

- It defines the purpose and functions of ENRESA, without significant changes to those previously enumerated by the Royal Decree 1349/2003.
- It establishes the obligations of ENRESA to inform periodically the Ministry of Industry, Energy and Tourism (MINETUR) and the Nuclear Safety Council (CSN).
- It defines the technical and administrative specifications for acceptance of spent nuclear fuel and radioactive waste that ENRESA must subscribe with the waste generators. These specifications were already regulated in the Royal Decree of 2003 as "type contracts". They must be approved by the MINETUR, upon the favourable report of the CSN.
- It stipulates that the radioactive wastes generated in Spain must be disposed of in Spain, unless at the time of shipment an agreement, taking into account the criteria established by the Commission in accordance with the Directive, has entered into force between the Kingdom of Spain and another member state or a third country to use a disposal facility outside of Spain.
- It contains the requirements of notification and reporting as established by the Directive (notification of the GRWP and report to the Commission on the implementation of the Directive every 3 years); as well as for the arrangement for self-assessments of the national framework, competent regulatory authority and GRWP, and for the invitation of an international peer review of them at least every 10 years.
- It amends the Regulation on Nuclear and Radioactive Installations, approved by Royal Decree 1836/1999 of 3 December. It introduces a new type of authorisation for dismantling and closure, specifically for the installations for the disposal of spent nuclear fuel and radioactive waste.

Royal Decree 102/2014 diverges from the contents of the Directive in the sense that it also regulates, where applicable, the dismantling of nuclear installations, which is acknowledged as an essential public service by the Nuclear Energy Law.

Ministerial Order IET/1946/2013 of October 17 on the management of wastes generated in activities using materials that contain natural radionuclides[24]

The purpose of this Order of the Ministry of Industry, Energy and Tourism, pursuant to Title VII of the Regulation on Sanitary Protection against Ionizing Radiations approved by Royal Decree 783/2001 of 6 July, is to regulate the management of the wastes containing radionuclides of natural origin, so called "NORM".

This order is applicable to the industries in which processes or other activities generate NORM. Such activities can result in increased concentrations of these materials, which are not negligible from the standpoint of radiation protection.

The order sets the values of the activity concentration levels for exemption or clearance which, if not exceeded, allow the management of NORM as conventional wastes, without prejudice to the application of radiological criteria established by the Nuclear Safety Council in accordance with the level of control that these wastes require. In addition, the order requires license holders to carry out a study of radiological impact to estimate the potential resulting annual effective dose to members of the public and workers. The order also provides that, in the event that

24. *Boletín Oficial Del Estado* (Official State Bulletin) No. 254 (23 October 2013), pp. 86016-19.

certain values are exceeded, such materials are to be managed by ENRESA as radioactive waste.

Ukraine

Radioactive waste management

Pursuant to article 14 of the Law No. 1868-IV on Regulation of Issues related to Nuclear Safety Assurance, as amended, the Cabinet of Ministers issued on 22 January 2014 Decree No. 21 on the Supervisory Board for Control of the Use and Investment of the Financial Reserve Funds Intended for Decommissioning of Nuclear Power Plant Units in Operation. The decree establishes the supervisory board and identifies the initial members of the supervisory board.

Among the duties of the supervisory board are (1) review and approval of the plant operator's plans of action related to cessation of operation and decommissioning of nuclear power plant units in operation; (2) the exercise of control over the use and investment of the financial reserve funds for the intended purpose; (3) review and approval of the Operator's annual plans for investment of the financial reserve funds and (4) annual review of the operator's use of financial reserve funds. Before 25 March of each year, the supervisory board must submit to the Cabinet of Ministers an annual progress report on the control over the use and investment of the financial reserve funds and shall provide its recommendations on how to improve the use of the financial reserve.

The decree also invests the supervisory board with powers, such as inspection and audit and authority to hire experts to assist in its duties, and the decree specifies certain rules of procedure applicable to the board.

United Kingdom

Organisation and structure

Office of Nuclear Regulation established as a statutory body

The Energy Act 2013 (c. 32), which received royal assent on 18 December 2013, is a comprehensive piece of legislation addressing various aspects of energy policy in the United Kingdom, including decarbonisation targets and the reform of the electricity market to encourage low carbon electricity generation and to ensure security of supply.[25] Part 3 of the Energy Act 2013 establishes the Office for Nuclear Regulation (ONR) as a "body corporate", a statutory body accountable through the Secretary of State. ONR was originally established in 2011 within the Health and Safety Executive and consolidated within its auspices disparate regulatory functions in the nuclear field.[26] Under the Energy Act 2013, ONR is assigned functions related to nuclear safety, nuclear site health and safety, nuclear security, nuclear safeguards and the transport of radioactive materials.

25. A copy of the act is available at: www.legislation.gov.uk/ukpga/2013/32/contents. A detailed set of "Explanatory Notes" on the legislation is available at: www.legislation.gov.uk/ukpga/2013/32/resources.
26. See *Nuclear Law Bulletin*, No. 87, OECD/NEA, Paris, p. 100.

Intergovernmental organisation activities

European Atomic Energy Community

Proposed binding instruments

Proposal for a Council Regulation laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency (COM/2013/943, 10 January 2014)

A proposal to recast Council Regulation 3954/87/Euratom laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency[1] was adopted by the European Commission in 2010. The Commission decided, however, to withdraw the recast procedure in order to bring Regulation 3954/87/Euratom in line with the new provisions of Regulation 182/2011/EU, laying down the rules and general principles concerning mechanisms for control by member states of the Commission's exercise of implementing powers.[2]

In accordance with the provisions of Article 31 of the Treaty establishing the European Atomic Energy Community (Euratom Treaty), a draft proposal for a revision of Council Regulation 3954/87/Euratom was adopted on 6 August 2013 and submitted to the European Economic and Social Committee (EESC) for a formal opinion. After having received a favourable opinion of the EESC on 16 October 2013, the Commission adopted its final proposal on 10 January 2014.

The proposal lays down the maximum permitted levels of radioactive contamination of food and feed which may be placed on the market following a nuclear accident or any other case of radiological emergency which is likely to lead to or has led to significant radioactive contamination of food and feed, and the procedures to render these maximum permitted levels applicable. The aim of the proposal is in particular to provide more flexible tools allowing specific responses to any nuclear accident or radiological emergency in the European Union (EU), in the vicinity of the EU or in a remote country.

The proposal is currently being discussed by EU Member States in the Council of the EU (the Council), which shall also consult the European Parliament.

Adopted legally binding instruments

Council Directive 2013/51/Euratom of 22 October 2013 laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption[3]

The Council adopted on 22 October 2013 a directive on requirements for the protection of the general public with regard to radioactive substances in water

1. COM (2010) 184 final.
2. *Official Journal of the European Union* (OJ) L 55, 28.2.2011, pp. 13-18.
3. OJ L 296, 7.11.2013, pp. 12-21.

intended for human consumption.[4] The new directive sets out parametric values, frequencies and methods for monitoring radioactive substances. In addition, it provides for the establishment of monitoring programmes by each member state to ensure that water intended for human consumption meets the requirements set in the directive. The monitoring will include testing water for radon and tritium and to establish the indicative dose. Natural mineral waters and waters which are deemed as medicinal products are excluded from the scope of this directive because special provisions for those types of water were established in Directive 2009/54/EC and Directive 2001/83/EC.

Furthermore, the directive provides for remedial action and notification to inform the public of the quality of water for human consumption.

The directive entered into force on 27 November 2013. EU Member States are required to transpose it into national legislation by November 2015 at the latest.

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[5]

The Council adopted on 5 December 2013 a new directive laying down basic safety standards (BSS) for protection against the dangers arising from exposure to ionising radiation.[6]

The new BSS directive modernises and consolidates the European radiation protection legislation by taking account of the latest scientific knowledge, technological progress and operational experience with current legislation by merging the existing set of five directives into a single piece of legislation.

The BSS directive provides for the protection of workers, members of the public and patients from the dangers arising from exposure to ionising radiation .The directive sets out a system of radiation protection based on the principles of justification, optimisation and dose limitation and requires appropriate regulatory control for all exposure situations. Furthermore, the directive strengthens the requirements on emergency preparedness and response, taking account of lessons learnt from the Fukushima Daiichi accident, and the directive provides for radiation protection education, training and provision of information.

The directive entered into force on 6 February 2014. EU Member States are required to transpose it into national legislation by February 2018 at the latest.

Council Regulation (Euratom) No. 237/2014 of 13 December 2013 establishing an Instrument for Nuclear Safety Cooperation[7]

The Council adopted on 13 December 2013 a regulation establishing an instrument for nuclear safety co-operation for the period 2014-2020 to support third countries in improving nuclear safety and implementing the highest standards.[8] The

4. For more information, see the press release of the Council, "New rules for the protection of public health with regard to radioactive substances in water", No. 15066/13 (22 October 2013).
5. OJ L 13, 17.1.2014, pp. 1-73.
6. For more information, see the press release of the Council, "Council approves new standards for protection against the dangers arising from exposure to ionising radiation", No. 17059/13 (5 December 2013).
7. OJ L 77, 15.3.2014, pp. 109-116.
8. For more information see press release of the Council, "Council establishes the instrument for nuclear safety cooperation", No. 17548/13 (13 December 2013).

new regulation replaces Regulation (Euratom) 300/2007,[9] under which the previous instrument was established and which expired on 31 December 2013.

The new instrument provides for financing measures aimed at supporting the promotion of a high level of nuclear safety and radiation protection, as well as the application of efficient and effective safeguards for nuclear material in third countries. A total of EUR 225 321 000 has been set aside for the implementation of this regulation for the period 2014-2020.

Council Regulation (Euratom) No. 1368/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programmes in Bulgaria and Slovakia and repealing Regulations (Euratom) No 549/2007 and (Euratom) No 647/2010[10]

Council Regulation (Euratom) No 1369/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programme in Lithuania, and repealing Regulation (EC) No 1990/2006[11]

In the context of the negotiations for accession to the European Union, Bulgaria, Lithuania and the Slovak Republic undertook to close and subsequently decommission the nuclear reactors at Ignalina Units 1 and 2 (Lithuania), Bohunice V1 Units 1 and 2 (Slovak Republic) and Kozloduy Units 1 through 4 (Bulgaria). While the three EU Member States are ultimately responsible for nuclear safety, including the financing of decommissioning, the EU has undertaken to assist those countries in addressing the exceptional financial burden imposed by the decommissioning process, due to the early shutdown of these reactors.

The Council adopted on 13 December 2013 two regulations on Union support for the nuclear decommissioning assistance programmes respectively in Bulgaria and Slovakia, as well as in Lithuania for the period 2014-2020.[12]

The first regulation establishes a programme for the implementation of Union financial support for measures linked to the decommissioning of units 1 and 2 of the Ignalina nuclear power plant in Lithuania. The financial envelope for the implementation of the Ignalina programme for the period 2014-2020 is set at EUR 450 818 000 at current prices.

The second regulation establishes a programme for the implementation of Union financial support for measures connected with the decommissioning of units 1 to 4 of the Kozloduy nuclear power plant in Bulgaria and units 1 and 2 of the Bohunice V1 nuclear power plant in the Slovak Republic. A total of EUR 293 032 000 has been set aside for the period 2014-2020 for the implementation of the Kozloduy programme and a total of EUR 225 410 000 has been set aside for the Bohunice programme at current prices.

Council Regulation (Euratom) No 1314/2013 of 16 December 2013 on the Research and Training Programme of the European Atomic Energy Community (2014-2018) complementing the Horizon 2020 Framework Programme for Research and Innovation[13]

The Council adopted on 16 December 2013 the Euratom programme for nuclear research and training activities for the period 2014-2018.[14] The new programme is a

9. OJ L 81, 22.3.2007, pp. 1-10.
10. OJ L 346, 20.12.2013, pp. 1-6; OJ L 8, 11.1.2014, Corrigendum, p. 31.
11. OJ L 346 20.12.2013, pp. 7-11; OJ L 8, 11.1.2014, Corrigendum, p. 30.
12. See press release of the Council, "Council adopts nuclear decommissioning programmes for Bulgaria, Slovakia and Lithuania", No. 17550/13 (13 December 2013).
13. OJ L347 (20 December 2013), pp. 948-964.
14. For more information, see the press release of the Council, "Euratom programme for nuclear research (2014 to 2018)", No. 17898/13 (16 December 2013).

part of the EU's research and innovation framework programme "Horizon 2020", which was adopted on 3 December 2013.[15] It allows for the continuity of nuclear research activities carried out under the previous Euratom programme, which expired at the end of 2013.

Euratom programmes are limited by the Euratom treaty to five years, whereas the general framework programmes for research and innovation last for seven years.

The budget of the Euratom programme is set at 1.6 billion euros in current prices for the years 2014 to 2018. It covers indirect actions for fusion energy research and research on nuclear fission, safety and radiation protection, as well as direct actions for activities of the Joint Research Centre in the field of nuclear waste management, environmental impact, safety and security.

The Euratom programme will continue to contribute to the implementation of the "Innovation Union" strategy, by enhancing competition for scientific excellence and accelerating deployment of key innovations in the nuclear energy field, notably in fusion and nuclear safety, and with the objective of favouring the long-term decarbonisation of the energy system in a safe, efficient and secure way.

Commission Implementing Decision of 10 December 2013 adopting the 2014-2015 work programme in the framework of the Research and Training Programme of the European Atomic Energy Community (2014-2018) complementing the Horizon 2020 – The Framework Programme for Research and Innovation and the 2014-2018 work programme in respect to the Fusion Joint Programme and the Joint European Torus operating contract as part of the Research and Training Programme of the European Atomic Energy Community (2014-2018) complementing the Horizon 2020 – The Framework Programme for Research and Innovation (C/2013/8563)

In accordance with Article 11 of Council Regulation on the Euratom Research and Training Programme, the European Commission has to adopt work programmes for the implementation of indirect actions, i.e. research and innovation activities to which the Union provides financial support. The 2014-2015 Work Programme has been adopted through the Commission Implementing Decision C/2013/8563.

This Decision also serves to adopt the 2014-2018 Work Programme in respect to the Fusion Joint Programme and the Joint European Torus operating contract as part of the Euratom Research and Training Programme.

Commission Implementing Regulation (EU) No. 322/2014 of 28 March 2014 imposing special conditions governing the import of feed and food originating in or consigned from Japan following the accident at the Fukushima nuclear power station

Following the accident at the Fukushima Daiichi nuclear power station on 11 March 2011, the European Commission was informed that radionuclide levels in certain food products originating in Japan exceeded the action levels in food applicable in Japan. Because such contamination may constitute a threat to public and animal health in the EU, the Commission has continued to monitor the situation, on the basis of the occurrence data on radioactivity in feed and food provided by the Japanese authorities.

Since the previous Commission Implementing Regulation – i.e. Commission Implementing Regulation (EU) No. 996/2012,[16] as amended by Commission Implementing Regulation (EU) No. 45/2013[17] – only applied until 31 March 2014, a new Implementing Regulation imposing special conditions governing the import of

15. OJ L 347, 20.12.2013, pp. 104-173.
16. OJ L 299, 27.10.2012, pp. 31-41.
17. OJ L 143, 30.5.2013, pp. 3-10.

feed and food originating in or consigned from Japan following the accident at the Fukushima nuclear power station was adopted by the Commission on 28 March 2014 in order to take into account the further development of the situation.

The existing measures have been reviewed by taking into account more than 85 000 occurrence data on radioactivity in feed and food other than beef and more than 232 000 occurrence data on radioactivity in beef, data that was provided by the Japanese authorities on the third growing season after the accident. The next review of the provisions is planned by 31 March 2015 when the results of sampling and analysis on the presence of radioactivity of feed and food during the fourth growing season after the accident will be available.

Non-legally binding instruments

Communication from the Commission on "Delivering the internal electricity market and making the most of public intervention" (C/2013/7243)

In its Communication on "Delivering the internal electricity market and making the most of public intervention", adopted on 5 November 2013,[18] the European Commission gives guidance to the EU Member States on how to design and adapt public interventions in the electricity market, in order to avoid distortions of the internal energy market.

Although the Communication is not legally binding, it sets out the main principles which the Commission will apply when assessing state interventions relating to renewable support schemes or capacity mechanisms, including nuclear energy.

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on "A policy framework for climate and energy in the period from 2020 to 2030" (COM/2014/015)

The Communication setting out the 2030 framework for the EU climate and energy policy was adopted by the European Commission on 22 January 2014. The proposed framework builds on the existing "climate and energy package" of targets for 2020, as well as the Commission's 2050 roadmaps for energy and for a competitive low-carbon economy.[19] The Communication on the 2030 policy framework follows the Commission's March 2013 Green Paper,[20] which launched a broad public consultation on the most appropriate range and structure of climate and energy targets for 2030. These documents reflect the EU's goal of reducing greenhouse gas emissions by 80 to 95% below 1990 levels by 2050, as part of the effort needed from developed countries.

Amongst the key elements of this 2030 framework, the Commission proposes a binding greenhouse gas reduction target of 40% below the 1990 level, a reform of the EU Emissions Trading System, an EU-wide binding target for renewable energy of at least 27%, increased emphasis on energy efficiency, and a new European governance process for energy and climate policies based on member state plans for competitive, secure and sustainable energy.

18. See the press release of the Commission, "EU Commission: Guidance for state intervention in electricity", No. IP/13/2021 (5 November 2013), available at: http://europa.eu/rapid/press-release_IP13-1021_en.htm.
19. COM (2011) 885 (15 December 2011), "Energy Roadmap 2050"; COM (2011) 112 final/2 (25 May 2011), "A Roadmap for moving to a competitive, low-carbon economy in 2050".
20. COM (2013) 169 (27 March 2013), "Green Paper on a 2030 Framework for climate and energy policies".

The communication on the 2030 framework is accompanied by a report on energy prices and costs, which assesses the key drivers and compares EU prices with those of its main trading partners.

International Atomic Energy Agency

Convention on Nuclear Safety

The Sixth Review Meeting of the Contracting Parties to the Convention on Nuclear Safety (CNS) was held from 24 March to 4 April 2014. Based on a report of the Working Group in Effectiveness and Transparency, which was established during the Second Extraordinary Meeting of the CNS in August 2012, the contracting parties agreed by consensus on proposed amendments to the CNS guidance documents, namely the Guidelines regarding the Review Process under the CNS (INFCIRC/571/Rev.6), the Guidelines regarding National Reports under the CNS (INFCIRC/572/Rev.4), and the Rules of Procedure and Financial Rules (INFCIRC/573/Rev.5). The contracting parties also agreed on the "Recommendations for Action" to other bodies which were submitted by a group of contracting parties for consideration at the review meeting. The amendments to the guidance documents and the Recommendations for Action provide clearer guidance on actions to be taken by the contracting parties to meet the objectives of the convention and enhance preparation of national reports. They also provide improvements to the review process, enhance international co-operation and foster greater transparency for the public.

At the Sixth Review Meeting, the CNS contracting parties also decided, by a two-thirds majority, to submit a proposal by Switzerland to amend CNS Article 18 to a diplomatic conference to be convened within one year following this decision. The proposed amendment addresses the design and construction of both existing and new nuclear power plants. The contracting parties also requested the IAEA Director General, as depositary for the CNS, to prepare a set of rules and procedures for organising the diplomatic conference and to organise, at least 90 days prior to the first day of the diplomatic conference, a consultation meeting open to all contracting parties to exchange views and prepare for the adoption of the rules of procedure.

During the final plenary of the review meeting, a special session was held to report on actions carried out by the contracting parties in the light of the Fukushima Daiichi accident. The contracting parties agreed to continue to report in their National Reports on actions taken with regard to lessons learned from the Fukushima Daiichi accident. It was also proposed to convene a topical meeting in 2015 to allow the contracting parties the opportunity to present and discuss enhancing the safety existing installations in light of lessons learned from the accident.

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

The Second Extraordinary Meeting of the Contracting Parties to the Joint Convention was held on 12-13 May 2014 following a request by the United States. During the Second Extraordinary Meeting, the contracting parties agreed on a number of changes to the Rules of Procedure and Financial Rules for the Joint Convention (INFCIRC/602/Rev.5), the Guidelines regarding the Review Process (INFCIRC/603/Rev.6), and the Guidelines regarding the Form and Structure of National Reports (INFCIRC/604/Rev.3). At the Second Extraordinary Meeting, the contracting parties also agreed to discontinue the Working Group of Experienced Officers of the Joint Convention and the CNS, and instead, as practicable, to invite to the "workshop of incoming and outgoing officers" of the Joint Convention the Presidency (the President and two Vice-Presidents) of the last Review Meeting of the

CNS and, where necessary, additional experienced officers, to informally share experience and lessons learned under the review processes of the CNS. They also encouraged the contracting parties to the CNS to similarly invite to the "officers turnover meeting" of the CNS the Presidency of the last Review Meeting of the Joint Convention and, where necessary, additional experienced officers, to informally share experience and lessons learned under the review processes of the Joint Convention.

The organisational meeting for the Fifth Review Meeting of the Contracting Parties to the Joint Convention was held on 14-15 May 2014. The meeting, among other things, elected the officers for the Fifth Review Meeting, decided on the establishment and composition of seven Country Groups for the upcoming Review Meeting, and discussed the timetable for the Fifth Review Meeting, to be held from 11 May 2015 at the IAEA Headquarters in Vienna.

International Expert Group on Nuclear Liability

The Third Workshop on Civil Liability for Nuclear Damage was held in Vienna on 19 May 2014. The workshop provided diplomats and experts from member states with an introduction to the subject, and was attended by 54 participants from 39 member states.

The 14th meeting of the International Expert Group on Nuclear Liability (INLEX) took place in Vienna, from 20-22 May 2014. The group discussed the revision of the Board of Governors' decision excluding small quantities of nuclear material from the scope of the nuclear liability conventions following the adoption of the 2012 edition of the IAEA Transport Regulations; liability issues in the context of the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency; whether there is a need to establish a special liability regime covering radioactive sources; the scope of application of the IAEA liability conventions regarding shutdown reactors or reactors being decommissioned; the revision of the model provisions on nuclear liability in the *Handbook on Nuclear Law* Volume II; and outreach activities.

With respect to outreach activities, three IAEA/INLEX missions have been conducted in order to raise awareness of the international legal instruments relevant for achieving a global nuclear liability regime. Preparations are also underway for the conduct of similar missions in interested member states in the coming months. In addition, a sub-regional workshop on civil liability for nuclear damage was held in Vietnam on 17-18 March 2014 to provide participants with information on the existing international nuclear liability regime and to advise on the development of national implementing legislation. The event was attended by 35 participants from 12 member states.

Legislative assistance activities

The IAEA Secretariat continued to support member states, upon request, under its legislative assistance programme. Several draft national laws were reviewed and comments were provided to the countries concerned. The IAEA Office of Legal Affairs also trained scientific visitors and fellows from a number of member states in various aspects of nuclear law. Awareness missions have been dispatched to member states in order to raise the awareness of national policymakers about the importance of adhering to relevant international legal instruments adopted under the IAEA's auspices, and preparations are under way to conduct similar missions in other interested member states over the coming months.

In addition, the IAEA Secretariat's outreach capabilities are being further enhanced through the development of new online training material and a third volume of the *Handbook on Nuclear Law*, which will cover various areas of nuclear law beyond the regulatory matters covered in the previous two volumes.

OECD Nuclear Energy Agency

Appointment of new Director-General

Mr. Luis E. Echávarri, NEA Director-General, retired from the organisation at the end of April after almost 17 years of service.

Mr. Echávarri joined the NEA in 1997 after having previously worked as Commissioner for the Spanish Nuclear Safety Council (CSN) and later Director-General of the Spanish Nuclear Industry Forum.

On 19 March 2014, the OECD Secretary-General Angel Gurría announced the appointment of Mr. William D. Magwood, IV to succeed Mr. Echávarri as Director-General of the NEA. Mr. Magwood has a distinguished career in the nuclear field and in public service. Since April 2010, Mr. Magwood has served as one of five Presidentially-appointed, Senate-confirmed commissioners of the NRC. The Commission heads the NRC and formulates policies and regulations governing US nuclear reactor and materials safety, among other matters duties.

From 2005-2010, Mr. Magwood established a private business to advise US and international clients, particularly related to energy, environmental and technology policy issues. During this time, he also sat on various advisory groups and provided advice to members of the US Congress on a range of technical issues, including nuclear research issues, education and climate change policy.

Mr. Magwood was with the US Department of Energy (DOE) for 11 years, including serving as the Director of Nuclear Energy from 1998-2005 where he was the senior nuclear technology official in the United States Government. In his role, he led the creation of "Nuclear Power 2010," "Generation IV," and other initiatives. During his tenure at DOE, Mr. Magwood was recognised as a strong advocate of international technology co-operation and served as chairman of both the Generation IV International Forum and the OECD Steering Committee on Nuclear Energy.

Mr. Magwood will take up his duties at the NEA 1 September 2014.

International experts in Japan to review safety after Fukushima Daiichi

On 8 April 2014, the NEA, in co-operation with the Nuclear Regulation Authority (NRA) of Japan, held an international conference in Tokyo focusing on enhancing global nuclear safety and industry regulatory reform following the Fukushima Daiichi accident. This conference is the latest initiative by the NEA to consolidate international knowledge and expertise in the field of nuclear safety and to evaluate lessons learnt from Fukushima.

High-level experts and representatives from the nuclear regulatory authorities of France, Japan, Korea, Russia and the United States, as well as the NEA and the International Atomic Energy Agency (IAEA), attended the conference and discussed in detail the various safety improvements that have taken place since March 2011.

In his opening remarks, NRA Chairman Dr. Shunichi Tanaka stressed the importance of independence, technical capability and transparency of the regulatory authorities, as well as a strong safety culture. Dr. Tanaka also discussed the ongoing safety reviews at 17 nuclear power reactors to determine suitability for restart. Finally, he noted that new guidelines for emergency preparedness and emergency response were being developed.

OECD Secretary-General Angel Gurría spoke about sound energy policies for economic and social development and insisted on very high levels of safety as the first condition for using nuclear power. NEA Director-General Luis Echávarri highlighted the role of international co-operation, stating that through co-operation,

nuclear safety can be further enhanced worldwide, thus enabling countries that wish to do so to make use of low-carbon, baseload nuclear energy supplies.

Conference proceedings will be provided online through the NEA website.

China Atomic Energy Authority co-operation workshop

On 26-27 February 2014, NEA Director-General Luis Echávarri led an NEA delegation to meet with several Chinese institutions to discuss co-operation in a number of areas, including nuclear safety and development. Practical implementation of the 2013 Joint Declaration on Co-operation between the NEA and China was one of the key topics for discussion during this two-day visit to China by NEA officials. The Joint Declaration was signed in November 2013, and is intended to facilitate wider international co-operation on important scientific research, the assessment of innovative technologies and the development of national and international legal frameworks, in the interest of further strengthening the safety of nuclear power.

On 27 February, the China Atomic Energy Authority (CAEA) organised a co-operation workshop to explore practical implementation of the 2013 Joint Declaration. The workshop was attended by 40 participants from the CAEA, the National Nuclear Safety Administration (NNSA), the National Energy Administration (NEA), the China National Nuclear Corporation (CNNC), the China General Nuclear Power Corporation (CGN), the State Nuclear Power Technology Corporation (SNPTC) and other important actors in China's nuclear power programme.

News briefs

Meeting on "Stress Tests for Nuclear Power Plants in European Union (EU) Neighbouring Countries: Experience and Follow-up", 29 October 2013, Luxembourg

The European Commission organised on 29 October 2013 a meeting in Luxembourg with participation of EU neighbouring countries that had not been fully involved in the European stress tests (Armenia, Belarus and Turkey), as well as from the European Nuclear Safety Regulators Group. The Russian Federation was also invited but declined participation. The meeting provided a good opportunity to present and discuss the status of the stress tests already performed or planned in these countries with existing nuclear power plants such as Armenia or for those like Belarus and Turkey that are planning new nuclear projects.

Commission Decision of 18 December 2013 to initiate the procedure laid down in Article 108(2) of the Treaty on the Functioning of the European Union concerning the Investment Contract (early Contract for Difference) for the Hinkley Point C New Nuclear Power Station[1]

By a formal decision adopted on 18 December 2013, the European Commission has decided to open an in-depth investigation to examine whether the plans of the United Kingdom to subsidise the construction and operation of a new nuclear power plant at Hinkley Point in Somerset are in line with EU state aid rules. In particular, the Commission expresses doubt that the project suffers from a genuine market failure.

The opening of an in-depth inquiry gives interested third parties an opportunity to comment on the measure but does not prejudge the outcome of the investigation.

26th Plenary meeting of the European Nuclear Safety Regulators Group (ENSREG) – 16 January 2014, Brussels

The main topics addressed at the 26th Plenary meeting of ENSREG were: 1) the ENSREG work programme for the period 2014-2016, which was approved in principle and will be published after finalisation; 2) the progress of the discussions in the Council of the European Union on the Revised Nuclear Safety Directive, with the agreement of ENSREG to participate in a joint meeting of national authorities and national regulators on the issue of peer reviews; and 3) the support to the decommissioning activities at Fukushima, with the decision to send a letter offering ENSREG assistance to the Japanese nuclear regulator.

Further information is available on the ENSREG website: www.ensreg.eu/news.

1. *Official Journal of the European Union* (OJ), C 69, 7.3.2014, pp. 60-98.

Stakeholder Conference on "Taking nuclear third party liability into the future: Fair compensation for citizens and level playing field for operators" – 20 and 21 January 2014, Brussels

A stakeholder conference on nuclear third party liability and insurance was organised on 20 and 21 January 2014 by the European Commission in co-operation with the Brussels Nuclear Law Association and the European Economic and Social Committee.

The event gathered representatives of all major stakeholders, including from civil society, the insurance and reassurance sectors, the nuclear industry, relevant international organisations, including the OECD Nuclear Energy Agency (OECD/NEA) and the International Atomic Energy Agency (IAEA), and academics in the field of nuclear energy. The aim of the Conference was to discuss the most important issues related to nuclear third party liability and insurance, in particular in the light of the recommendations adopted at the beginning of 2013 by the expert group to the Commission on nuclear third party liability and of the outcomes of the public consultation conducted by the Commission in the second half of 2013. The discussion focused on three key issues: the cross border aspects of claims management; the relation between the insurance market's capacity, the financial coverage of nuclear liability and electricity costs; and the implementation in EU member states of the international conventions in the field of nuclear third party liability.

All presentations made at the conference are available at: http://ec.europa.eu/energy/nuclear/events/20140120_nuclear_third_party_liability_and_insurance_en.htm.

Workshop on the "Lessons learnt following Integrated Regulatory Review Service (IRRS) missions", 22 and 23 January 2014, Brussels

ENSREG Working Group 1 on "Improving Nuclear Safety arrangements", in collaboration with senior nuclear regulators from EU member states and Switzerland, participated in a workshop on 22 and 23 January 2014 in Brussels, to discuss and share experiences from past IRRS missions organised through the IAEA and conducted in the context of Article 9 of the 2009 Nuclear Safety Directive.[2]

Member States considered that the workshop provided an important opportunity towards strengthening of the International peer review process and agreed that IRRS missions contributed strongly to improvements in nuclear and radiation safety with, in some cases, mission findings contributing to significant changes in the regulatory organisation.

It was agreed to hold a second workshop in two to three years' time with a focus on specific issues and implemented measures.

Second meeting of Senior Officials of the IAEA and the EU, 21 February 2014, Vienna

IAEA and EU officials met on 21 February in Vienna for the second annual Senior Officials Meeting to review and further strengthen their co-operation in the areas of nuclear safety, nuclear security, nuclear applications, nuclear energy and safeguards.

2. Council Directive 2009/71/EURATOM of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, OJ L 172, 2.7.2009, pp. 18–22.

This meeting followed the visit of IAEA Director General Yukiya Amano to Brussels earlier in the month of February, where he met with the President of the European Commission José Manuel Barroso, Energy Commissioner Günther Oettinger and other high-level EU officials to discuss enhanced co-operation between the EU institutions and the IAEA. In addition, Mr. Amano met with the EU High Representative Catherine Ashton, on 2 February 2014 in Munich.

The next Senior Officials Meeting is planned in early 2015 in Luxembourg.

A Joint Press Statement is available at: www.iaea.org/newscenter/press releases/2014/prn201405.html.

Recent publications

Internationales und europäisches Atomrecht, edited by Kerstin Odendahl[1]

The March 2011 accident at the reactors at the Fukushima Daiichi nuclear power plant led to the decision in Germany and some other European states to bring an end to the use of nuclear energy in those countries. The accident put the issues of the control and controllability of nuclear energy back at the centre of public debate. But apart from the question of the safety of peaceful uses of nuclear energy, the control of military uses of the atom also remains a thorny issue. In this context the Walther Schücking Institute for International Law at the Christian Albrechts University of Kiel organised a lecture series addressing the question of the control of civil and military uses of nuclear energy from a European and international public law perspective.

The current volume provides an interesting mix of articles that explore the important facets of nuclear law, as well as the importance of law in the control of the atom. The contents are largely composed of articles based on the lecture series. Professor Odendahl, Director of the Walther Schücking Institute, edited the publication and opens the volume with an overview of international and European nuclear law. Consistent with the dual focus on both civilian and military uses of nuclear energy, the volume includes contributions exploring both aspects.

With respect to military uses, Dr. Stefanie Haumer and Katja Schöberl, who are affiliated with the German Red Cross, explore the international law context against the use of nuclear weapons. Professor Michael Bothe addresses nuclear disarmament and the creation of nuclear weapons-free zones. Dr. Jens Beynio, who is affiliated with the law firm Clifford Chance in Frankfurt, discusses the struggle against the proliferation of nuclear weapons from a legal and practical perspective.

Three articles give context to the issues related to the safe use of nuclear energy in the wake of the Fukushima Daiichi accident. Wolfram Tonhauser, Head of the Nuclear Law and Treaty Section in the Office of Legal Affairs at the International Atomic Energy Agency (IAEA), provides a perspective on the IAEA's role in promoting peaceful uses of nuclear energy in the context of the norms established through international conventions and treaties to address the key subjects of safety, security, safeguards and liability. Dr. Norbert Pelzer reflects on the lessons of the Chernobyl and Fukushima Daiichi nuclear power plant accidents for strengthening the international regime and international co-operation. Professor Kurt Fassbender addresses nuclear power plants in the context of environmental law, and Professor Jürgen Grunwald provides a view of peaceful uses of nuclear energy under the Euratom Treaty and European Union norms.

1. Odendahl, K., ed. (2013), Internationales und europäisches Atomrecht (International and European Atomic Law), Duncker and Humblot, Berlin, 221 pages, ISBN 978-3-428-84271-1 (print and e-book). With the exception of one article in English, the publication is in German.

Nuclear Law in the EU and Beyond, Proceedings of the AIDN/INLA Regional Conference 2013 in Leipzig, edited by Christian Raetzke[2]

The German Regional Conferences are well-established events within the framework of the Association Internationale du Droit Nucléaire/International Nuclear Law Association (AIDN/INLA) and in the worldwide nuclear law community. The German Branch of AIDN/INLA has regularly organised conferences in the years between the biannual Nuclear Inter Jura congresses. Starting in 1985 and in 12 editions up to 2009, the German Branch conferences were held, and their proceedings were edited by Dr. Norbert Pelzer. The 13th Regional Conference of the German Branch of AIDN/INLA took place in Leipzig in June 2013. Christian Raetzke, the current chairman of the German Branch, presided over the conference and also edited this latest volume of proceedings.

The proceedings of the conference were organised in five sessions, during which German and international experts explained and discussed the most recent developments in nuclear law in the European Union (EU), in Germany and worldwide. The keynote session focused on the Euratom Treaty and on current nuclear law initiatives being undertaken by the European Commission. The speakers of the first session "Nuclear safety and safeguards in the EU" dealt with the planned revision of the EU Nuclear Safety Directive, with the notion of "continuous improvement of nuclear safety" and with the EU safeguards system.

The second session was devoted to nuclear new build. Topics included developments in selected countries – Poland, Turkey, and the United Kingdom – as well as a spotlight on specific issues such as transportable nuclear power plants and trans-boundary consultation on new build programmes.

Nuclear liability was the focus of the third session. The first part of this session covered, with two presentations, the current developments in the EU in this field, while the second part widened the scope to look at worldwide implications. After a presentation on transport issues and the difficulties caused by the existence of different liability regimes, a panel with seven experts discussed the question "Do we need a global nuclear liability regime?" Quite divergent views were given and a lively discussion ensued.

The fourth session dealt with nuclear phase-out, decommissioning and nuclear waste and included presentations on the German Energiewende and the situation in Switzerland. The final session was devoted to issues of German nuclear law, such as the legal structure of the German federal nuclear regulator and the recent judgments on the 2011 shutdown order concerning the Biblis nuclear power plant.

The conference proceedings include papers and reports covering all the sessions described above. All papers and discussion reports are in English, with the exception of those presented in the last session, which are in German. Given the broad scope of the programme and the balanced mixture of distinguished veteran speakers and competent younger experts, the volume offers to the reader a colourful and varied journey through many relevant and highly interesting aspects of current nuclear law.

The volume features papers and discussion reports by: David Davies, Roland Dussart-Desart, Erinç Ercan, David Erni, Peter Faross, Ulrike Feldmann, Thomas Fetzer, Jürgen Grunwald, Dirk Harbrücker, Kyoji Kawasaki, Wolfgang Kilb, Stefan

2. Raetzke, C., ed. (2014), *Nuclear Law in the EU and Beyond*, Proceedings of the AIDN/INLA Regional Conference 2013 in Leipzig, Nomos Publishers, Baden-Baden, 473 pages, ISBN 978-3-8487-1151-2. The publication includes material printed in English and German.

Kochanski, Boris Kolesnik, Alexander Matveev, Simon Mayer, Michael Micklinghoff, Christoph Moench, Łukas Młynarkiewicz, Tomasz Nowacki, Martina Palm, Norbert Pelzer, Markus Pfaff, Rasa Ptasekaite, Julian Rotter, Sidonie Royer-Maucotel, Ian Salter, Horst Schneider,Rüdiger Tscherning, Axel Vorwerk, Julius F.W. Weitzdörfer and Andreas Woitecki.

List of Correspondents to the *Nuclear Law Bulletin*

ALBANIA	Mr. F. YLLI, Director, Institute of Nuclear Physics
ALGERIA	Mr. F. CHENNOUFI, Head of Nuclear Regulation Division, Atomic Energy Commission
ARGENTINA	Mr. M. PAEZ, Deputy Director of Legal Affairs, National Commission of Atomic Energy
ARMENIA	Mr. A. MARTIROSYAN, Chairman, Armenian Nuclear Regulatory Authority
AUSTRALIA	Mr. S. MCINTOSH, Manager, International Relations, Government Affairs and Policy, Australian Nuclear Science and Technology Organisation Mr. M. REYNOLDS, Corporate Counsel, Australian Radiation Protection and Nuclear Safety Agency
AUSTRIA	Mr. T. AUGUSTIN, Deputy Director for Nuclear Co-ordination, Federal Ministry of Agriculture, Forestry, Environment and Water Management
BANGLADESH	Mrs. S. RAHMAN, Chairman, Bangladesh Atomic Energy Regulatory Authority (BAERA) Mr. M. RAHMAN, Director, International Affairs Division, Bangladesh Atomic Energy Commission (BAEC)
BELARUS	Mr. D. LOBACH, Head of Division for Organisation of Scientific Research and Elaboration of Documentation, Department of Nuclear and Radiation Safety (*Gosatomnadzor*), Ministry for Emergency Situations
BELGIUM	Ms. K. GEERTS, Head of Legal Service, Federal Agency for Nuclear Control
BRAZIL	Ms. D. FISCHER, Brazilian Association of Nuclear Law
BULGARIA	Ms. M. MINKOVA, Chief Expert, International and European Matters, Department of International Co-operation, Nuclear Regulatory Agency Mr. A. ROGATCHEV, Director, Department of International Cooperation, Nuclear Regulatory Agency
CANADA	Mr. S.D BERGER, Partner, Fogler Rubinoff Mr. J. LAVOIE, Senior General Counsel and Director, Legal Services, Canadian Nuclear Safety Commission Ms. L. THIELE, General Counsel and Deputy Director, Legal Services, Canadian Nuclear Safety Commission
CHINA	Ms. Z. LI, Director of the Law Office, China National Nuclear Corporation Mr. J. YUAN, Partner, Jun He Law Offices
CZECH REPUBLIC	Mr. J. HANDRLICA, Law Faculty, Charles University, Prague
DENMARK	Ms. L.A. UGGERHØJ, Head of Section, Law Department, Property Law Division, Ministry of Justice
EGYPT	Mr. A. ALI, Acting Chairman, Nuclear Law Department, National Centre for Nuclear Safety and Radiation Control, Egyptian Atomic Energy Authority
ESTONIA	Mr. I. PUSKAR, Head of Radiation Safety Department, Environmental Board
FINLAND	Ms. E. MELKAS, Senior Adviser, Energy Department, Ministry of Employment and the Economy
FRANCE	Ms. F. TOUITOU-DURAND, Head of Legal Services, Atomic Energy Commission
GEORGIA	Mr. G. BASILIA, Chief specialist of Department of Nuclear and Radiation Safety Service, Ministry of Energy and Natural Resources of Georgia

GERMANY	Prof. N. PELZER, Consultant, University of Göttingen
GREECE	Dr. C. HOUSIADAS, Chairman, Greek Atomic Energy Commission Ms. V. TAFILI, International and Public Relations Office, Greek Atomic Energy Commission
HUNGARY	Dr. L. CZOTTNER, Senior Legal Adviser, Hungary Atomic Energy Authority Pr. V. LAMM, Institute for Legal Studies, Academy of Sciences M. Z. ZOMBORI, Legal Advisor, Hungary Atomic Energy Authority
ICELAND	Mr. S. MAGNUSSON, Director, Icelandic Radiation Protection Institute
INDIA	Mr. Y. T. MANNULLY, Advocate, High Court of Kerala, India Mr. R. MOHAN, Fellow, The Energy and Resources Institute Ms. E. REYNAERS KINI, Partner, M.V. Kini & Co., Advocates & Solicitors
INDONESIA	Ms. V. DEWI FAUZI, Legal Officer, National Nuclear Energy Agency Mr. M. POERNOMO, Consultant
IRELAND	Ms. I. BOLGER, IAEA/INIS Liaison Officer, Radiological Protection Institute of Ireland
ISRAEL	Mr. R. LAHAV, Legal Adviser, Atomic Energy Commission
ITALY	Mr. V. FERRAZZANO, Director of Corporate Affairs, Legal Affairs and Industrial Security, Nuclear Plant Management Company (SO.G.I.N. S.p.A.) Ms. S. SCARABOTTI, Head of the Legal Affairs, Nuclear Plant Management Company (SO.G.I.N. S.p.A.)
JAPAN	Mr. H. KAMAI, First Secretary, Permanent Delegation of Japan to the OECD Dr. T. YAMAMURA, Policy Research Office, Department of Science and Technology for Nuclear Material Management, Japan Atomic Energy Agency
KOREA (REPUBLIC OF)	Dr. S. KIM, Principal Engineer, Department of Nuclear Emergency Management, Korea Institute of Nuclear Safety (KINS) Prof. K.G. PARK, Faculty of Law, Korea University
LITHUANIA	Ms. U. ADOMAITYTE, Head of Legal Affairs and Personnel Division, State Nuclear Power Safety Inspectorate (VATESI)
LUXEMBOURG	Mr. P. MAJERUS, Radiation Protection Division, Health Directorate, Ministry of Health
MEXICO	Mr. J. GONZALEZ ANDUIZA, Legal Affairs Department, Federal Commission on Electricity Mr. M. PINTO CUNILLE, Head of the Legal and International Affairs Department, National Commission on Nuclear Safety and Safeguards (NARNRA)
MOLDOVA (REPUBLIC OF)	Ms. E. MURSA, Head of Monitoring, Analyzing and Planning Service, National Agency for Regulation of Nuclear and Radiological Activities
MONTENEGRO	Prof. S. JOVANOVIC, Professor and Head of the University Centre for Nuclear Competence and Knowledge Management
NETHERLANDS	Dr. N. HORBACH, Consultant Mr. I. OOMES, Legal Adviser, Ministry of Finance
NORWAY	Mr. S. HORNKJØL, Acting Head of Section, Norwegian Radiation Protection Authority
POLAND	Mr. P. KORZECKI, Director, Legal Department, National Atomic Energy Agency of the Republic of Poland Mr. K. SIECZAK, Head of the Regulation Division, Legal Department, National Atomic Energy Agency of the Republic of Poland
PORTUGAL	Ms. M. MONTEIRO, Legal Adviser, Nuclear and Technological Institute Mr. M. SOUSA FERRO, Counsel, Eduardo Paz Ferreira & Associados

ROMANIA	Ms. R. BANU, International Affairs Counsellor, National Commission for Nuclear Activities Control Mr. V. CHIRIPUS, Attorney, Nuclear Electrica Ms. B. VAJDA, President, National Commission for Nuclear Activities Control
RUSSIAN FEDERATION	Mr. A. SHKARBANOV, Counsel, State Atomic Energy Corporation ROSATOM
SERBIA (REPUBLIC OF)	Ms. M. ĆOJBAIŠIĆ, Head of Unit for International Co-operation, Agency for Ionising Radiation Protection and Nuclear Safety
SLOVAKIA	Mr. M. POSPÍŠIL, Director, Legal Affairs Division, Nuclear Regulatory Authority of the Slovak Republic Ms. G. ŠPAČKOVÁ, Legal Adviser, Division of Legislation and Legal Affairs, Nuclear Regulatory Authority
SLOVENIA	Mr. A. ŠKRABAN, Head of Office of General Affairs, Slovenian Nuclear Safety Administration
SPAIN	Ms. I. DOVALE HERNANDEZ, Technical Counselor, Cabinet of the Secretariat of State for Energy, Ministry of Industry, Energy and Tourism Ms. E. MENENDEZ-MORAN ALVAREZ, Head of Service, Deputy Direction General for Nuclear Energy, Ministry of Industry, Energy and Tourism
SWEDEN	Mr. S. CARROLL, Analyst, Operation and Decommissioning of Nuclear Facilities, Swedish Radiation Safety Authority Mr. T. ISENSTAM, Senior Legal Adviser, Swedish Radiation Safety Authority Mr. T. LOFGREN, Senior Legal Adviser, Swedish Radiation Safety Authority
SWITZERLAND	Mr. C. PLASCHY, Legal Specialist, Swiss Federal Office of Energy Ms. F. PORTMANN-BOCHSLER, Legal Specialist, Swiss Federal Office of Energy
TUNISIA	Mr. M. CHALBI, Ministry of Education and Science, National School of Engineering
TURKEY	Mr. F. KURHAN, Legal Adviser, Turkish Atomic Energy Authority Ms. E. ATALAY, Energy Advisor, Permanent Delegation of Turkey to the OECD
UKRAINE	Mr. V. SHVYTAI, Head of Presidential Office, National Nuclear Energy Generating Company (*Energoatom*)
UNITED ARAB EMIRATES	Mr. E. MAHADEEN, Director of Legal Affairs, Federal Authority for Nuclear Regulation
UNITED KINGDOM	Mr. A. PEYCHERS, Senior Policy Adviser, Office for Nuclear Development, Department of Energy and Climate Change
UNITED STATES	Ms. S. ANGELINI, Attorney Adviser, Office of Civilian Nuclear Programs, US Department of Energy Ms. A. CAPOFERRI, Deputy Assistant General Counsel for Civilian Nuclear Programs, US Department of Energy Mr. B. MCRAE, Assistant General Counsel, US Department of Energy Mr. T. ROTHSCHILD, Associate General Counsel, US Nuclear Regulatory Commission
URUGUAY	Prof. D. PUIG, Professor of Nuclear Law, College of Law, University of Uruguay
EUROPEAN COMMISSION	Ms. A. DURAND, Legal Officer, Directorate General for Energy
INTERNATIONAL ATOMIC ENERGY AGENCY	Ms. S. RIVERA, Legal Officer, Office of Legal Affairs
CTBTO	Ms. S. BRANDER, Chief, Legal Services Section

NEA PUBLICATIONS AND INFORMATION

The full **catalogue of publications** is available online at www.oecd-nea.org/pub.

In addition to basic information on the Agency and its work programme, the **NEA website** offers free downloads of hundreds of technical and policy-oriented reports.

An **NEA monthly electronic bulletin** is distributed free of charge to subscribers, providing updates of new results, events and publications. Sign up at www.oecd-nea.org/bulletin/.

Visit us on **Facebook** at www.facebook.com/OECDNuclearEnergyAgency or follow us on **Twitter** @OECD_NEA.

OECD/NEA PUBLISHING, 2 rue André-Pascal, 75775 PARIS CEDEX 16

Nuclear Law Bulletin No. 93

The *Nuclear Law Bulletin* is a unique international publication for both professionals and academics in the field of nuclear law. It provides authoritative and comprehensive information on nuclear law developments. Published free online twice a year in both English and French, it features topical articles written by renowned legal experts, covers legislative developments worldwide and reports on relevant case law, bilateral and international agreements as well as regulatory activities of international organisations.

Feature articles in this issue include: "Progress towards a global nuclear liability regime"; "The Convention on Supplementary Compensation for Nuclear Damage and participation by developing countries: A South African perspective"; "Fusion energy and nuclear liability considerations"; and "Nuclear energy and Indian society: Public engagement, risk assessment and legal frameworks".

OECD Nuclear Energy Agency
12, boulevard des Îles
92130 Issy-les-Moulineaux, France
Tel.: +33 (0)1 45 24 10 15
nea@oecd-nea.org www.oecd-nea.org

NEA No. 7181