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Searching for a Trans-Boundary Nuclear Liability Regime in the China and ASEAN Area: Legal Principles and Challenges
การค้นหาระบอบความรับผิดต่อนิวเคลียร์ข้ามพรมแดนในประเทศจีนและภูมิภาคอาเซียน: หลักการและความท้าทายทางกฎหมาย

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Abstract

To date, none of the countries in the China and ASEAN Area (“Area”) has enacted any laws governing trans-boundary nuclear liability and ratified the prominent convention relating to nuclear liability, the Convention on Supplementary Compensation for Nuclear Damage (“CSC”). Given the geographical proximity between China and ASEAN, any weakness of the nuclear liability framework, such as the inability to claim relief for a trans-boundary incident, will likely lead to stronger resistance to nuclear energy. Hence, the nuclear liability regime needs to be robust enough to fairly compensate all injured parties if and when an accident occurs in the Area. Currently, the international nuclear community has proposed two main

approaches to establish a nuclear liability regime in the Area, namely, the ratification of the CSC, and the cooperation to form a regional nuclear liability regime between China and ASEAN. Regardless of the approach to be adopted in the future, the purpose of this article is to identify the potential challenges hindering China and ASEAN to develop an applicable nuclear liability regime.

Keywords: China and ASEAN Area, CSC, Indonesia, Nuclear Compensation, Malaysia, Trans-boundary Liability

บทคัดย่อ

จวบจนถึงปัจจุบันยังไม่มีประเทศใดในพื้นที่จีนและอาเซียน (“พื้นที่”) ที่ออกกฎหมายควบคุมความรับผิดชอบทางนิวเคลียร์ข้ามพรมแดนและให้สัตยาบันในอนุสัญญาเกี่ยวกับความรับผิดชอบทางนิวเคลียร์ในอนุสัญญาชดเชยเพิ่มเติมสำหรับความเสียหายทางนิวเคลียร์ (“CSC”) เนื่องด้วยความใกล้ชิดทางภูมิศาสตร์ระหว่างจีนและอาเซียน จุดอ่อนใดใดของกรอบความรับผิดชอบทางนิวเคลียร์ เช่น การไม่สามารถเรียกค่าสินไหมทดแทนสำหรับอุบัติการณ์ข้ามพรมแดนได้นั้นอาจนำไปสู่การต่อต้านพลังงานนิวเคลียร์ที่รุนแรงขึ้น ดังนั้นระบบกฎความรับผิดชอบทางนิวเคลียร์จึงจำเป็นต้องมีความแข็งแกร่งเพียงพอที่จะชดเชยกลุ่มผู้เสียหายได้อย่างเป็นธรรมหากและเมื่อเกิดอุบัติเหตุขึ้นในพื้นที่ ในปัจจุบันประชาคมนิวเคลียร์นานาชาติได้เสนอแนวทางหลักในการจัดตั้งระบบกฎความรับผิดชอบทางนิวเคลียร์ในพื้นที่ขึ้นมาสองแนวทางด้วยกัน คือ การให้สัตยาบันใน CSC และการร่วมมือในการก่อตั้งระบบกฎความรับผิดชอบทางนิวเคลียร์ในระดับภูมิภาคระหว่างจีนและอาเซียน วัตถุประสงค์ของบทความนี้คือการระบุอุปสรรคที่อาจขัดขวางการพัฒนาระบบกฎความรับผิดชอบทางนิวเคลียร์ของจีนและอาเซียน โดยไม่คำนึงถึงแนวทางหนึ่งทางใดที่จะถูกนำมาใช้ในอนาคต

คำสำคัญ: พื้นที่จีนและอาเซียน ซีเอสซี อินโดนีเซีย การชดเชยด้านนิวเคลียร์ มาเลเซีย ความรับผิดชอบข้ามพรมแดน

1. Introduction

As of December of 2021, the People's Republic of China, as the biggest platform in the world for the deployment of nuclear technology to generate electric power, has 52 nuclear power reactors in operation with a capacity of approximately 49.7 GW and 17 under construction with a capacity of 18.5 GW.[1] Also, as pointed out by a recent study, it is predicted that the nuclear power production in China may surpass that of United States sometime before 2030.[2] The rapid development of nuclear power industry presents not only the increased electricity demand stemming from industrialization and the growth of the economy but also the urgent need to solve the national smog issue caused by coal-fired power plants.[3] Although China remains optimistic and confident about the prospects of nuclear energy, the nuclear power plants construction is slowing down in 2018, affected by "public pressure on safety issues, and by the emphasis placed by the government on the rehabilitation of ecosystems."[4]

Nuclear energy is no longer a novelty for most of the ASEAN countries. As illustrated by a recent Report released by the ASEAN Centre for Energy, since the 1960s, a limited number of nuclear reactor research facilities have been constructed in the ASEAN Region.[5] Moreover, the Philippines constructed the Bataan Nuclear Power Plant ("NPP") as the first and the only NPP in Southeast Asia in 1984. Due to the financial issues and safety concerns related to natural disaster, the Bataan NPP never took off.[6] To ensure that the energy supplies are secure, affordable, and environmentally sustainable, at different levels, several ASEAN states aspire the

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[1] 'World Nuclear Power Reactors & Uranium Requirements' (World Nuclear Association, March 2019) <http://www.world-nuclear.org/information-library/facts-and-figures/world-nuclear-power-reactors-and-uranium-requireme.aspx> accessed 31 December 2021; Mycle Schneider and Antony Froggatt, 'the World Nuclear Industry Status Report' (2018) <https://www.worldnuclearreport.org/IMG/pdf/20180902wnisr2018-lr.pdf> accessed 31 December 2021.

[2] 'Is China Powering the Future of Nuclear' (Power Technology, 10 October 2018) <https://www.power-technology.com/features/future-of-nuclear-china/> accessed 31 December 2021.

[3] Yasuo Takeuchi and Tallulah Lutkin, 'China's nuclear industry shows potential to overpower rivals' (ASIA Insight, 3 July 2018) <https://asia.nikkei.com/Spotlight/Asia-Insight/China-s-nuclear-industry-shows-potential-to-overpower-rivals> accessed 31 December 2021.

[4] Schneider and Froggatt (n 1) 11.

[5] 'Pre-Feasibility Study on the Establishment of Nuclear Power Plant in ASEAN' (ASEAN Centre for Energy, April 2018), 6 <http://www.aseanenergy.org/resources/pre-feasibility-study-on-the-establishment-of-nuclear-power-plant-in-asean/> accessed 31 December 2021.

[6] ibid 30-32.

nuclear energy to be one of the future and long-term solutions to sustainable energy source.[7] Pursuant to the Report, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam are identified as the nuclear frontrunners in ASEAN since they have carefully developed their own nuclear power programmes to achieve the ambitious desire after the occurrence of Fukushima incident in 2011. The Report also suggested that most of the frontrunners, after considering an adequate time span to construct a NPP, have predetermined the year of 2030 to 2035 as the target to use nuclear energy.[8] Although the frontrunners' commitment on the construction of NPPs shows that nuclear power promises an economically sound solution for the growing energy needs of emerging ASEAN Region, commentators pointed out that those countries who wish to pursue a NPP programme must not only focus on their own nuclear plans, but must also consider the interests of the Region, especially the liability thresholds as well as trans-boundary impacts.[9]

Given the geographical proximity between China and ASEAN, once a nuclear incident occurs, potential cross-border damage is likely to happen, especially for those NPPs that are sited close to international borders. As the previously Chernobyl incident[10] showed, the high levels of radioactive iodine released from the Chernobyl reactor in Ukraine severely affected foreign inhabitants, also the radioactive plume that resulted from the accident covered much of Europe, even reaching the UK in the first few days of May 1986.[11] Since the former Soviet Union was not a party to any international nuclear liability conventions, it was very difficult for foreign victims to claim compensation from Ukraine. As noted by one commentator:

> "victims within the Soviet Union were obliged to trust in the political will of their government to provide compensation, … whilst victims outside the

[7] ibid 51.

[8] ibid.

[9] George Borovas and Elina Teplinsky, 'ASEAN: The Next Nuclear Powerhouse? How Regional Cooperation can Aid the Development of Nuclear Power in Southeast Asia' (2011) Infrastructure Journal 3 <https://www.pillsburylaw.com/images/content/3/5/v2/3524/ASEANTheNextNuclearPowerhouse.pdf> accessed 31 December 2021.

[10] 'Chernobyl Accident 1986' (World Nuclear Association) <http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/chernobyl-accident.aspx> accessed 31 December 2021.

[11] 'Health Effects of the Chernobyl Accident: An Overview' (World Health Organization, April 2006) ("A large increase in the incidence of thyroid cancer has occurred among people who were young children and adolescents at the time of the accident and lived in the most contaminated areas of Belarus, the Russian Federation and Ukraine.") <https://www.who.int/ionizing_radiation/chernobyl/backgrounder/en/> accessed 31 December 2021.

> Soviet Union fell back on either common or civil law principles if applicable, or the political will of their own governments to compensate their losses."[12]

In China, although the recently enacted Nuclear Safety Law of China[13] ("NSL") is deemed as the highest legal validity in the field of nuclear law, the rules concerning nuclear liability and compensation are abstract.[14] Besides the principal provisions set out under Article 90 of the NSL, the State Council of China previously issued two essential administrative regulations, namely the Reply on Addressing the Issue of Third-Party Nuclear Liability (No. 44 [1986] of the State Council) ("1986 Reply")[15] and the revision to the 1986 Reply in 2007 (No. 64 [2007] of the State Council) ("2007 Reply")[16] as the main legislation addressing civilian nuclear damage compensation within the territory of China, but none of them regulates the issue of trans-boundary nuclear liability. Pursuant to the 2007 Reply, if there is no treaty or protocol on trans-boundary nuclear damage liability between China and a foreign country, the issue of compensation shall be handled according to the principle of reciprocity. It is still unclear what the effects of the principle of reciprocity would be when a foreign law establishes a different regime than China or even fails to adopt a nuclear liability regime.[17] In ASEAN, four nuclear energy frontrunners, Malaysia, Indonesia, the Philippine, and Vietnam, have set up their domestic nuclear liability regime. For instance, Malaysia enacted the Atomic Energy Licensing Act[18] ("AELA") in 1984, while the liability for nuclear damage has been well regulated according to Part IX. Moreover, the Act No. 10, 1997 on Nuclear Energy[19] ("1997 ANE"), enacted by

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[12] Julia A. Schwartz, 'International Nuclear Third Party Liability Law: The Response to Chernobyl' (2006) OECD 38.

[13] Nuclear Safety Law of China ("NSL"), English Version available at <https://www.oecd-nea.org/law/legislation/2017_china_nuclear_safety_law.pdf> accessed 31 December 2021.

[14] Jiu Liu, Bingyu Liu, and Dantao Chen, 'Legislative Study on China's Compensation for Nuclear Damage Liability' (2018) 10 Sustainability 2 <https://www.mdpi.com/2071-1050/10/7/2222> accessed 31 December 2021.

[15] 'Reply on Addressing the Issue of Third-Party Nuclear Liability' (Guohan 1986 No. 44) ("1986 Reply") <http://www.okcis.cn/20111123-i10-3532.html> accessed 31 December 2021.

[16] 'The Revision to the 1986 Reply in 2007' (Guohan 2007 No. 64) ("2007 Reply") <https://baike.baidu.com/item/国务院关于核事故损害赔偿责任问题的批复/22273506?fr=aladdin> accessed 31 December 2021.

[17] Jiu Liu and Michael Faure, 'Compensating Nuclear Damage in China' (2012) 11(4) Washington University Global Studies Law Review 807.

[18] Atomic Energy Licensing Act of Malaysia ("AELA"), English Version available at <http://extwprlegs1.fao.org/docs/texts/mal40263.doc> accessed 31 December 2021.

[19] Act No. 10, 1997 on Nuclear Energy of Indonesia ("ANE"), English Version available at <https://jdih.bapeten.go.id/files/_000160_1.pdf> accessed 31 December 2021.

Indonesia in 1997, contains a Chapter stipulating liability for nuclear damage. However, the above laws failed to go further to discuss the possibility of trans-boundary incidents. Additionally, the trans-boundary risk is aggravated by the fact that China and a majority of ASEAN countries are not contracting states to any international nuclear liability conventions.

To date, two main approaches have been proposed by the international nuclear law community in order to conquer the trans-boundary risk in the China and ASEAN Area. The first approach available for China and ASEAN countries is to participate in a universal international damage liability convention.[20] In case of a nuclear accident with trans-boundary impact, the country of the incident cannot refuse payment of compensation due to its strict responsibility under the convention. For the last several decades, the incidents at Chernobyl and Fukushima have showed the lack of a realizable universal nuclear liability framework, reflecting the inability of the international community to achieve a universal harmonized regime.[21] Considering the difficulty that the international community has already seen in developing a global nuclear liability regime, the second approach has been proposed, which is to establish a regional damage liability regime in the Area.[22] Regardless of the approach to be adopted in the Area, a fundamental question needs to be explored in the first instance in order to conduct further researches on what approach is more suitable for the Area, which is the legal principles of nuclear damage liability adopted by China and ASEAN countries as well as their distinctions. After illustrating the key distinct practices adopted among the states, the article will analyse the potential challenges faced by China and ASEAN to achieve a trans-boundary nuclear damage liability regime now.

[20] Makiko Tazaki, 'A Nuclear Third Party Liability Regime of a Multilateral Nuclear Approaches Framework in the Asian Region' (2014) 6 Sustainability 436-448, 441.

[21] Mohit Abraham, 'Nuclear Liability: A Key Component of the Public Policy Decision to Deploy Nuclear Energy in Southeast Asia' (Cambridge, Mass.: American Academy of Arts and Science, 2014) <https://www.amacad.org/sites/default/files/publication/downloads/nuclearLiability.pdf> accessed 31 December 2021.

[22] ibid.

2. Approaches of Establishing a Trans-Boundary Nuclear Damage Liability Regime in China and ASEAN

Currently, there are no legal or treaty obligations on China and a majority of ASEAN countries related to trans-boundary nuclear liability and compensation. Considering the scale of nuclear power expansion in the Area, one commentator raised that, in the early stages of implementing nuclear power programmes, China and ASEAN Area must have a clear mechanism for how to react in the event of a cross-border nuclear accident.[23] Pursuant to the recent studies, two main approaches are proposed in order to resolve the potential concerns of trans-boundary impacts of a nuclear incident in the Area. The first approach for China and ASEAN is to join one of the existing international nuclear liability conventions as a realistic and practical solution.[24] However, considering the difficulty that the international community has already seen in developing a global nuclear liability regime, it would be more practical to achieve such a framework with a "modest goal of attaining uniformity and certainty in a Region as opposed to the entire world".[25]

The current international nuclear damage compensation liability regime is well developed with two independent systems,[26] which are the Paris Convention system proposed by the Organization for Economic Cooperation and Development ("OECD") as well as the Vienna Convention system formed by the International Atomic Energy Agency ("IAEA"). The Paris Convention system consists of the original 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy ("Paris Convention"),[27] the 1963 Brussels Supplementary Convention as the supplement to the Paris Convention ("Brussels Supplementary Convention"),[28] and the 2004 Protocol to Amend the Paris Convention as the complete revision to the above Conventions ("2004 Protocol").[29] The Vienna system contains the 1963 Vienna Convention on Civil

[23] ibid 20.

[24] Tazaki (n 20) 440.

[25] Abraham (n 21) 36.

[26] Liu and Faure (n 17) 790.

[27] Convention on Third Party Liability in the Field of Nuclear Energy ("Paris Convention").

[28] 1963 Convention Supplementary to the Paris Convention of July 29, 1960 ("Brussels Supplementary Convention").

[29] 2004 Protocol to Amend the Paris Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960 ("2004 Protocol").

Liability for Nuclear Damage ("Vienna Convention")[30] and its 1997 Protocol to amend the Vienna Convention ("1997 Protocol").[31] Although the two systems share many principles concerning cross-border nuclear damage liability, such as strict liability of operator, liability is channeled exclusively to operator, exclusive jurisdiction, and limited liability of operator, etc., the two systems are completely independent.[32] Hence, the international nuclear energy community raised the issue of coordination and harmonization because, in general, "no country could be a party to both conventions, because the exact details were not consistent and could lead to potential conflict in their simultaneous application."[33]

Although the principles established by the two conventional systems have gradually formed the bedrock of the current international nuclear liability law, the effectiveness of the two conventions has also been doubted due to the different practices adopted between them. For instance, several key distinctions, such as the amount of liability, the time period within which a claim can be made, the geographical scope of application, the definition of "nuclear damage," and the approach to how compensation must be dispersed, are clearly presented among these conventions.[34] Since the two systems were operated in isolation, in 1988, the Joint Protocol relating to the Application of the Vienna Convention and the Paris Convention ("Joint Protocol") was proposed under the support of the IAEA and OECD.[35] Pursuant to the Joint Protocol, any parties to the Protocol are treated as if they are parties to both Conventions. Because the Joint Protocol only provides a solution regarding the relationship between the victims in contracting states of both conventions, significant increase in the amount of compensation and also issues of States that are not party to any of the conventions remain as the issues not addressed by the Joint Protocol.[36] Presently, only a few states ratified the Joint Protocol. As pointed out by IAEA, most of the Western European countries rely on the principles laid down by the Paris Convention to deal with nuclear liability and

[30] Vienna Convention on Civil Liability for Nuclear Damage ("Vienna Convention").

[31] Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage ("1997 Protocol").

[32] Abraham (n 21) 10.

[33] ibid 12.

[34] ibid 17.

[35] Joint Protocol relating to the Application of the Vienna Convention and Paris Convention (Joint Protocol) <https://www.oecd-nea.org/law/joint-protocol.html> accessed 31 December 2021.

[36] M.P. Ram Mohan, *Nuclear Energy and Liability in South Asia* (Chapter 2 "The Development of Institutions and Liability Laws Relating to Nuclear Energy", Springer India 2015) 19-52, 38.

compensatory standards, while the Vienna Convention system is popular among states from Eastern Europe as well as South America.[37] Since those states are far away from the China and ASEAN Area, any nuclear incident is unlikely to cause damage to the parties in the Area.[38] Therefore, it would be difficult for China and ASEAN to reach the consensus to choose one of the convention systems as the framework to govern trans-boundary nuclear liability.

In order to achieve a wider harmony in the international nuclear liability laws, in 1997, the IAEA sponsored another international nuclear liability regime under the support of the United States, namely the Convention on Supplementary Compensation for Nuclear Damage ("CSC").[39] The CSC required ratification from at least five states within a minimum of 400 GW thermal of installed nuclear capacity so as to enter into force. With Japan's ratification of the CSC, it finally took effect on 15 April 2015.[40] The CSC is open not only to states that are contacting parties to either of the two main convention systems, but also other states provided that their national legislation is consistent with uniform rules on liability laid down in the Annex to the CSC.[41] It has been pointed out that the difficulty in attaining a universal nuclear damage liability is "owing to the different approaches subscribed to by the two of the most important players: the United States and France."[42] Although France is a strong supporter of the Paris convention system in the Western Europe, it showed its desire to bring the CSC into force in a joint French-U.S. statement from August 28, 2013.[43]

One of the key innovations created by the CSC is the two-tiered system of nuclear damage compensation. In the first tier, the installation state has the obligation to ensure availability of 300 million special drawing rights ("SDRs") or a greater amount that it may have specified to the Depositary at any time prior to the nuclear

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[37] 'Initiative for Global Liability' (World Nuclear News, 30 August 2013) <http://www.world-nuclear-news.org/NP_Initiative_for_global_liability_3008131.html> accessed 31 December 2021.

[38] Tazaki (n 20) 441.

[39] Convention on Supplementary Compensation for Nuclear Damage (CSC) (adopted on 12 September 1997, entered into force on 15 April 2015) <https://www.iaea.org/topics/nuclear-liability-conventions/convention-supplementary-compensation-nuclear-damage> accessed 31 December 2021.

[40] Aabha Dixit, 'Japan Joins the Convention on Supplementary Compensation for Nuclear Damage' (International Atomic Energy Agency, 16 January 2015) <https://www.iaea.org/newscenter/news/japan-joins-convention-supplementary-compensation-nuclear-damage > accessed 31 December 2021.

[41] CSC.

[42] Abraham (n 21) 17.

[43] 'Joint Statement of Liability for Nuclear Damage between United States and France' (singed on 28 August 2013) <https://www.energy.gov/sites/prod/files/2013/08/f2/Joint%20Statement%20Signed_0.pdf> accessed 31 December 2021.

incident.[44] To the extent that the funds from the operators are insufficient to cover this amount, the installation state is bound to make public funds to capture the difference.[45] Pursuant to the second tier, beyond the first tier of compensation, additional amounts would have to be offered through contributions by contracting states.[46] The contributions to the fund are based on a formula under which more than 90% of the contributions will come from nuclear generating member states while the remaining portion comes from all member states to the CSC on the basis of their United Nations rate of assessment.[47] Nuclear power generating states generally have high rates of assessment, indicating that a high percentage of the contributions will come from nuclear power generating contracting states.[48]

As noted by one commentator, first, non-generating contracting states are only bound to provide 2 or 3 percent of the contributions to the international fund; in addition, one half of the international fund is reserved exclusively for trans-boundary damage, so the second tier of compensation was developed to be especially attractive to non-generating states.[49] The advantage for the nonnuclear ASEAN countries in joining the CSC is that "they will become a part of a liability and compensation regime that provides a level of certainty and predictability."[50] To date, although Indonesia and Philippines have signed the CSC, as of yet none of China and the ASEAN countries has deposited an instrument of ratification, acceptance, and approval for the Convention. The most likely route by which "inconsistencies created by disparate national law regimes may be harmonized is through joiner of CSC and by national laws complying with the legal requirements in the Annex."[51] In recent years, it has witnessed that China is actively developing its nuclear liability regime, such as the enactment of the NSL in 2018, and is gradually planning to raise the degree of

[44] CSC art III (1).

[45] ibid.

[46] ibid art IV (1).

[47] Marija Ampovska, 'Participation by Developing Countries in the Convention on Supplementary Compensation for Nuclear Damage: A Western Balkans Perspective' (2016) 7 Balkan Social Science Review 31-47, 39.

[48] David, D. B, 'The Convention on Supplementary Compensation for Nuclear Damage and participation by developing countries: A South African perspective' (2014) 93 Nuclear Law Bulletin 25-43, 33.

[49] Ampovska (n 47) 39.

[50] ibid 43.

[51] Jonathan Bellamy, 'Civil Liability for Nuclear Damage in Countries Developing Nuclear New Build Programmes' (2019) 12(1) The Journal of World Energy Law & Business 108-120.

limitation of financial security.[52] Although the above efforts show China's determination to make the domestic nuclear liability statute that conform to the standards set forth in the CSC's Annex, it would be difficult for China to ratify the CSC in near future. Given the slow progress on achieving a global nuclear liability regime, one commentator raised that "perhaps the approach needs to shift from looking for international consensus on issues of nuclear liability to focusing on how various Regions decide to approach nuclear liability."[53]

In 2015, China organized the 1st ASEAN-China Capacity Building on Civilian Nuclear Energy in China, aiming to pursue civilian nuclear energy cooperation in conformity with their obligations under international law and in accordance with their respective domestic laws, regulations, and policies.[54] Subsequently, the China General Nuclear Power Corporation and the ASEAN Centre for Energy signed a cooperation agreement on working together to carry out capacity-building activities for ASEAN countries in the area or planning nuclear energy programs.[55] Presently, China also plans to provide ASEAN nuclear frontrunners, such as Thailand, with the most advanced, economical and safest nuclear power technology, as well as equipment, management experience and quality service.[56] Given the above efforts put forward by China and ASEAN, the Area has an intrinsic mutual interest in formulating and strengthening a regional framework on trans-boundary nuclear liability. Therefore, it may be more practical to achieve such a framework with a more modest goal of attaining uniformity and certainty in the Area as opposed to the entire world.[57]

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[52] Chen Gang, 'China's Nuclear Damage Liability System: Its Establishment and Framework' 298 (1) 2019 Academic Exchange 69.

[53] Abraham (n 21) 19.

[54] 'Building Capacity for Nuclear Power Development' (ASEAN Centre for Energy) <http://www.aseanenergy.org/articles/building-capacity-for-nuclear-power-development/> accessed 31 December 2021.

[55] 'CGN to Train ASEAN Nuclear Professionals' (World Nuclear News, 2 June 2015) <http://www.world-nuclear-news.org/Articles/CGN-to-train-ASEAN-nuclear-professionals> accessed 31 December 2021.

[56] 'China, Thailand Agree to Nuclear Energy Cooperation' (World Nuclear News, 5 April 2017) <http://www.world-nuclear-news.org/NP-China-Thailand-agree-to-nuclear-energy-cooperation-0504174.html> accessed 31 December 2021.

[57] Abraham (n 21) 36.

3. Comparative Study on the Legal Principles on Trans-Boundary Nuclear Liability Adopted by Domestic Legislation of China and ASEAN countries

Although the two conventional systems have no binding force on China and ASEAN countries, a number of principles of the systems have been replicated in the domestic legislation of several states in the Area. Currently, although the relevant legal principles of nuclear liability are mainly scattered in the NSL as well as two important Replies, cross-border liability has not been addressed in China. Additionally, in the ASEAN Region, Malaysia and Indonesia have enacted domestic laws that follow internationally accepted principles of exclusive operator liability and that place limitations on liability. However, the laws failed to go further to discuss the impacts of trans-boundary nuclear incidents. The following sections, based on the above laws, sketch out whether the current rules on nuclear damage liability in China and the two frontrunners, Malaysia and Indonesia, are consistent with the principles laid down by the two conventional systems. Specifically, some key distinctions among the rules will be highlighted.

A. Definition of Nuclear Operator and Scope of Nuclear Damage

In accordance with Article 90 of the NSL, in the event of a nuclear accident, the installation operator is strictly bound to compensate damage caused by the accident pursuant to the national nuclear damage liability regime. Under Article 1 of the 1986 Reply, a nuclear operator refers to an entity that obtains the status of legal person in the territory of China and operates a nuclear plant or engages in supply, reprocessing, and transport of nuclear materials with its own nuclear facilities. Due to the development of nuclear energy industries in China, the State Council noticed that the traditional definition was no longer capable of regulating new types of damage caused by nuclear entity. Subsequently, in 2007, the State Council extended the scope of nuclear operator to an entity operating civilian research reactor, or civilian engineering experimental reactors, or conducting the production or transport of civilian nuclear fuel and the storage, transport, or reprocessing of spent fuel with its

own nuclear facilities.[58] It is clear that an explicit scope of nuclear operator could enable injured parties to institute a compensation claim against the right offender. In China, only certain types of damage are entitled to be compensated. The State Council, after reviewing the current practices established by the two convention systems, stipulates that a nuclear operator shall be liable for personal bodily injury or death, property loss, or environmental damage caused by a nuclear accident.[59] The NSL also restated that only the types of damage listed above are entitled to compensation.[60]

In ASEAN, Malaysia is deemed as the first country incorporating a specific definition on nuclear operator into its domestic legislation. According to the AELA, an installation operator means: "a person licensed under this Act by the appropriate authority as the operator of a nuclear installation."[61] In addition, upon the designation by the competent authority, a carrier of nuclear material or a person handling radioactive waste can also be considered as an installation operator.[62] Article 2 of the AELA stipulates that personal death or injury or property loss is entitled to compensation if it is proven before the court that such damage has been caused by a nuclear incident. Furthermore, if there is any nuclear damage to the environment, the Government of Malaysia or a State in Malaysia, or by both, shall make a claim for compensation before the competent court.[63] In Indonesia, an operator is defined as an individual person or a legal body that is liable in operating a nuclear installation.[64] If damage that has resulted from a nuclear incident occurs in that nuclear installation, the operator will be held liable for such damage.[65] In addition, if a nuclear incident

[58] 2007 Reply art 1.

[59] ibid art 2.

[60] NSL art 90.

[61] AELA art 42. ("nuclear installation" means-(a) any nuclear reactor other than one with which a means of sea or air transport is equipped for use as a source of power, whether for propulsion thereof or for any other purpose;(b) any factory using nuclear fuel for the production of nuclear material;(c) any factory using nuclear material for the production of nuclear fuel or any factory designed or adapted for the processing of nuclear material, including the reprocessing of irradiated nuclear fuel; or(d) any facility where nuclear material is placed or stored other than storage incidental to the carriage of such material: Provided that the appropriate authority may determine that several nuclear installations of one installation operator which are located at the same site shall be considered as a single nuclear installation.).

[62] ibid art 51.

[63] ibid art 48.

[64] ANE art 1 (17). Also pursuant to art 1 (12), "Nuclear installation is defined as: a. any nuclear reactor; b. any facility for the purification, conversion, enrichment of uranium, fabrication of nuclear fuel and/or reprocessing of spent fuel; and/or c. any facility which is used for storing nuclear fuel and spent fuel.".

[65] ibid art 28.

happens during the transportation of nuclear fuel or spent fuel, the nuclear installation consignor will be held liable for any damage.[66] Pursuant to Article 1(16), traditional damage, such as any loss in the form of personal death or injury, damage to property, as well as contamination and damage to the environment is entitled to compensation. The rule further states that loss as a result of preventive measure or loss as a result of measure of reinstatement of impaired environment shall be compensated by the operator.[67]

B. Sole and Absolute Liability of Nuclear Operator

As indicated above, both of the conventional systems adopt the principle that the liability of operator for nuclear damage shall be absolute, which requires the operator to assume not only strict liability, but also sole liability, for nuclear accident damage.[68] The above principle has also been adopted in the Chinese nuclear liability system since 1986. Pursuant to Article 2 of the 1986 Reply and Article 90 of the NSL, nuclear operators are the only parties to be liable for nuclear damage, while other parties, such as the suppliers of equipment, engineering, and services to the operators, shall not be deemed as the subject of liability. The adoption of sole liability principle aims to avoid lengthy questions of complicated legal cross-actions for the victims as well as assist the victims to obtain compensation in a timely manner.[69] In addition, the current rule requires nuclear operators to bear strict liability for nuclear damage. Once a nuclear accident occurs, no matter whether the operator constitutes any fault in the accident, the operator is strictly responsible for the damage. In practice, "given the special dangers involved in civil industry activities and the difficulty of establishing negligence in particular cases,"[70] the adoption of strict liability could encourage victims to promptly file the compensation lawsuit against the designated operator only upon proving the relationship between the accident and the damage for which compensation is sought.

In terms of the liability regime of installation operators in the ASEAN Region, the two nuclear frontrunners adopt distinct approaches. On the one hand, Malaysia explicitly provides an absolute and exclusive liability regime applicable to operator.

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[66] ibid art 29.
[67] ibid art 1 (16).
[68] Liu, Liu, and Chen (n 14) 8.
[69] ibid 9.
[70] ibid.

Pursuant to Article 45 of the AELA, the liability of operator for any nuclear damage shall be absolute, and no party other than the operator shall be liable for nuclear damage.[71] On the other hand, the Government of Indonesia has already ratified the Vienna Convention, implying that the principle of strict and absolute liability should be applied to installation operator. But according to Chapter VII of 1997 ANE, Article 28 and Article 29 only stipulate that nuclear installation operators and nuclear installation consignors shall be liable for nuclear damage in a general sense,[72] but there is no explicit provision regulating the strict and absolute liability of nuclear operators under the Act. Additionally, the ANE further provides that if there is a prior written agreement, the consignor may transfer the liability to the nuclear installation consignee or the management carrier.[73]

C. Exemptions and Right of Recourse

Although the liability imposed to nuclear operator is absolute in China, where a nuclear accident is fully caused by several legal grounds, including wars, armed conflicts, or riots, as listed under the NSL, the operator can be exonerated from liability.[74] Prior to the adoption of the above exemptions to operator's strict liability, pursuant to the 1986 Reply, operators shall rely on the exemption of "a grave natural disaster of an exceptional character" as a defense to avoid liability.[75] Since the international nuclear law community reached the consensus that it is crucial for operators to construct and operate nuclear installations more carefully in order to make them more resistant to natural disasters, the protocols to the two original Conventions have abrogated the natural disaster as a defense. The State Council of China, in its 2007 Reply, also excluded the defense of grave natural disaster from the exception of nuclear liability. In Malaysia and Indonesia, the issue of exceptions to strict liability has also been addressed by the two domestic nuclear laws. Under Article 46(1) of AELA, no operator shall be liable for nuclear damage caused by incident directly due to "an act of armed conflict, hostilities, civil war, insurrection or a grave natural disaster of an exceptional character."[76] In Indonesia, nuclear damage,

[71] AELA art 45.
[72] ANE art 28, 29.
[73] ibid.
[74] NSL art 90 (2).
[75] 1986 Reply art 5.
[76] AELA art 46 (1).

which is caused by a nuclear incident directly due to "an act of international or non-international armed conflict, or a grave natural disaster exceeding the limit of safety requirement design established by the Regulatory Body"[77] shall be excluded from the liability of operator. Based on the above practices, one of the main differences between China and the two ASEAN states is that whether "a grave natural disaster of an exceptional character" can constitute a legal ground to be exonerated from liability for nuclear operator.

In addition, after the whole compensation process has been completed, is the operator granted the right of recourse if the damage is caused by the intentional act or omission of a third party? The answer is confirmed pursuant to the two Replies in China.[78] In addition, upon a prior mutual agreement reached by the operator and any other parties, such as the suppliers of equipment, engineering, and services to the operator, the operator may seek recourse after it has assumed liability for the damage.[79] In the ASEAN Region, both nuclear laws stipulate that an operator shall have a right of recourse under certain legal circumstances. In Malaysia, upon proving that the nuclear damage is resulted from the intent of a third party, the operator shall have a right of recourse against the said party.[80] In Indonesia, the right of recourse is also explicitly stipulated. The operator of the nuclear installation, after paying the compensation for nuclear damage, shall have a right of recourse where (1) such a right is expressly provided for in a contract in writing with another installation operator or any other person; (2) the incident has resulted from the act of commission or omission of an individual done with the intent to cause such damage; (3) the nuclear incident results from stolen nuclear material, against the person who stole or unlawfully received the nuclear material causing the incident.[81]

D. Limit of Liability and Financial Guarantee System

To promote socio-economic development and ensure that the nuclear operators will not end up bankrupting due to the unlimited liability regime imposed on them, it is a common place by now to say that most of the states have incorporated the limited liability regime into their nuclear liability law, including China

[77] ANE art 32.
[78] 1986 Reply art 4; 2007 Reply art 9.
[79] 2007 Reply art 9; NSL art 90.
[80] ANE art 33.
[81] AELA art 47.

and the two ASEAN nuclear frontrunners. The maximum amount of liability applicable to nuclear operator was not fixed under the NSL, so the amount adopted by the 2007 Reply will be applied in nuclear compensation claims. According to Article 7 of the 2007 Reply, nuclear operators managing a nuclear plant or conducting the storage, transport, or reprocessing of spent fuel would have their potential liability capped at RMB 300 million for nuclear-related damage, and the maximum amount of liability of other types of operator would be RMB 100 million.[82] The two nuclear frontrunners of ASEAN also incorporated the limited liability regime in their domestic civilian nuclear legal system. The maximum limit of liability of the installation operator shall be Ringgit 50 million and Rp 900 billion for one nuclear accident in Malaysia and Indonesia respectively.[83] Also, in consideration of the size and nature of the nuclear installation, the extent of the damage involved or any other circumstances, the maximum limit of liability may be reconsidered by competent organs in both countries.[84]

To ensure the effective fulfillment of liability for nuclear damage, Article 90 of the NSL stipulates that operator of a nuclear facility should "maintain adequate financial security by purchasing liability insurance, participating in mutual assistance programmes, and adopting other means."[85] This rule well indicates that a nuclear operator, before its official operation or function, shall purchase sufficient insurance and rely on other financial security means to cover its maximum amount of liability. Additionally, following the principle established by the two convention systems, unless an insurance or other financial security covering an operator's liability for nuclear damage is secured and maintained, no license to operate a nuclear installation or transport nuclear materials shall be issued by the competent organ in Malaysia and Indonesia.[86] Article 60 of the AELA further provides that "such insurance or other financial security may include private insurance, private contractual indemnity,

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[82] 2007 Reply art 7.

[83] AELA art 59; ANE art 34.

[84] AELA art 59(2) ("The Board may, taking into account the size and nature of the nuclear installation, the extent of the damage involved or any other circumstances, prescribe a different limit of liability from that provided under subsection (1) but such different limit of liability shall in no event be less than an amount equivalent at the commencement of this Act to twelve million ringgit for any one nuclear incident."); ANE (n 20) art 34(4). ("The maximum limit of liability under clause (1) may be reconsidered through the Government Regulation.").

[85] NSL art 90.

[86] AELA art 60; ANE art 35.

self-insurance or a combination thereof or other evidence of financial ability to pay compensation."[87]

E. Government Indemnity

To ensure the victims will be efficiently and adequately compensated, if the amounts for which the operator bears compensation liability exceed the maximum amount, the Chinese government is bound to provide financial indemnity up to RMB 800 million for nuclear damage.[88] In case of damage resulting from an extraordinary nuclear accident, upon the assessment and approval by the State Council, additional financial indemnity shall be arranged for the state's complementary compensation regime.[89] Since the rule failed to provide the specified agency to be responsible for complementary indemnity and how the agency should fulfill its duties, future legislation should consider a feasible way to address the unsettled issues.[90] In addition, where the government of Malaysia considers the necessity, it may decide to "provide the necessary funds for the payment of claims for compensation for nuclear damage which have been established against the operator to the extent that the yield of insurance or other financial security is inadequate to satisfy such claims."[91] The Atomic Energy Licensing Board of Malaysia bears the responsibility to furnish a report containing its recommendations for the appropriation of additional funds to the Minister. Later, the Minister shall cause the report to be laid forthwith before the Dewan Rakyat for final approval.[92] In Indonesia, the issue of government indemnity regime was not addressed under the 1997 ANE, so the domestic nuclear law still requires some amendments to ensure it is up to date with current international nuclear liability provisions.

F. Court Jurisdiction and Time Limits

Pursuant to the NSL as well as the 2007 Reply, the competent court with jurisdiction over nuclear compensation claims as well as the time limits to file compensation lawsuits are not addressed, so the only reference to the above issues is

[87] AELA art 60 (2).
[88] 2007 Reply art 7.
[89] ibid.
[90] Liu, Liu, and Chen (n 14) 10.
[91] AELA art 61(1).
[92] ibid art 61 (2), (3).

the regulation under the 1986 Reply. According to Article 7 of the 1986 Reply, for a nuclear accident occurring in the territory of China, the court located where the accident occurred shall have the jurisdiction over compensation claims.[93] As to the issue of time limitation applicable to nuclear damage compensation, Article 6 stipulates that a victim shall lose the right to claim compensation if more than three years have elapsed from the date on which the victim first acquired, or should have first acquired, knowledge of the nuclear accident damage. In addition, a victim shall bring its claim before the competent court no more than 10 years after the occurrence of the accident, failing to meet the above requirement, and the right to be compensated by the operator will be forfeited.[94]

In the ASEAN Region, Indonesia also adopts the same practice that the competent court to hear compensation claims is the court of the first instance within the place where the nuclear incident occurred. Also, in case that a nuclear incident occurred outside Indonesia during transportation of nuclear fuel or spent fuel, the competent court is the Court of the first instance in Central Jakarta.[95] However, the AELA, as the domestic nuclear legislation in Malaysia, failed to address the competent court with jurisdiction over nuclear compensation claims. In addition, the right to claim compensation by victims shall be brought within twenty years in Malaysia and three years in Indonesia from the date on which the persons suffering nuclear damage had knowledge or should reasonably have had knowledge of such damage.[96] Subject to the above rule, rights to compensation under the AELA and the 1997 ANE shall cease after twenty years from the date of the nuclear incident in Malaysia and thirty years from the date of the statement issuance by the Regulatory Body in Indonesia.[97]

4. Potential Challenges of Establishing a Trans-Boundary Nuclear Damage Liability Regime in the Area

It is evident that a robust nuclear liability regime available for the China and ASEAN plays a significant role for the growth of nuclear power as well as its public acceptance in the Area. To achieve the goal, nuclear cooperation on trans-boundary

[93] 1986 Reply art 7.
[94] ibid art 6.
[95] ANE art 40.
[96] AELA art 63(2); ANE art 39 (2).
[97] AELA art 63(1); ANE art 39 (1).

liability is strongly required to be put forward by governments, regulators, international or regional institutions, and the nuclear industry. It has been clarified that the purpose of the article is not to conduct a debate on what approach should be adopted in order to achieve an ideal nuclear liability regime in the Area. No matter what approach to be adopted in the future, a prior question needs to be identified, which is the potential challenges hindering China and ASEAN to reach a harmonized regime in the Area. As studied earlier, China and two of the nuclear frontrunners adopt a number of principles established by the two conventional systems in forming their domestic nuclear damage liability and compensation regulations, but there are still several inconsistent practices among them. These inconsistent practices may hinder the countries to reach a trans-boundary liability regime in the Area, and the following sections aim to highlight the potential challenges faced by China and ASEAN now.

A. A Clear Scope of Nuclear Damage

In the last several decades, a key problem of the two original conventions is the relatively narrow scope of nuclear damage that qualifies to be compensated. Both conventions define nuclear damage as loss of lives and personal injury as well as loss of or damage to property, except on-site property damage. Compensation for any damage other than the above damage is subject exclusively to the law of the competent court.[98] The Chernobyl accident showed that damage to the environment, costs of preventive measures and economic loss should constitute substantial portions of the total damage. If the domestic nuclear law fails to acknowledge that the above types of damage are entitled to compensation, the legitimate interests of victims shall not be fully preserved.[99] With the increasing demand for protection of environment and legitimate interests that could be affected by a nuclear incident, the scope of nuclear damage under the original conventions has been broadened by the international nuclear community. Currently, pursuant to the CSC, three main additional types of damage have been incorporated into the scope of nuclear damage, namely the cost of reinstatement measures for the impaired environment, cost of preventive measures, as well as different forms of economic loss, such as loss

[98] Vienna Convention art 1(1)(k); Paris Convention art 3(1).

[99] Duncan E.J. Currie, 'the Problems and Gaps in the Nuclear Liability Conventions and an Analysis of How an Actual Claim Could be Brought Under the Current Existing Treaty Regime in the Event of a Nuclear Accident' (2008), 110-112, <https://www.law.du.edu/documents/djilp/The-Problems-Gaps-Nuclear-Liability-Conventions-Analysis-How-Actual-Claim.pdf> accessed 31 December 2021.

arising from death, personal injury or damage to property, to the extent determined by the law of the competent court.[100] The CSC is a product of "many years of multilateral negotiations and represents a balance of various legal, economic and political considerations",[101] so the widened scope of damage represents a significant improvement in the protection of the public from the adversely effects of a nuclear incident.

In the China and ASEAN Area, it has been widely acknowledged that damage to or loss of life of any person, of any property, and damage to environment caused by a nuclear incident fall into the scope of nuclear damage compensation. In China, the scope of damage is "far too abstract and principal."[102] Although the NSL regards "environmental damage" as a significant part of nuclear damage compensation, it is still unclear whether the enjoyment of the environment, costs of preventive measures, and restoration measures can be compensable. Moreover, the NSL failed to address whether different forms of economic loss are entitled to compensation.[103] Contrarily, Indonesia provides that loss as a result of preventive measure and loss as a result of measure of reinstatement of impaired environment are recoverable under the 1997 ANE. It can be seen that the current scope of nuclear damage under the Indonesian legislation is more consistent with the practice adopted by the CSC. Faced with the distinct practices adopted by China and ASEAN countries, a key challenge is to reach the consensus on what types of nuclear damage are recoverable under the nuclear liability regime to be adopted in the future.

B. Exemption of Absolute Liability: Grave Natural Disaster of an Exceptional Character

The principle of absolute liability of operator laid down by the two conventional systems has formed a fundamental feature of the international nuclear liability law. China, Indonesia, and Malaysia have all replicated this principle into its domestic nuclear legislation. Once an injured party proves the causation of the nuclear incident and the damage for which compensation is claimed, the operator

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[100] Ampovska (n 47) 40.

[101] Vladimir Boulanenkov, 'Main Features of the Convention on Supplementary Compensation for Nuclear Damage-an Overview' (Reform of Civil Nuclear Liability, Budapest Symposium, OECD/NEA 1999) 170.

[102] Liu, Liu, and Chen (n 14) 8.

[103] Liu and Faure (n 17) 801.

cannot avoid liability even by proving his diligence. Pursuant to the Paris Convention and Vienna Convention, no liability shall attach the operator if he proves that the damage is directly due to several legal grounds, such as an act of armed conflict, hostilities, civil war.[104] Moreover, the liability of the operator is excluded in case of a nuclear incident which is caused by "a grave nature disaster of an exceptional character", but later, such an exemption has been removed from the Protocols to the Paris Convention and Vienna Convention.[105]

As noted above, a key difference between the domestic nuclear laws of China and the two frontrunners of ASEAN is whether a grave natural disaster can constitute an exoneration of the absolute liability principle. In China, the rapid development of nuclear technology has pushed the domestic nuclear community to believe that nuclear operators should construct and operate nuclear installations more carefully in order to make them more resistant to natural disasters, thus making it reasonable to exclude such a defense from the exoneration. The NSL reaffirmed that nuclear operator cannot raise "a grave nature disaster of an exceptional character" as a legal defense to exempt liability. In the ASEAN Region, due to the frequent occurrence of natural disasters such as volcanic eruptions, earthquakes, tsunamis, floods, and landslides in Indonesia, and disasters like floods and landslides in Malaysia even it is located outside the Pacific Ring of Fire and typhoon belt,[106] the domestic laws of both countries remain the traditional practice that no liability shall attach to an operator for nuclear damage caused by a nuclear accident directly due to "a grave nature disaster of an exceptional character". So far, another challenge faced by China and ASEAN to form a clear nuclear liability regime is to reach a mutual understanding on whether "a grave natural disaster of an exceptional character" can serve as a defense for nuclear operators.

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[104] Vienna Convention art 6; Paris Convention art 9.

[105] For example, when the Paris Convention was passed in 1960, natural disaster may compose a valid defense. Article 9 states: The operator shall not be liable for damage caused by a nuclear incident directly due to an act of armed conflict, hostilities, civil war, insurrection or, except in so far as the legislation of the Contracting Party in whose territory his nuclear installation is situated may provide to the contrary, a grave natural disaster of an exceptional character. After the convention was revised in 2004, natural disaster is no longer a valid defense. Article 9 now states: The operator shall not be liable for nuclear damage caused by a nuclear incident directly due to an act of armed conflict, hostilities, civil war, or insurrection.

[106] Mely Caballero-Anthony and Julius Cesar I. Trajano, 'The State of Nuclear Energy in ASEAN: Regional Norms and Challenges' (2015) 39 Asian Perspective 695-723, 707-708.

C. Principle of Supplier Liability

As studied above, China and the two ASEAN nuclear frontrunners also accepted the practice of channeling the liability for a nuclear incident to operators as established by the two conventional systems. Consequently, nuclear suppliers will not be the subject of liability in the Area. The adoption of this principle could avoid complicated questions of legal cross-actions to establish liability as well as obviate the necessity of all parties involved in construction or operation of a nuclear installation to take out insurance.[107] Indeed, if a nuclear accident has resulted from the act of omission or commission of the supplier done with the intent, or the operator and supplier have a prior contact providing a right of recourse, the operator, after paying the compensation, shall rely on the recourse right to seek reimbursement from the supplier. To date, many countries, academic and environmental organizations have argued that since the current liability regime permits nuclear suppliers to escape the consequences of liability, they may be reluctant to comply with safety compliance, and any defects of the nuclear equipment or material might be noticed after the operator has commenced the operation. Therefore, the operator, after paying the compensation for nuclear damage, shall have a right of recourse against the supplier whose products or services have patent or latent defects or are substandard.[108]

In 2014, about 1,400 injured parties filed a joint lawsuit against the suppliers that manufactured reactors at Fukushima NPP, challenging the current regulations that provide immunity to suppliers from liability and claiming the suppliers should be financially liable for damage cause by the accident.[109] The goal of the plaintiffs is not to claim economic compensation, but to "raise awareness in relation to the issue of supplier immunity from nuclear liability."[110] In 2010, a principle of supplier liability was adopted by India when the Parliament passed the Civil Liability for Nuclear Damages Act, 2010. Pursuant to Section 17(b), the operator, after paying the compensation for nuclear damage, shall have a right of recourse where "the nuclear incident has resulted as a consequence of an act of supplier or his employee, which

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[107] Abraham (n 21) 4.

[108] ibid 47.

[109] 'Mari Yamaguchi, Hundreds Sue Makers of Fukushima Nuclear Plant' (San Diego Union Tribune, 30 January 2014) <https://www.sandiegouniontribune.com/sdut-hundreds-sue-makers-of-fukushima-nuclear-plant-2014jan30-story.html> accessed 18 April 2019.

[110] Abraham (n 21) 8.

includes supply of equipment or material with patent or latent defects or sub-standard services."[111] As noted above, armed with the third-generation nuclear power technology, China is currently discussing cooperation with countries from ASEAN to provide nuclear equipment to feed into the planned nuclear plants.[112] So whether ASEAN will consider the principle of supplier liability to be a feasible principle in the Area remains to be seen. If ASEAN countries believe that an operator should have a right to recourse in cases where a nuclear incident has resulted as a consequence of an act of supplier or its employee, which includes supply of equipment or material with defects or sub-standard services, whether China, as a potential prominent supplier country, will accept this novel principle remains to be a question.

D. Liability Thresholds for Nuclear Accidents and Financial Security

The adoption of the principle that limits the amount of compensation by a nuclear operator aims to ensure the development of nuclear industry. If a country fails to adopt the limited liability principle in its legislation, nuclear operators may have to resort to their own assets to pay nuclear compensation once their insurance coverage for the damage is exhausted, which may lead them into bankruptcy. Unlimited liability may lead to the ruin of the operator, but in contrast, limited liability may lead to ruin the victims in the event of insufficient funds to meet potential compensation demand in case of a severe nuclear accident.[113] To alleviate the above concern, the minimum level of a nuclear operators' liability under the Protocol to the Paris Convention and Vienna Convention as well as the CSC has been significantly increased. For instance, as indicted above, at least 300 million SDRs should be provided by the liable operators, or by the Installation State or by a combination of the two.

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[111] Civil Liability for Nuclear Damage Act of India section 17(b) ("The operator of the nuclear installation, after paying the compensation for nuclear damage in accordance with section 6, shall have a right of recourse where— (b) the nuclear incident has resulted as a consequence of an act of supplier or his employee, which includes supply of equipment or material with patent or latent defects or sub-standard services.").

[112] Eijas Ariffin, 'Will We See Nuclear Energy in Southeast Asia' (The ASEAN Post, 11 July 2018) <https://theaseanpost.com/article/will-we-see-nuclear-energy-southeast-asia> accessed 31 December 2021.

[113] Currie (n 99) 91.

In the China and ASEAN Area, the debate on increasing the maximum level of liability of operators is still ongoing. As noted above, the amount of liability imposed upon an operator is fixed at RMB 300 million in China. A fatal nuclear accident would entail substantive compensation as Fukushima Daiichi Accident showed. Given China's social economy and the status of the nuclear industry, the amount is far below the average standards contained in the international conventions and is also contrary to relevant international development trends.[114] In Indonesia and Malaysia, the liability thresholds are also relatively low compared to other nuclear energy-producing countries.[115] Indeed, to strike a better balance between the protection of injured parties and the sustainable development of nuclear industry in the Area, China and ASEAN should exert numerous efforts to reach the consensus on the amount of the minimum level of a nuclear operators' liability.

Moreover, it has been noted that nuclear operators are strictly bound to maintain financial security up to its liability amount in China and the two ASEAN Nuclear frontrunners. In China, the China Nuclear Insurance Pool is the main nuclear insurance entity established by the China's Reinsurance Company, the People's Insurance Company, the China Pacific Insurance Company, and China Ping An Insurance Company in 1999, aiming to provide nuclear material insurance, nuclear liability insurance, and liability insurance for the transportation of nuclear substances.[116] However, the regulations of nuclear insurance are too abstract for operation in practice, and do not provide the coverage and premium of the insurance. Hence, "the compulsory liability of purchasing nuclear damage insurance for operators as the first tier must be provided with systematic and feasible rules in future legislation."[117] In addition, pursuant to the domestic nuclear laws of both Malaysia and Indonesia, the provisions governing financial security are also relatively general and outdated. Financial security, as a vital element of the nuclear liability regime, shall be well addressed by legislators in the ASEAN in near future.

If the total compensation exceeds the compensation limitation of the operator, in accordance with the current nuclear liability regime, the Chinese government is bound to provide indemnity up to RMB 800 million, also additional indemnity may be provided for extraordinary nuclear accidents. Hence, the total amount of compensation

[114] Liu, Liu, and Chen (n 14) 9.
[115] Abraham (n 21) 11.
[116] Liu and Faure (n 17) 808.
[117] Liu, Liu, and Chen (n 14) 10.

available for victims can be up to USD 173 million (RMB 300 million+ RMB 800 million) approximately. Compared with the government indemnity practice adopted by Malaysia, the Chinese nuclear liability regime presents two key distinctions. First, a designated organ responsible for dealing with state indemnity has not been appointed, and also the relevant procedures applicable to government indemnity have not been established in China. Although the fixed maximum amount of indemnity is provided in China, the amount is not high enough to be commensurate with the economic development of China.[118] In order to form a nuclear liability regime in the Area, the rules on Chinese government indemnity require some amendments to ensure they are up to date with the current international nuclear liability provisions. In addition, since the nuclear liability law is relatively outdated in Indonesia, there is no explicit provision governing the matter of government indemnity. Given the increasing importance of nuclear energy in Indonesia, it is crucial for the Government of Indonesia to introduce the nuclear liability indemnity regime into its future legislation if it aims to establish a regional nuclear regime or plans to ratify the CSC.

E. Time Limit of Liability

The existence of radiation may not be known, and consequences may not be manifested until later generations, and even when they are manifested, the causes may not be known or may be hard to prove.[119] Hence, there should be a reasonable period for injured parties to bring claims after the damage is found or caused. To date, most of the jurisdictions have provided a certain period of time, varying from ten years to thirty years, for victims to claim compensation before the competent court. But as one commentator argued, a thirty-year time period may be too short for claimants. Even if it is more than thirty years from the incident, "genetic damage, for instance, may take more than 30 years to manifest itself in future generations"[120] The ten years provided by the 1987 Reply is quite short in the context of nuclear damage since "certain types of damage, especially personal injury, may not manifest themselves for decades."[121] Additionally, in the ASEAN Region, rights to compensation shall cease after twenty years from the date of the nuclear incident in Malaysia and thirty years

[118] ibid 5.
[119] Currie (n 99) 86.
[120] ibid 118.
[121] Liu and Faure (n 17) 806.

from the date of the statement issuance by the Regulatory Body in Indonesia. Therefore, the practice established by Indonesia is more consistent with the standard provided by the two conventional systems. If China plans to establish a nuclear liability regime with ASEAN, one key step that needs to be made is to extend the time limit under the future nuclear legislation.

Moreover, as pointed out earlier, victims should bring claims within a certain period from the date on which they had knowledge or should reasonably have had knowledge of such damage. In China and ASEAN, the time limit normally varies from two to three years. But pursuant to the 1984 AELA, "actions for compensation under this Act shall be barred unless brought within twenty years from the date on which the person suffering nuclear damage had knowledge or should reasonably have had knowledge of such damage."[122] It is crucial that the time should start from when the damage becomes known or reasonably should have become known by the victims,[123] so China and ASEAN should maintain the "discovery rule" under the nuclear liability regime, requiring claims to be instituted within a period upon which the victims discovered the damage for which compensation is claimed.[124] But given the distinct practices adopted by the three states, an agreed period should be provided under the future nuclear liability regime in the Area.

5. Conclusion

Faced with the increasing electricity demand stemming from industrialization and the urgent need to solve the smog issue caused by coal-fired power plants, China has become the biggest platform in the world for the deployment of nuclear technology to generate electric power. Also, to ensure that the energy supplies are secure, affordable, and environmentally sustainable, five nuclear frontrunners in ASEAN plan to rely on nuclear energy to be one of the future and long-term solutions to sustainable energy source. As indicated above, China and ASEAN countries have not enacted any national law governing the trans-boundary nuclear liability, also none of the states in the Area have ratified the protocols to the two original conventions and the CSC. Given the geographical proximity between China and ASEAN, once a nuclear incident occurs in the Area, how to address cross-border nuclear liability becomes a

[122] AELA art 63(2).

[123] Currie (n 99) 93.

[124] Schwartz (n 12) 41.

mutual and urgent task for both China and ASEAN. One feasible approach to address the above risk is to encourage the countries in the Area to adhere to one of the nuclear liability regimes, such as the CSC, and adopt consistent domestic legislation. Contrarily, due to the slow progress on achieving a global nuclear liability regime, some commentators argued that it might be more practical to formulate a regional framework on the trans-boundary nuclear liability in the Area. Regardless of the approach to be finally adopted by the governments of China and ASEAN, it is essential to identify the inconsistent practices adopted by the nuclear liability regime of each state and the challenges faced by the states in the Area.

This article, after carefully conducting a comparative study on the legal principles of nuclear liability in China and the two ASEAN nuclear frontrunners, concluded that there are several challenges hindering China and ASEAN to reach a nuclear trans-boundary liability regime in the Area. First and foremost, it is clear that the absence of a broad and clear scope of nuclear damage under the domestic legislation will likely lead to stronger resistance to nuclear energy in the Area. If China and ASEAN cannot reach the understanding on what types of nuclear damage are recoverable, it would be difficult to form a nuclear liability regime in the Area. Second, due to the influence of the principle of supplier liability adopted by India, if the ASEAN Region believes that it would be beneficial to introduce such principle into the future regional nuclear liability regime, China, as a potential nuclear supplier, may oppose this principle to be adopted under the regime. Moreover, in China, the amount of operator's liability is far below the average standards contained in the international conventions and is also contrary to relevant international development trends. If China aims to establish a regional trans-boundary nuclear liability in the Area, ASEAN countries may require China to increase the maximum limit of compensation liability conforming to the international standard as adopted by the CSC. Indeed, in order to determine the appropriate liability threshold, it requires a great deal of negotiations among countries, regulators, international institutions, and the nuclear industry in the Area. Last but not least, due to the distinct practices adopted by China and ASEAN, it is suggested that they need to reach the consensus on whether "a grave natural disaster of an exceptional character" can serve as a defense to avoid liability and the specified time limit under the future regime in the Area.