

# COMPENSATING NUCLEAR DAMAGE IN CHINA

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## I. INTRODUCTION

The Japanese Fukushima accident of March 2011 triggered numerous countries to reconsider their nuclear policies.<sup>1</sup> Some reconsidered the use of nuclear power altogether, while others postponed building new plants.<sup>2</sup> The Fukushima incident has also led to a heated discussion on the adequacy of the compensation that victims receive after a nuclear accident.<sup>3</sup> China, in particular, given its geographical proximity to Japan, is starting to pay close attention to nuclear power issues.<sup>4</sup> Countries'

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1. See *Policy Responses to the Fukushima Accidents*, WORLD NUCLEAR ASS'N (Feb. 24, 2012), <http://www.world-nuclear.org/info/default.aspx?id=29733&terms=Fukushima%20Accident>. For the discussion of different responses to the Fukushima accident, see Lincoln Davies, *Beyond Fukushima: Disaster, Nuclear Energy, and Energy Law*, 2011 BYU L. REV. 1937, 1947–59 (2011).

2. For example, the UK temporarily suspended its new nuclear plant construction program shortly after the accident. See THE INST. OF ENERGY ECON., JAPAN IMPACTS ON OVERSEAS NUCLEAR POWER DEVELOPMENT POLICIES BY THE SEVERE ACCIDENT AT FUKUSHIMA DAIICHI NUCLEAR POWER STATION (2011), available at <http://eneken.ieej.or.jp/data/3782.pdf>.

3. For a detailed analysis of the compensation system for nuclear damage in Japan, as well as of the Fukushima incident, see Julius Weitzdörfer, *Die Haftung für Nuklearschäden nach japanischem Atomrecht—Rechtsprobleme der Reaktorkatastrofe von Fukushima I*, *Zeitschrift für Japanisches Recht [Liability for Nuclear Damages pursuant to Japanese Atomic Law—Legal Problems Arising from the Fukushima I Nuclear Accident]*, 31 JOURNAL OF JAPANESE LAW [J. OF JAPAN. L.] 61 (2011) (Ger.). There are also criticisms stating that GE's vulnerable design of the power plant contributed to the accident. See Reiji Yoshida, *GE Plan Followed with Inflexibility*, THE JAPAN TIMES (July 14, 2011), <http://www.japantimes.co.jp/text/nn20110714a2.html>. Ramseyer even argued that earthquakes are so common in Japan that TEPCO basically decided to build its reactor at the site, which is vulnerable to earthquake risks, because it would not have to pay the full costs of a meltdown. See J. Mark Ramseyer, *Why Power Companies Build Nuclear Reactors on Fault Lines: The Case of Japan 18–19* (Harvard John M. Olin Centre for Law, Econ. and Bus., Disc. Paper No. 698, 2011), available at [http://www.law.harvard.edu/programs/olin\\_center/papers/pdf/Ramseyer\\_698.pdf](http://www.law.harvard.edu/programs/olin_center/papers/pdf/Ramseyer_698.pdf).

4. Before the Fukushima accident, China already decided to develop its nuclear power and approved its “Medium- and Long-term Nuclear Power Development Plan” (2005–2020) in 2006. See *China Medium and Long Term Development Planning for Nuclear Power (2005~2020)*, DYNABOND POWERTECH SERV. (Aug. 17, 2009) [hereinafter Nuclear Development Plan], <http://www.dynabondpowertech.com/en/nuclear-power-news/topic-of-the-month/30-topic-of-the-month/2024-medium-and-long-term-development-planning-for-nuclear-power-20052020> (presenting an English copy of the

increasing energy needs and the global desire to fight climate change has also led to the existence of a “nuclear renaissance” in China and other countries.<sup>5</sup>

This nuclear renaissance is turning into reality in China. According to the “Medium- and Long-term Nuclear Power Development Plan (2005–2020),” China is planning to increase its nuclear capacity to 40 GWe<sup>6</sup> by 2020.<sup>7</sup> Nuclear power would then represent four percent of China’s electricity demand.<sup>8</sup> In 2004, nuclear industry produced 7 GWe, representing 2.3 percent of China’s electricity generation.<sup>9</sup> Thus, the aim is to nearly double China’s nuclear capacity in merely sixteen years.<sup>10</sup> Given this high-speed development of nuclear power, the question arises whether the existing nuclear industrial structure and regulatory framework can ensure a high level of nuclear safety. A critical component of this regulatory framework is the regulation of liability among nuclear power plant operators, and how potential victims of nuclear accidents should be compensated.<sup>11</sup> Indeed, an enforceable and efficient nuclear liability system may be indispensable to guarantee the protection of the public and to contribute to a safer and more environmentally friendly nuclear policy.

The goal of this article is to address the Chinese compensation regulatory regime for nuclear accidents, particularly regarding nuclear liability. A full discussion of the Chinese nuclear regulatory framework and liability system is beyond the scope of this article. This article

plan). Shortly after the accident, China temporarily suspended its approval process for new reactors. See WORLD NUCLEAR ASS’N, *supra* note 1.

5. See Ling Zhong, *Nuclear Energy: China’s Approach Towards Addressing Global Warming*, 12 GEO. INT’L ENVTL. L. REV. 493 (2000); see also Zhou, *infra* note 7.

6. GWe means gigawatt electrical, a unit to measure the rate of energy conversion or transfer.

7. Yun Zhou, *Why is China Going Nuclear?*, 38 ENERGY POL’Y 3755, 3755 (2010). See generally Nuclear Development Plan, *supra* note 4. This plan contains five parts: the existing status of Chinese nuclear power, the importance to develop nuclear power in China, the guiding principles and aim of nuclear development, priorities and implementation as well as supporting measures and policies. *Id.*

8. Zhou, *supra* note 7, at 3755.

9. *Id.*

10. See *id.*

11. Expanding nuclear power has led to some concerns such as effectiveness of the regulatory system, inadequate nuclear workforce, and lagging public participation, among others. See Yun Zhou et al., *Is China Ready for Its Nuclear Expansion?*, 39 ENERGY POL’Y 771, 778–80 (2011). Though there has been no significant nuclear accident in China and no reported serious damage to the public yet, the low liability limit has led to concerns in China. See Ximena Vásquez-Maignan, *Nuclear Liability in China*, ASIAN POWER 21 (Feb. 2010), [http://www.gide.com/front/files/AsianPower\\_GLN\\_NuclearLiabilityInChina\\_feb2010.pdf](http://www.gide.com/front/files/AsianPower_GLN_NuclearLiabilityInChina_feb2010.pdf); Cai Xianfeng, 蔡先凤, 中国核损害责任制度的构建, 中国软科学 2006年第9期, 第41页。 [*How to Establish and Perfect China’s Civil Liability System for Nuclear Damage*], 189 CHINA SOFT SCIENCE 38, 41 (2006) (China).

primarily focuses on the compensation system for nuclear damage in China. Part II of this article provides a short history of China's nuclear policy and its existing nuclear energy regulatory framework. Part III discusses the legislative framework for liability and the effectiveness of the two critical government documents that regulate nuclear liability in China: the "Reply to the Ministry of Nuclear Industry, the National Nuclear Safety Bureau and the State Council Atomic Energy Board in respect of Handling Nuclear Third Party Liability" published in 1986 (the "1986 Reply"), and the "Reply to Questions on the Liabilities of Compensation for Damages Resulting from Nuclear Accident" (the "2007 Reply").<sup>12</sup> Part IV then discusses in more detail the rules dealing with nuclear liability in China. Part V provides a critical evaluation and comparison of the nuclear liability framework in China, contrasting it to some nuclear liability economic starting points and to the nuclear liability regime under the U.S. Price-Anderson Act and international conventions. Part VI concludes the article.

## II. BACKGROUND

In 1964, China successfully tested its first atomic bomb and soon after began developing nuclear technologies.<sup>13</sup> Since then, China's nuclear policies and regulatory framework have changed significantly.<sup>14</sup> This section presents a brief introduction of China's nuclear regulation and policies. First, China's nuclear policies have shifted focus from a military-oriented policy to civilian uses of nuclear energy (II.A). This shift in policy has shaped China's nuclear energy regulatory framework (II.B). The third part presents a brief insight into the nuclear energy industry in China (II.C).

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12. STATE COUNCIL OF THE PEOPLE'S REPUBLIC OF CHINA, REPLY TO THE MINISTRY OF NUCLEAR INDUSTRY, THE NATIONAL NUCLEAR SAFETY AGENCY AND THE STATE COUNCIL ATOMIC ENERGY BOARD IN RESPECT OF HANDLING NUCLEAR THIRD PARTY LIABILITY (国务院关于处理第三方核责任问题给核工业部、国家核安全局、国务院核电领导小组的批复) (1986) (China) [hereinafter 1986 STATE COUNCIL REPLY], available at <http://wap.cnki.net/qikan-GWYB198609002.html> (last visited May 30, 2012). STATE COUNCIL OF THE PEOPLE'S REPUBLIC OF CHINA, OFFICIAL REPLY OF THE STATE COUNCIL TO QUESTIONS ON THE LIABILITIES OF COMPENSATION FOR DAMAGES RESULTING FROM NUCLEAR ACCIDENT (国务院关于核事故损害赔偿责任问题的批复) (2007) (China) [hereinafter 2007 STATE COUNCIL REPLY], translated in ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (Beijing Office of Env'tl. Def. Fund ed., 2007), available at [http://www.oecd-nea.org/law/nlb/nlb-80/documents/103\\_104\\_Text\\_China.pdf](http://www.oecd-nea.org/law/nlb/nlb-80/documents/103_104_Text_China.pdf).

13. Zhou et al., *supra* note 11, at 771.

14. For an analysis of the development of nuclear energy policies in China in detail, see *id.* at 771-77.

### A. A Short History of China's Nuclear Energy Policies

In 1955, China decided to develop its own nuclear industry.<sup>15</sup> From its inception until 1978, the nuclear industry was military-based.<sup>16</sup> China made remarkable progress in the weapons field from 1955 until 1967, during which time it successfully tested its first atomic bomb and hydrogen bomb and successfully launched its first nuclear missile.<sup>17</sup> From 1966 to 1976 the Cultural Revolution disrupted China's strategic weapons program.<sup>18</sup> Although China's nuclear policy was primarily military based during these first two decades of development,<sup>19</sup> the research, scientific insights, and technological infrastructure that came out of that time served as the foundation for China's nuclear energy industry today.<sup>20</sup>

In 1978, Deng Xiaopeng's converted the Chinese economy from centrally planned to a more market driven model.<sup>21</sup> The economic shift led to the change in China's nuclear policy.<sup>22</sup> Chinese nuclear policy changed from a "military first" approach to an approach combining military and civilian uses.<sup>23</sup> In the post-1978 period, military industries were converted to state owned enterprises in many respects.<sup>24</sup> As for the nuclear industry, the Ministry of Nuclear Industry ("MNI") was established in 1982 and was later reorganized as the China National Nuclear Corporation ("CNNC") in 1989.<sup>25</sup> A first proposal to build a commercial nuclear power plant was made in 1981,<sup>26</sup> to be constructed at Haiyang in the Zhejiang province.<sup>27</sup> Later, the State Council decided to build the Qinshan and the Daya Bay

15. STATE COUNCIL, NATIONAL NUCLEAR SAFETY AGENCY, CHINA "NUCLEAR SAFETY CONVENTION" NATIONAL REPORT (国务院, 中华人民共和国<核安全公约>国家报告) 1 (2001) (China), [http://nnsa.mep.gov.cn/hannb/200910/t20091029\\_180456.htm](http://nnsa.mep.gov.cn/hannb/200910/t20091029_180456.htm).

16. *Id.*

17. *See Nuclear Weapons*, FED'N OF AM. SCIENTISTS (Nov. 29, 2006), <http://www.fas.org/nuke/guide/china/nuke/index.html>.

18. Zhou et al., *supra* note 11, at 771.

19. During this stage, China mainly focused on developing nuclear weapons program. *See* Zhou et al., *supra* note 11, at 771–72. This may create a challenge for the transition to a civilian industry. For example, military-oriented facilities may not be diverted to civilian use quickly; military facilities were located inland and needed to be relocated when civilian facilities started to develop. A shift from military to commercial management may create difficulties as well.

20. Zhou et al., *supra* note 11, at 771.

21. Nicholas C. Hope et al., *Economic Policy Reform in China*, in *HOW FAR ACROSS THE RIVER? CHINESE POLICY REFORM AT THE MILLENNIUM 3* (Nicholas C. Hope et al. eds., 2003).

22. Zhou et al., *supra* note 11, at 771.

23. *Id.*

24. *Id.*

25. *Id.*

26. *Id.*

27. Zhou et al., *supra* note 11, at 772.

nuclear power plants.<sup>28</sup> In 1991, the Qinshan nuclear power plant began operations.<sup>29</sup> Two years later, the first reactor at the Daya Bay plant came into operation.<sup>30</sup> Despite this progress, the development of nuclear energy in China was still relatively low until 2005.<sup>31</sup> The lack of a long-term strategic plan, insufficient financial support, and inconsistencies in China's technological development strategies are all factors that contributed to the slow development of China's nuclear energy industry.<sup>32</sup>

China has experienced another shift in its nuclear energy policy since 2005.<sup>33</sup> China's nuclear policy shifted from a period of modest development to one of rapid development.<sup>34</sup> Under the "Medium- and Long-term Nuclear Power Development Plan (2005–2020)," the government set a goal to reach a nuclear capacity of 40 GWe by 2020.<sup>35</sup> This meant that in the years following the publication of the plan in 2005, China would have to construct more than two reactors every year, and the productive capacity for the whole nuclear fuel cycle needed to increase four to six times 2005 levels by 2020.<sup>36</sup>

This dramatic shift in nuclear energy policy resulted from escalating energy demands and environmental pressure.<sup>37</sup> China's rapid economic development after 1978 led to a fast increase in its total energy consumption, and this increased energy demand will only continue.<sup>38</sup>

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28. *Id.*

29. *Id.*

30. *Id.*

31. *Id.*

32. *See id.* In the energy sector of China, a fragmented regulatory approach and strong vested interest (strong state-owned companies in the energy sector) have long been criticized as contributing factors to inefficient energy development. For the discussion of institutional inefficiency of the general energy sector in China, see Yu Xiaojiang, *An Overview of Legislative and Institutional Approaches to China's Energy Development*, 38 ENERGY POL'Y 2161, 2164 (2010). There has been no centralized government agency making energy policies since 1993. It is even more problematic in the nuclear sector where a policy of "limited nuclear development" was adopted in the 1980s and 1990s. Therefore, both nuclear energy programs and technology research progressed slowly. *See* Xu Yichong, *Nuclear Energy in China: Contested Regimes*, 33 ENERGY 1197, 1200–01 (2008). For a discussion of the importance of national plans to nuclear development, see Yang Chijen, *A Comparison of the Nuclear Options for Greenhouse Gas Mitigation in China and in the United States*, 39 ENERGY POL'Y 3025, 3027 (2011), available at <http://people.duke.edu/~cy42/US-CN-FR.pdf>.

33. Zhou et al., *supra* note 11, at 772–73.

34. *Id.*

35. THE COMM'N OF SCI., TECH. AND INDUS. FOR NAT'L DEF., THE 11TH FIVE-YEAR PLAN ON NUCLEAR INDUSTRY DEVELOPMENT (国防科工委, 核工业“十一五”发展规划) § 2(1) (2006) (China), available at <http://www.china-nea.cn/files/upload/qhocs5uwkr802g2h74amvf3leodaozuobvw7vkyq0nm.doc>.

36. *Id.*

37. Xu Yichong, *supra* note 32, at 1219–20.

38. *See generally* Thomas S. Ulen, *The Uneasy Case for Competition Law and Regulation as Decisive Factors in Development: Some Lessons for China*, in COMPETITION POLICY AND

Accordingly, China needs to develop a nuclear energy policy that strikes a balance between the need for greater environmental protection and the need to meet increasing energy demands.<sup>39</sup> Today, China's energy supply still relies largely on coal-fired energy generation, which accounted for 80 percent of China's electricity generation in 2007.<sup>40</sup> The coal energy in China, however, is subject to significant challenges due to transportation constraints, increasing coal costs, coal safety issues, and environmental costs.<sup>41</sup> In addition, alternative sources of energy, including natural gas, renewable energy, and clean coal technologies, all come with serious challenges. These challenges include high costs, lack of storage, and lack of technologies.<sup>42</sup> The special energy mix in China—the existing energy structure, energy alternatives, and their potential to meet China's energy needs—makes nuclear energy an attractive alternative to satisfy both increasing energy demands and environmental goals such as lowering carbon emissions.<sup>43</sup>

As of September 2011, there are fourteen nuclear power reactors in operation in China.<sup>44</sup> The government approved approximately thirty-four new reactors.<sup>45</sup> Of these thirty-four, twenty-six are actually being built. Even though China set its nuclear energy capacity goal at 40 GWe by 2020 under the “Medium- and Long-term Nuclear Power Development Plan (2005–2020),”<sup>46</sup> due to the rapid construction, the World Nuclear Association estimates that the installed nuclear capacity would exceed 60 GWe by 2020, reach 200 GWe by 2030, and 400–500 GWe by 2050.<sup>47</sup>

The Fukushima Accident triggered nations worldwide to question their nuclear policies.<sup>48</sup> China is no exception.<sup>49</sup> The State Council announced that it would suspend approval of new nuclear power stations until the

REGULATION, RECENT DEVELOPMENTS IN CHINA, THE U.S. AND EUROPE 13 (Michael Faure & Zhang Xinzhu eds., 2011) (discussing China's economic growth).

39. See generally Antonette D'Sa & K.V. Narasimha Murthy, *Environmental Reform in the Electricity Sector: China and India*, 15 J. ENV. & DEV. 158 (2006) (providing a detailed discussion on environmental regulation and management in the electricity sector); Nathaniel T. Aden & Jonathan E. Sinton, *Environmental Implications of Energy Policy in China*, in ENVIRONMENTAL GOVERNANCE IN CHINA 100 (Neil T. Carter & Arthur P.J. Mol eds., 2007).

40. Zhou, *supra* note 7, at 1256.

41. *Id.*

42. *Id.*

43. *Id.*

44. *Nuclear Power in China*, WORLD NUCLEAR ASS'N, <http://www.world-nuclear.org/info/inf63.html> (last updated Nov. 14, 2012).

45. *Id.*

46. Nuclear Development Plan, *supra* note 4.

47. *Nuclear Power in China*, *supra* note 44.

48. *Id.*

49. *Id.*

adoption of a new Nuclear Safety Plan.<sup>50</sup> Moreover, it stated that comprehensive safety checks would be performed on all operating nuclear plants and on those under construction.<sup>51</sup> The State Council has not yet published a Nuclear Safety Plan, but officials in the National Energy Agency do not expect that it will make any significant changes to Chinese policy regarding the promotion of nuclear energy.<sup>52</sup>

### *B. The Shifts in China's Nuclear Regulatory Framework*

China's shifting nuclear policy also led to changes in its nuclear regulatory framework. Because China's nuclear regulatory system is administered by several authorities and not just a single minister, its system is complicated.<sup>53</sup> For example, in the early 1980s, several authorities were involved in nuclear regulation: the National Nuclear Safety Administration ("NNSA"), the Minister of Nuclear Industry ("MNI"), and the Commission of Science, Technology and Industry for National Defense ("COSTIND").<sup>54</sup>

Several important reforms of authority in the State Council took place since the 1980s. These reforms led to significant changes in the regulatory framework of the nuclear power industry.<sup>55</sup> For example, at the time of its establishment in 1984, the NNSA was affiliated with the Science and Technology Commission.<sup>56</sup> As a result of the reform in 1998, the NNSA was affiliated with the Minister of Environmental Protection ("MEP").<sup>57</sup> The MNI was reorganized and renamed the China National Nuclear Corporation ("CNNC") in 1988.<sup>58</sup> It became a state-owned enterprise and was no longer a state authority. The COSTIND was dismantled in 2008,

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50. *Id.*

51. *Id.*

52. Chen Qijue, *Officials Say that Chinese Nuclear Power May Be Restarted after March Next Year* (陈其珏, 权威人士称明年3月后我国核电可能步入恢复发展轨道) CN STOCK (Nov. 9, 2011) (China), <http://www.cnstock.com/index/cj/201111/1658207.htm> (last visited May 23, 2012).

53. Wang Jin, *Current Situation and Issues of China Atomic Energy Law Legislation*, THE INT'L SYMPOSIA ON NUCLEAR SAFETY, RETHINKING ON THE JAPANESE FUKUSHIMA NUCLEAR CRISIS 15–18 (2011).

54. Li Jingjing et al., *Recommendations for the Reform of China's Nuclear Regulatory System* (李晶晶等, 中国核安全监管体制改革建议) CAIXIN (Mar. 12, 2012) (China), [http://economy.caixin.com/2012-03-12/100367085\\_3.html](http://economy.caixin.com/2012-03-12/100367085_3.html).

55. Wang Jin, *supra* note 53, at 15.

56. *Historical Development*, NAT'L NUCLEAR SAFETY ADMIN. (国家核安全局, 历史沿革) (Oct. 28, 2009) (China), [http://nnsa.mep.gov.cn/lsyg/200910/t20091028\\_180280.htm](http://nnsa.mep.gov.cn/lsyg/200910/t20091028_180280.htm).

57. *Id.*

58. M.V. Ramana & Eri Saikawa, *Choosing a Standard Reactor: International Competition and Domestic Politics in Chinese Nuclear Policy*, 36 ENERGY 6779, 6781 (2011).

and its authority, except for the administration of nuclear electricity, was transferred to the newly established Minister of Industry and Information Technology (“MIIT”).<sup>59</sup>

The current nuclear regulatory system in China is a combination of “unified management and shared responsibilities.”<sup>60</sup> The departments include the MIIT, the MEP, and the National Development and Reformation Commission (“NDRC”).<sup>61</sup> Other departments and sectors are involved in nuclear and radiation related issues as well.<sup>62</sup>

The MIIT took control over all of the former functions of the COSTIND except for nuclear power management.<sup>63</sup> Two agencies under the MIIT are relevant here: the China Atomic Energy Authority (“CAEA”) and the State Administration of Science, Technology and Industry for National Defense (“SASTIND”). The CAEA is responsible for planning and managing nuclear research, setting policies and regulations for the use of nuclear technologies, and supervising nuclear material management and control.<sup>64</sup> It also promotes bilateral and multilateral cooperation with international organizations such as the International Atomic Energy Agency (“IAEA”).<sup>65</sup> The responsibility of SASTIND is to ensure core capacity building for the national defense industry.<sup>66</sup>

The MEP manages the nuclear industry through the NNSA.<sup>67</sup> The NNSA is responsible for regulating nuclear and radiation safety.<sup>68</sup> It makes relevant policies, plans, and standards, and it additionally supervises the operation of reactors and material management.<sup>69</sup>

The National Energy Commission (“NEC”) is another important agency in charge of nuclear energy. It was created in 2008 and has the authority to establish China’s energy development strategy and oversee its energy-related issues.<sup>70</sup> The daily work of the NEC is conducted by the

59. Li Jingjing, *supra* note 54; Professors Wang Jin & Tang Yingmao, Peking Univ. Nuclear Policy and Law Ctr., The International Workshop on Nuclear Safety: Recent Development of Nuclear Legislation in China, in NATURAL RES. DEF. COUNCIL, CHINA 7 (2011), available at [http://www.nrdc.cn/phpcms/userfiles/download/201107/08/5.Recent%20Development%20of%20Nuclear%20Legislation%20in%20China%20\(Prof.%20Jin%20Wang%20and%20Prof.%20Yingmao%20Tang\).pdf](http://www.nrdc.cn/phpcms/userfiles/download/201107/08/5.Recent%20Development%20of%20Nuclear%20Legislation%20in%20China%20(Prof.%20Jin%20Wang%20and%20Prof.%20Yingmao%20Tang).pdf).

60. Wang Jin & Tang Yingmao, *supra* note 53, at 16.

61. *Id.*

62. Wang Jin & Tang Yingmao, *supra* note 53, at 16–18.

63. Zhou et al., *supra* note 11, at 773–74.

64. *Id.*

65. *Id.*

66. Wang Jin & Tang Yingmao, *supra* note 53, at 17.

67. Zhou et al., *supra* note 11, at 774.

68. *Id.*

69. *Id.*

70. *Id.*



Nuclear Energy Bureau (“NEB”), an agency under the NDRC.<sup>71</sup> After the organization was restructured in 2008, the NEB took over nuclear power authority from the former COSTIND.<sup>72</sup>

In addition to the three main agencies, other ministers and agencies also shared responsibilities. For example, the Ministry of Land and Resources is responsible for mineral exploration and mining rights;<sup>73</sup> the Ministry of Health regulates the use of radioactive sources;<sup>74</sup> and the Departments of Public Security, Transportation, Railways, and Civil Aviation regulate radioactive material transportation safety.<sup>75</sup>

### C. *The Nuclear Industry in China*

In China, only three state-owned enterprises are licensed to own and operate nuclear power plants: the CNNC, the China Guangdong Nuclear Power Corporation (“CGNPC”), and the China Power Investment Corporation (“CPIC”).<sup>76</sup> As discussed earlier, the CNNC is reorganized from the former Ministry of Nuclear Industry.<sup>77</sup> Thus, it not only owns nuclear plants, but it also controls most nuclear sector business, such as R&D, engineering design, nuclear construction companies, and fuel cycle facilities.<sup>78</sup> The CGNPC is another important operator, and it began developing its R&D institutes and construction subsidiaries to compete with the CNNC.<sup>79</sup> The CPIC, the third party that can own nuclear power plants, is solely an investor and does not have nuclear R&D, manufacturing, or construction subsidiaries.<sup>80</sup> Although these three parties are the only parties licensed to own power plants, other parties can invest in nuclear projects, such as energy companies, financial institutions, and provincial governments.<sup>81</sup>

Previously, the CNNC owned all of the nuclear manufacturing companies in China, but China has started to allow manufacturer

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71. *Id.*

72. *Id.*

73. Wang Jin & Tang Yingmao, *supra* note 53, at 18.

74. *Id.*

75. *Id.*

76. See Zhou et al., *supra* note 11, at 774; see also Ramana & Saikawa, *supra* note 58, at 6784.

77. See Wang Jin & Tang Yingmao, *supra* note 53.

78. *Government Structure and Ownership: Nuclear Power in China Appendix 1*, WORLD NUCLEAR ASS’N, [http://www.world-nuclear.org/info/inf63ai\\_chinanuclearstructure.html](http://www.world-nuclear.org/info/inf63ai_chinanuclearstructure.html) (last updated Nov. 2012).

79. See Zhou et al., *supra* note 11, at 774; see also Ramana & Saikawa, *supra* note 58, at 6783.

80. Zhou et al., *supra* note 11, at 774.

81. *Id.* at 776.

competition.<sup>82</sup> China must rely heavily on foreign technologies. For example, as of September 2010, eight out of the twelve operating nuclear reactors, and nineteen out of the twenty-five reactors under construction were based on foreign designs.<sup>83</sup> China decided to increase its nuclear industry self-sufficiency by promoting technology transfer.<sup>84</sup> The State Nuclear Power Technology Company (“SNPTC”), established in 2004, oversees the selection of overseas technology and implements these technology transfers.<sup>85</sup>

### III. THE LEGISLATIVE FRAMEWORK CONCERNING NUCLEAR LIABILITY

This section will provide a broad sketch of the nuclear liability framework in China. It will discuss the sources that have established the different norms constituting China’s material rules on nuclear liability. The search for the normative framework is complex, as there is no integrated nuclear liability act to generally regulate liability issues.<sup>86</sup> Thus, to determine which rules apply to a specific nuclear accident, lawyers must consult a variety of sources. We first sketch the broad legislative framework (III.A) and then ask a few questions concerning the effectiveness of this framework (III.B). The subsequent section will then discuss the nuclear liability rules in more detail (IV).

#### A. *The Legislative Framework*

There are two international regimes concerning nuclear liability that were promulgated under the auspices of the IAEA and the Nuclear Energy Agency (“NEA”) of the Organization of Economic Cooperation and Development (“OECD”).<sup>87</sup> China is not a party to either of these conventions. There is also no specific legislative document that stipulates exactly how nuclear liability is regulated in China.<sup>88</sup> The main rules

82. *Id.* at 774.

83. Zhou et al., *supra* note 11, at 773.

84. Benjamin Sovacool & Scott Valentine, *The Socio-political Economy of Nuclear Energy in China and India*, 35 ENERGY 3803, 3810 (2010).

85. *Government Structure and Ownership*, *supra* note 78.

86. *See infra* Part III.A.

87. *See* Julia Schwartz, *International Nuclear Third Party Liability Law: The Response to Chernobyl*, in INT’L NUCLEAR LAW IN THE POST-CHERNOBYL PERIOD, OECD 37, 42 (2006), available at <http://www.oecd-nea.org/law/chernobyl/SCHWARTZ.pdf>; *see also* Tom van den Borre, *Shifts in Governance in Compensation for Nuclear Damage: 20 years after Chernobyl*, in SHIFTS IN COMPENSATION FOR ENVIRONMENTAL DAMAGE 261, 267 (Michael Faure & Albert Verheij eds., 2007) (providing a critique).

88. Cai Xianfeng, *supra* note 11, at 39.

concerning nuclear liability are found in two reply publications by the State Council: the 1986 Reply<sup>89</sup> and the 2007 Reply.<sup>90</sup> The effectiveness of these two replies and their place in the hierarchical system of legal norms in China is addressed below.

There is no specific act dealing with nuclear liability in China; instead, nuclear accidents, unlike in other legal systems, are not explicitly excluded from other statutes.<sup>91</sup> Because these statutes are relatively broad in scope and do not explicitly exclude nuclear accidents, they could play a role in compensating victims of nuclear accidents in addition to the two State Council replies. For example, general tort rules could be applicable. The new Tort Liability Law, the General Principles of Civil Law (“GPCL”), was introduced in China in December 2009.<sup>92</sup> Under the GPCL, the general provisions concerning civil liability (“Article 106”)<sup>93</sup> and environmental liability (“Article 124”)<sup>94</sup> do not exclude nuclear liability from their application.<sup>95</sup> Those two general provisions can also apply to nuclear liability. Article 70 of the 2009 Tort Law provides an explicit legal basis for nuclear liability: “If a nuclear accident from a nuclear installation leads to third party damage, the nuclear operators shall be liable, unless he can prove the damage is caused by war or caused by the victims on purpose.”<sup>96</sup>

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89. 1986 STATE COUNCIL REPLY, *supra* note 12.

90. 2007 STATE COUNCIL REPLY, *supra* note 12.

91. For example, the European Directive concerning environmental liability explicitly excludes nuclear risks and ecological damage resulting from nuclear activities from the scope of the directive. Council Directive 2004/35, art. 4, 2004 O.J. (L 143) 56, available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:143:0056:0075:EN:PDF>.

92. [Tort Liability Law of the People’s Republic of China] (promulgated by the Standing Comm. Nat’l People’s Cong. Gaz., Jan. 1, 2010, effective July 1, 2010) art. 70 (China) [hereinafter 2009 Tort Law]; See generally Michael Faure & Hu Weiqiang, *Towards a Reform of Environmental Liability in China: an Economic Analysis*, 13 ASIA PAC. J. OF ENVTL. LAW 225 (2011) (providing a commentary on this tort liability law, especially from the perspective of environmental liability).

93. [The General Principles of Civil Law] (promulgated by the Nat’l People’s Cong., April 12, 1986, effective Jan. 1, 1987) art. 106 (China) [hereinafter GPCL].

94. GPCL, *supra* note 93, art. 124.

95. *Id.* art. 106 (“Citizens and legal persons who through their fault encroach upon state or collective property or the property or person of other people shall bear civil liability. Civil liability shall still be borne even in the absence of fault, if the law so stipulates.”); see also *id.* art. 124 (“Any person who pollutes the environment and causes damage to others in violation of state provisions for environmental protection and the prevention of pollution shall bear civil liability in accordance with the law.”).

Those articles require certain parties to bear civil liability, without further limiting the types of activities that lead to the damage. Hence the two articles make no differentiation between nuclear damage and damage caused via other reasons. In GPCL, there is no specific provision excluding the application to nuclear damage either.

96. 2009 Tort Law, *supra* note 92, art. 70.

This is the first time that nuclear liability is explicitly prescribed in a statute rather than in merely normative rules issued by the government.<sup>97</sup> Even though the 2009 Tort Law does contain one provision addressing nuclear liability specifically,<sup>98</sup> it does not specify the concrete content of the liability rule. For instance, the 2009 Tort Law does not address issues such as the scope of compensable damage, whether liability is limited, and who is a nuclear operator.

Nuclear damage is not caused by nuclear operators alone. Third parties such as suppliers, designers, manufacturers, or constructors contribute to the risk as well. The recent Fukushima accident demonstrates the contributory risks of third parties. In Fukushima, scientists argued that the tsunami led to a full meltdown in several nuclear reactors when it flooded the basements housing diesel generators that drove the emergency core cooling system.<sup>99</sup> The meltdown led engineers to question the soundness of the basement design by General Electric.<sup>100</sup>

Consequently, provisions aimed at third parties may be relevant to the discussion of nuclear liability. In China, provisions in the Product Quality Act (“PQA”) may be relevant.<sup>101</sup> Article 73 of the PQA stipulates, “as far as nuclear installations and nuclear products are concerned, if the law and administrative regulations have different rules, those rules will apply.”<sup>102</sup> Article 73 of the PQA, however, still leaves room for specific nuclear liability legislation.<sup>103</sup>

China also has sector specific environmental laws that could apply to nuclear accidents. Since nuclear activities may cause serious environmental damage, liability rules under environmental legislations may be relevant. The Environmental Protection Act (“EPA”) is the basic act in the field of environmental law.<sup>104</sup> Sector based acts may also play a

97. See *infra* discussion Part III.B (addressing the hierarchy and effectiveness of different normative documents).

98. 2009 Tort Law, *supra* note 92, art. 70.

99. Norihiko Shirouzu & Chester Dawson, *Design Flaw Fueled Nuclear Disaster*, WALL ST. J. (June 30, 2011), <http://online.wsj.com/article/SB10001424052702304887904576395580035481822.html>.

100. *Id.*

101. Cai Xianfeng, *supra* note 11, at 42.

102. [Product Quality Law] (promulgated by the Standing Comm. Nat’l People’s Cong., Feb. 22, 1993, effective Sept. 1, 1993) art. 73 (China) [hereinafter Product Quality Law].

103. *Id.*

104. [Environmental Protection Law of the People’s Republic of China] (promulgated by the Standing Comm. Nat’l People’s Cong., Dec. 26, 1989, effective Dec. 26, 1989) (China) [hereinafter EPA]. See generally Wang Canfa et al., *Pondering over the Incident of Songhua River Pollution from the Perspective of Environmental Law*, in CHINA AND INTERNATIONAL ENVIRONMENTAL LIABILITY: LEGAL REMEDIES FOR TRANSBOUNDARY POLLUTION 291 (Michael Faure & Song Ying eds., 2008)

role, including the Water Pollution Prevention Act (“WPPA”),<sup>105</sup> the Marine Environmental Protection Act (“MEPA”),<sup>106</sup> and the Solid Waste Pollution Prevention Act (“SWPPA”).<sup>107</sup> In addition, these statutes may help define the scope of compensable damage for nuclear accidents.

Another relevant act is the Radiation Pollution Prevention Act (“RPPA”). According to Article 12 of the Act:

An entity running transportation of nuclear facilities, an entity utilizing nuclear technology or an entity developing and utilizing uranium (thorium) mines and associated radioactive mines shall be responsible for its own prevention and control of radioactive pollution, accept the supervision by the administrative department of environmental protection and other relevant departments, and bear the liabilities in accordance with the law for the radioactive pollution it has caused.<sup>108</sup>

Article 59 further provides: “Whoever causes any damage to others due to radioactive pollution shall bear the civil liabilities in accordance with the law.”<sup>109</sup> These rules apply to the liability caused by radioactive pollution, but they are still suspect and do not provide detailed guidance on the scope or contents of liability.

In 1984, China drafted the Atomic Energy Act (“AEA”), which was intended to serve as China’s basic nuclear energy act.<sup>110</sup> It was intended to incorporate both safety regulations and liability rules.<sup>111</sup> One competent authority usually organized the legislative preparatory work for the AEA.<sup>112</sup> Four drafts of the AEA were published, and they were open to

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(discussing the practical functioning of the Environmental Protection Act in providing protection to victims of environmental pollution in China).

105. [Water Pollution Prevention Act] (promulgated by the Standing Comm. Nat’l People’s Cong., May 11, 1984, revised Feb. 28, 2008, effective June 1, 2008) (China) [hereinafter WPPA].

106. [Marine Environmental Protection Act] (promulgated by the Standing Comm. Nat’l People’s Cong., Aug. 23, 1982, revised Dec. 25, 1999, effective Apr. 1, 2004) [hereinafter MEPA].

107. [Solid Waste Pollution Prevention Act] (promulgated by the Standing Comm. Nat’l People’s Cong., Oct. 30, 1995, revised Dec. 29, 2004, effective Apr. 1, 2005) (China) [hereinafter SWPPA].

108. [Law of the People’s Republic of China on Prevention and Control of Radioactive Pollution] (promulgated by the Standing Comm. Nat’l People’s Cong., June 28, 2003, effective Oct. 1, 2003) art. 12 (China) [hereinafter RPPA].

109. *Id.* art. 59.

110. Peng Feng, 彭峰, 我国原子能立法之思考, 上海大学学报 [A Reflection on the Legislation of China’s Atomic Energy], 18 J. OF SHANGHAI UNIV. (SOCIAL SCI. EDITION) 69, 73 (2011) (China).

111. Wang Jin & Tang Yingmao, *supra* note 53, at 4.

112. *Id.* at 2–11.

other ministers and companies for consultation.<sup>113</sup> Despite these efforts, the AEA was still not enacted.<sup>114</sup>

One reason that may explain why China has not yet passed the AEA is the often changing and sophisticated nature of China's regulatory framework.<sup>115</sup> Since 1984, there have been several organizational restructurings of the State Council. This restructuring has led to changes in the competent authority in charge of the drafting work.<sup>116</sup> The competent authority changed from the State Science and Technology Commission to the COSTIND, and then the MIIT.<sup>117</sup> Since there are several ministers in charge of nuclear issues, the need for coordination between them makes drafting a basic nuclear law even more difficult.<sup>118</sup>

In spite of these difficulties, drafting work for the AEA is ongoing. Since the Fukushima accident, more attention has been paid to the legislative work.<sup>119</sup> There is still no specific atomic energy act implemented in China. Although the 2009 Tort Law provides a legal basis for nuclear liability, as the provision is quite abstract, China must still rely on the two State Council replies when issues regarding nuclear plant operator liability and victim compensation arise.<sup>120</sup>

### *B. The Effectiveness and Hierarchical Position of the Two Replies*

The above introduction demonstrates that China lacks a specific law addressing nuclear liability. Some general rules about tort law and environmental law may be relevant, but the details of liability rules are primarily reflected in the two State Council Replies.

China did not start to build its nuclear power plants until the 1980s.<sup>121</sup> It is also not a party to either of the international nuclear liability regimes.<sup>122</sup> Accordingly, foreign suppliers were concerned about the

113. Peng Feng, *supra* note 110, at 73.

114. *Id.*

115. *See supra* Part II.B.

116. Wang Jin & Tang Yingmao, *supra* note 53, at 15.

117. *Id.* at 3–10.

118. *See* Wang Jin & Tang Yingmao, *supra* note 53.

119. In response to Fukushima accident, the government restarted the draft procedure of AEA. *See* Zhao Wei, 赵威:原子能立法研究,法学杂志 [*Research About Legislation for Atomic Energy*], 212 LEGAL SCI. MAG. 14, 15 (2011) (China).

120. *See* 1986 STATE COUNCIL REPLY, *supra* note 12; 2007 STATE COUNCIL REPLY, *supra* note 12.

121. Ximena Vásquez-Maignan, *supra* note 11, at 20.

122. There are two international nuclear liability regimes: the Paris Convention regime and Vienna Convention regime. They are established under the OECD/NEA and IAEA auspices. *See* Paris Convention on Third Party Liability in the Field of Nuclear Energy, July 29, 1960, 956 U.N.T.S. 251

Chinese nuclear liability framework—or lack thereof—during contract negotiations for the construction of the Daya Bay power plant in 1985.<sup>123</sup> One critical concern was whether the operator or the suppliers would be liable for damage suffered by third parties during the construction and operation of the plant.<sup>124</sup> In response to this concern, the Ministry of Nuclear Industry, the National Nuclear Safety Bureau, and the State Council Atomic Energy Board began research on nuclear liability issues and decided to follow the major principles of the Paris Convention and the Vienna Convention.<sup>125</sup> They then requested the State Council to issue instructions to follow the major principles of the Paris and Vienna Conventions.<sup>126</sup> In 1986, the State Council published its Reply to the organizations' request.<sup>127</sup> The State Council's 1986 Reply resulted in the promotion of contracts and cooperation between the Chinese nuclear operators and foreign suppliers over the next several years.<sup>128</sup>

Over the next two decades, China improved its mastering of Generation II power plant technologies, decreasing its dependence on foreign suppliers.<sup>129</sup> In 2007, China planned to introduce Generation III technologies from AREVA and Westinghouse.<sup>130</sup> The concerns of foreign suppliers rose again, resulting in the publication of the State Council's 2007 Reply.<sup>131</sup>

The circumstances surrounding the State Council's two replies explains why the Chinese system mimics the two international nuclear liability regimes. The process of their issuance also suggests that they are not formal administrative regulations published by the State Council, which require a more formal and sophisticated promulgation procedure.

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[hereinafter Paris Convention of 1960]; Vienna Convention on Civil Liability for Nuclear Damage, May 21, 1963, 1063 U.N.T.S. 358 [hereinafter Vienna Convention]. China is a contracting party to neither Convention. See *Press Kit: International Nuclear Third Party Liability*, OECD/NEA, <http://www.oecd-nea.org/press/press-kits/nuclear-law.html> (last visited May 23, 2012); *Vienna Convention on Civil Liability for Nuclear Damage*, IAEA, [http://www.iaea.org/Publications/Documents/Conventions/liability\\_status.pdf](http://www.iaea.org/Publications/Documents/Conventions/liability_status.pdf) (last visited May 30, 2012).

123. Ximena Vásquez-Maignan, *supra* note 11, at 20.

124. Li Yayun, 李雅云, 核损害责任法律制度研究, 环球法律评论 [*On the Nuclear Damage Liability*], 24 GLOBAL LAW REVIEW 360, 370 (2002) (China).

125. Cai Xianfeng, 蔡先凤, 核损害民事责任研究, [The Civil Liability for Nuclear Damage] (May 2004) (unpublished Ph.D. dissertation, Wuhan University, China) (on file with the Wuhan University Library), at 291–92, available at <http://cdmd.cnki.com.cn/Article/CDMD-10486-2008047666.htm>.

126. Cai Xianfeng, *supra* note 125.

127. See 1986 STATE COUNCIL REPLY, *supra* note 12.

128. *Id.*

129. Ximena Vásquez-Maignan, *supra* note 11, at 20.

130. *Id.*

131. *Id.*

According to the “Law on Legislation,” formal legal sources in China include laws, administrative regulations, local decrees, autonomy decrees, administrative rules, and local rules.<sup>132</sup> The law is promulgated by the National People’s Congress or the Standing Committee thereof;<sup>133</sup> administrative regulations are enacted by the State Council;<sup>134</sup> local decrees and autonomous decrees are issued by the Peoples’ Congress of provinces, autonomous regions, or municipalities directly under the central government;<sup>135</sup> and administrative rules and local rules are issued by ministers or local governments.<sup>136</sup> The two relevant State Council replies were enacted by the State Council as general rules on nuclear liability and do not qualify as administrative regulations.<sup>137</sup> An administrative regulation requires promulgation under the authorization of the constitution and national law, and it must comply with special procedures.<sup>138</sup> The State Council’s replies are normative rules that have the nature of quasi-administrative regulations in practice.<sup>139</sup>

To what extent litigants could directly use the 2007 Reply in a civil court or how the courts would deal with the rules promulgated in the Reply if it contradicted a law of higher legal hierarchy, however, is unclear. The Supreme Court published a judicial explanation entitled “The Rules on the Citation of Law, Administrative Regulations and Other Normative Documents in the Judgment” in 2009.<sup>140</sup> According to the Supreme Court’s explanation, a civil judgment should cite laws, legislative explanations, or judicial explanations.<sup>141</sup> Courts can cite the applicable administrative regulations and local decrees directly.<sup>142</sup> Other normative documents, if necessary and determined to be effective, can only be used

132. Lifa Fa [Law on Legislation] (promulgated by the Standing Comm. Nat’l People’s Cong., Mar. 15, 2000, effective July 1, 2000) 2000 STANDING COMM. NAT’L PEOPLE’S CONG. GAZ. 112, art. 2 (China) [hereinafter Law on Legislation]; see also Jan Michiel Otto & Yuwen Li, *An Overview of Law-making in China*, in LAW-MAKING IN THE PEOPLE’S REPUBLIC OF CHINA 1 (Jan Michiel Otto et al. eds., 2000) (explaining law making powers in China).

133. Law on Legislation, *supra* note 132, art. 7.

134. See Li Shishi, *The State Council and Law-Making*, in LAW-MAKING IN THE PEOPLE’S REPUBLIC OF CHINA 91 (Jan Michiel Otto et al. eds., 2000) (discussing the law making powers of the State Council in China).

135. Law on Legislation, *supra* note 132, art. 63.

136. *Id.* art. 71–73.

137. Cai Xianfeng, *supra* note 11, at 41.

138. Li Shishi, *supra* note 134, at 94–101.

139. See *supra* note 12.

140. [The Rules on the Citation of Law, Administrative Regulations and Other Normative Documents in the Judgment] (Judicial Explanation) (promulgated by Judicial Committee of Supreme Court, July 7, 2009, effective Nov. 4, 2009), art. 4 (China) [hereinafter Judicial Explanation 2009].

141. *Id.*

142. *Id.*



as a source of argument.<sup>143</sup> In other words, courts cannot use other normative documents as the sole source of their judgment.

Accordingly, the binding force of both State Council replies is unclear. The 2007 Reply is intended to be temporary until an AEA is enacted that expressly provides for regulations concerning nuclear liability.<sup>144</sup> As previously mentioned,<sup>145</sup> the legislative framework of the AEA is still developing. If the binding force of a State Council reply is unclear, it is curious why the Chinese government chose to address the important issue of nuclear liability via a State Council reply. One explanation may be efficiency; the State Council's ability to issue a reply quickly makes it possible for nuclear industries to sign contracts with the foreign suppliers in a timely manner.<sup>146</sup> Questions regarding the legal effect of State Council replies will not be answered until the National People's Congress enacts the AEA and courts begin to enforce it.<sup>147</sup>

#### IV. LIABILITY RULES

Having sketched the general legislative framework and the problem it creates in Part III, Part IV will address the contents of the legal rules applicable to nuclear accidents, particularly the liability regime, in more detail. The 1986 Reply and 2007 Reply provide the general framework concerning the nuclear liability regime in China. They are both normative documents issued by the State Council. The 1986 Reply has not been officially revoked. According to the last in time rule, meaning that a new law prevails over the old one, when the two documents have contradictory provisions, the 2007 Reply applies.<sup>148</sup> Certain issues, however, such as the

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143. *Id.* art. 6.

144. The end of the Reply states: "The Atomic Energy Law of the People's Republic of China (Draft) shall be drafted to expressly provide for the foregoing matters as well as the limitation of actions, jurisdiction, etc." 2007 STATE COUNCIL REPLY, *supra* note 12. In the other words, the 2007 Reply applies before the AEA is enacted. If the AEA has some different stipulations, the AEA will be applicable. *See id.*

145. *See supra* Part III.A.

146. Ximena Vásquez-Maignan, *supra* note 11, at 21.

147. For a more in depth discussion regarding the legal status of the State Council Replies, see Kevin Li, *Development of Maritime Limitation of Liability in China*, 42 HONG KONG L. J. 253 (2012).

148. A last in time rule also applies in China. *See* Law on Legislation, *supra* note 132, art. 83. In the case of national law, administrative regulations, local decrees, autonomous decrees and special decrees, and administrative or local rules enacted by the same body, if a special provision differs from a general provision, the special provision shall prevail; if a new provision differs from an old provision, the new provision shall prevail. *See id.*

statute of limitations and the jurisdictional issues, are only addressed in the 1986 Reply.<sup>149</sup> For those issues, the 1986 Reply remains applicable.

As previously stated,<sup>150</sup> the State Council's responses to the concerns of foreign suppliers contain principles derived from international nuclear liability conventions. The replies, however, are just cursory provisions. Some issues, such as the scope of compensable damage, need further clarification in light of the Chinese tort system. This section highlights some important components of the nuclear liability regime under the replies, with reference to other related and more general acts. After all, as explained above,<sup>151</sup> nuclear accidents do not fall outside the scope of these general tort law rules. The general tort law rules may be applicable in cases of nuclear accidents.

#### A. *Definition of Nuclear Damage*

##### 1. *Nuclear Damage under the Replies*

In establishing nuclear liability, it must first be determined what type of damage is actionable. According to the 1986 Reply, nuclear operators are liable under two circumstances. First, they are liable for nuclear damage caused by nuclear accidents on the site of a nuclear power plant.<sup>152</sup> Second, they are liable for nuclear damage caused by nuclear accidents within the territory of China that occurred during the transportation of nuclear substances after the operator had taken charge of the nuclear substances and before another party took charge of the nuclear substance.<sup>153</sup> This provision in the 1986 Reply, however, does not clearly define what constitutes nuclear damage or a nuclear accident. It does not touch upon the gradual damage a nuclear installation can cause. It also does not discuss nuclear damage that nuclear substances alone can cause without an accident.

The 2007 Reply, however, did include three express examples of what constitutes nuclear damage: "The operators shall be liable to compensate

149. For example, in the 1986 Reply, Article 6 states: "The victim can claim for damages from the operator within three years from the day he knows or should have know the damage caused by a nuclear accident; however, this claim should be made within ten years after the accident." 1986 STATE COUNCIL REPLY, *supra* note 12, art. 6. Article 7 states: "For all the liability litigations caused by an nuclear accident happening in the territory of China, Chinese law should apply. Those litigations should be filed to the court, which has jurisdiction in the place where the accident happens." *Id.* art. 7.

150. *See supra* Part III.B.

151. *See supra* Part III.A.

152. 1986 STATE COUNCIL REPLY, *supra* note 12, art. 2.

153. *Id.*

for the personal casualties, property losses or environmental damage arising out of nuclear accidents . . . .”<sup>154</sup> Environmental damage now explicitly qualifies for compensation under the 2007 Reply. As previously discussed,<sup>155</sup> however, the Reply itself does not define the three types of damage resulting in uncertainties, including whether pure economic losses qualify for compensation and what constitutes environmental damage. The concrete scope of these concepts can only be understood within the broader picture of Chinese tort law and environmental law.

## 2. *Scope of Liability under Other Related Acts*

As mentioned in Part III.A, in addition to the two State Council replies, nuclear liability may be based on general rules under the GPCL, the Tort Law, and other environmental acts.

### a. *Personal Injury, Property Damage, and Pure Economic Loss*

Article 106 of the GPCL provides that “[c]itizens and legal persons who through their fault encroach upon state or collective property or the property or person of other people shall bear civil liability. Civil liability shall still be borne even in the absence of fault, if the law so stipulates.”<sup>156</sup> Under this provision, the court can establish liability if there is encroachment upon property or person.<sup>157</sup> It does not use the term “property right” or “personal right.” Under Article 2 of the 2009 Tort Law, the expression is clearer:

Those who infringe upon civil rights and interests shall be subject to the tort liability according to this Law.

The term “civil rights and interests” used in this act includes the right to life, the right to health, the right to name, the right to reputation, the right to honor, right to self image, right of privacy, marital autonomy, guardianship, ownership, usufruct, security interest, copyright, patent right, exclusive right to use a trademark, right of discovery, equities, right of succession, and other personal and property rights and interests.<sup>158</sup>

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154. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 2.

155. *See supra* Part III.A.

156. GPCL, *supra* note 93, art. 106.

157. *Id.*

158. 2009 Tort Law, *supra* note 92, art. 2.

The provisions under Article 2 use “civil rights and interests” instead of simply “civil rights.” The provision further defines the term “civil rights and interest” by listing specific rights and interests.<sup>159</sup> The catchall expression also enables an interest to receive protection under the Tort Law even if it is not established as a “civil right” and not explicitly included in the list.<sup>160</sup> An example would be pure economic loss.<sup>161</sup> As a result of this provision, there are, in theory, no specific legislative hurdles for establishing liability for pure economic loss even though neither the GPCL nor the Tort Law contain explicit provisions regarding pure economic losses. Acts or judicial explanations that explicitly permit compensation for pure economic loss only exist in specific limited fields.<sup>162</sup> In practice, therefore, pure economic losses are compensated in only a limited number of cases. These cases include claims for living expenses for individuals dependent on the deceased, misrepresentation under the Securities Act, third parties infringing creditor’s rights,<sup>163</sup> and marine oil pollution.<sup>164</sup>

Under Article 65 of Chapter VIII of the Tort Law, parties responsible for environmental damage will be held strictly liable, meaning that polluters will be held liable for the harm caused by their pollution irrespective of fault or wrongfulness.<sup>165</sup> Chapter IX of the Tort Law deals specifically with ultra hazardous activities.<sup>166</sup> Article 70 of Chapter IX explicitly stipulates strict liability for the operator of civil nuclear facilities except for specific situations.<sup>167</sup> Although Chapter VIII and Chapter IX of

159. *Id.*

160. The language, “and other personal and property rights and interests” in Article 2 implies that the list of rights and interests is not exclusive. Hence, in addition to the listed civil rights and interests, if there is infringement on other rights and interests, tort liability may also be established. See Vernon V. Palmer, *The Great Spill in the Gulf . . . and a Sea of Pure Economic Loss: Reflections on the Boundaries of Civil Liability*, 116 PENN ST. L. REV. 105, 115 n.45 (2011).

161. *See id.*

162. For example, there are provisions about compensation for the living expenses of the victim’s dependents and mis-presentations in the field of security market or by professionals. Zhang Xinbao & Li Qian, 张新宝,李倩,纯粹经济损失赔偿规则:理论、实践及立法选择. 张新宝,李倩 [*The Compensation Rule of Pure Economic Loss: Theory, Practice and Legislative Choice*], 121 LEGAL FORUM [LEGAL F.] 5, 7–10 (2009) (China).

163. *Id.* at 7–10.

164. See Ma Jingjing & Du Jiang, *Discussion on the National Claim System for Oil Pollution Damage from Ships*, in PREVENTION AND COMPENSATION OF MARINE POLLUTION DAMAGE: RECENT DEVELOPMENTS IN EUROPE, CHINA AND THE U.S. 223, 234–36 (Michael Faure & James Hu eds., 2006) (discussing compensation for pure economic losses in the field of marine oil pollution).

165. 2009 Tort Law, *supra* note 92, art. 65 (“Where any harm is caused by environmental pollution, the polluter shall assume the tort liability.”).

166. *Id.* arts. 69–77.

167. *Id.* art. 70 (“Where a nuclear accident occurs to a civil nuclear facility and causes any harm to another person, the operator of the civil nuclear shall assume the tort liability unless it can prove that

the Tort Law may cover nuclear accidents, neither of them specifies the scope of damage for which polluters and operators can be held liable.

*b. Environmental Damage*

Environmental damage is another term that needs explanation. Since neither the GPCL, the ELP, nor the new Tort Law defines “environmental damage,”<sup>168</sup> it is unclear whether environmental damage covers only personal injury and property damage, or whether it also covers damage done to the environment itself. It is also unclear whether the enjoyment of the environment, costs of preventive measures, and restoration measures are compensable. Some specific environmental acts do contain provisions that indirectly permit remedies for pure environmental damage. For example, under the MEPA, “[f]or damages to marine ecosystems, marine fishery resources and marine protected areas which cause heavy losses to the State, the department invested with power by the provisions of this law to conduct marine environment supervision and administration shall, on behalf of the State, claim for the damage.”<sup>169</sup>

Under this provision, the competent public authorities can file claims for pure environmental damage.<sup>170</sup> Another example is the SWPPA, which requires parties who pollute through solid waste to eliminate the risk, compensate for the losses, and take measures to restore the environment.<sup>171</sup> The liable party has an obligation to take restorative measures or to pay the costs.<sup>172</sup> Thus, if a nuclear accident pollutes the marine environment or radiation waste results in pollution, these provisions may be applied.

In practice, however, compensation for pure environmental damage is still limited.<sup>173</sup> Marine pollution has received more compensation than other types of pure environmental damage, but most of the cases involve

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the harm is caused by a situation such as war or by the victim intentionally.”).

168. Even though, as was just mentioned, the new Tort Law explicitly introduces strict liability for environmental harm. *See* 2009 Tort Law, *supra* note 92.

169. [Marine Environmental Protection Law] (promulgated by the Standing Comm. Nat’l People’s Cong., Dec. 25, 1999, effective Apr. 1, 2000) (China).

170. *Id.*

171. SWPPA, *supra* note 107, art. 85 (“When solid waste leads to environmental pollution, the liable party should eliminate hazards, compensate for damage and restore the environment.”).

172. *Id.*

173. ZHU XIAO, A STUDY OF SOCIALIZED INDEMNIFICATION FOR ECOLOGICAL DAMAGE: A JURISPRUDENTIAL PERSPECTIVE (竺效,生态损害的社会化填补法理研究,中国政法大学出版社) 28 (2007) (China).

oil pollution.<sup>174</sup> For nuclear accidents, compensation may be directed more toward personal injury and property damage than pure environmental damage. Based on the text of the MEPA, it is still relatively unclear whether and to what extent pure environmental damage would be compensated. The new Tort Law seems to provide an important legal basis, but the text is still novel, and it is unclear how it would be applied in cases of environmental harm by way of a nuclear accident.

### *B. Strict Liability*

Strict liability is also adopted under China's nuclear damage liability regime. The 1986 Reply prescribes that the operators bear "absolute

174. China is a party to the International Convention on Civil Liability for Oil Pollution Damage (the "CLC"), which allows compensation for preventive and reinstatement measures. Protocol of 1992 to amend the International Convention on Civil Liability for Oil Pollution Damage, 1969, Nov. 27, 1992, 973 U.N.T.S. 3 [hereinafter the CLC]. Under the influence of the CLC, China promulgated various regulations and judicial explanations that explicitly allow compensation for some parts of environmental damage. For example, Article 3 of the Provision of the Supreme People's Court on Several Issues Concerning the Trial of Cases of Disputes over Compensation for Vessel-induced Oil Pollution Damage allows compensation for preventive measures, loss of revenue due to environmental damage, and reinstatement measures. [Provision of the Supreme People's Court on Several Issues Concerning the Trial of Cases of Disputes over Compensation for Vessel-induced Oil Pollution Damage] (promulgated by Judicial Comm. Sup. People's Ct., Jan. 10, 2011, effective July 1, 2011) (China), available at <http://www.lawinfochina.com/display.aspx?lib=law&id=8822&CGid=>. Similar provisions can also be found in the Maritime Procedure Act (Article 21) and in the Regulation on the Prevention and Control of Vessel-induced Pollution to the Marine Environment (Article 42). Article 21 of the Maritime Procedure Act states:

The following maritime claims may applied for arresting ships: . . . (4) the damage or threat of damage caused by the ship to the environment, seashore or the relevant interested parties; the measures taken for prevention, reduction and elimination of such damage; payment for compensation of such damage; the reasonable cost for the measures taken actually or preparing to take for restoring the environment; loses the third party suffered or will probably suffer due to such damage; and the damage, fees or loses which are similar in nature specified in this Item.

[Maritime Procedure Act] (promulgated by the Standing Comm. Nat'l People's Cong., Dec. 25, 1999, effective July 1, 2000) (China). Article 42 of the Regulation on the Prevention and Control of Vessel-induced Pollution to the Marine Environment states:

Where a vessel-induced pollution incident occurs, the Maritime Administration may take necessary measures, including removal, salvage, towage, pilotage and lighterage, to mitigate the pollution damage. The relevant expenses arising from such measures shall be borne by the ship and/or the unit that is responsible for the pollution to the marine environment.

[Regulation on the Prevention and Control of Vessel-induced Pollution to the Marine Environment] (promulgated by St. Council, Sept. 2, 2009, effective Mar. 1, 2010) (China). However, China issued those provisions mainly under the influence of international conventions on oil pollution. See Song Ying, *China and International Protection of Marine Environment*, in *MARITIME POLLUTION LIABILITY AND POLICY: CHINA, EUROPE AND THE U.S.* 333 (Michael Faure et al. eds., 2010). It is less clear to what extent pure environmental damage can be compensated.

liability” for nuclear damage.<sup>175</sup> Although the term “strict” or “absolute” liability is not used in the 2007 Reply, it does not require fault to establish liability for operators.<sup>176</sup> Article 70 of the new Tort Law also follows a strict liability standard.<sup>177</sup> It holds liable the operator of the facility causing the nuclear accident unless the operator can prove that such harm was caused by war or inflicted intentionally by the victim.<sup>178</sup>

Liability established under the State Council replies and the 2009 Tort Law is quite strict. The only available defense is that armed conflict, hostile action, war, or riot caused the nuclear accident, and consequently, damage.<sup>179</sup> The 2009 Tort Law added the additional defense for harm inflicted intentionally by the victim.<sup>180</sup> The 1986 Reply also allows “a grave natural disaster of an exceptional nature” to serve as a defense,<sup>181</sup> but the 2007 Reply does not.<sup>182</sup> This change is in line with those made to the international nuclear liability regimes; under the first generation of international nuclear liability conventions, nuclear damage caused by a grave natural disaster was a permissible defense if the domestic legislation of the Member States permitted it. Under the second generation of international conventions, however, this defense was abrogated.<sup>183</sup> A

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175. 1986 STATE COUNCIL REPLY, *supra* note 12, art. 2 (“For the nuclear damage caused by an accident happened in a nuclear power plants in the territory of China, or before the nuclear material is taken charged by other persons and after taking charge of nuclear material from others, the operators of the nuclear power plant shall assume absolute liability; no other party will be liable.”).

176. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 2 (“The operators shall be liable to compensate for the personal casualties, property losses or environmental damages arising out of nuclear accidents, while no persons other than the operators shall be liable to compensate therefore.”).

177. 2009 Tort Law, *supra* note 92, art. 70.

178. *Id.* See also *supra* Part IV.A.2.a.

179. 1986 STATE COUNCIL REPLY, *supra* note 12, art. 5 (“Operators are not liable when a nuclear accident is caused directly by armed conflict, hostile action, riot or natural disaster of an exceptional character.”); 2007 STATE COUNCIL REPLY, *supra* note 12, art. 6 (“With regard to the damages caused by a nuclear accident directly resulting from armed conflict, hostile action, war or riot, the relevant operator shall not be liable to compensate for such damages.”).

180. 2009 Tort Law, *supra* note 92, art. 70.

181. 1986 STATE COUNCIL REPLY, *supra* note 12, art. 5.

182. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 6.

183. For example, when the Paris Convention was passed in 1960, natural disaster may compose a valid defense. See Paris Convention of 1960, *supra* note 122. 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.

*Id.* art. 9.

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.” Paris Convention, *supra* note 122, art. 9 (*amended* by the 2004 Protocol to Amend the Paris Convention) [hereinafter Paris Convention of 2004].

possible positive consequence of this change is that the operators now have more incentive to construct and operate nuclear installations more carefully in order to make them more resistant to natural disasters. But the question of how the operators can afford to pay liability costs for damage caused by natural disaster may arise since liability insurance does not often cover this type of damage.

### C. *Liable Parties*

Both State Council replies adopt the principle of channeling liability; only nuclear operators are liable while all other parties are exonerated from liability.<sup>184</sup> The 1986 Reply does not contain a right to recourse provision, but the 2007 Reply allows recourse under certain conditions.<sup>185</sup> If a written contract between an operator and another person provides for the right of recourse, the operator may exercise that right against the other person after compensating the victim.<sup>186</sup> The operator may also have the right of recourse if the damage is caused by a third party's willful act or omission.<sup>187</sup>

Channeling of liability is in contradiction to the general principles of tort law, and especially with the Product Quality Act ("PQA"). According to the PQA, the producer of the defective product must be held liable for personal injury and other property damage caused by the defect.<sup>188</sup> The seller shall be liable for the personal injury and other property damage if he is at fault.<sup>189</sup> If courts apply these provisions to nuclear damage cases, the nuclear suppliers may also be held liable if they contributed to the damage. Although the PQA leaves room for specific legislation, the derogations should be laid down in laws and administrative regulations.<sup>190</sup> Since the State Council replies are only normative rules, the method by which courts would resolve these conflicts remains unclear.<sup>191</sup>

The 2009 Tort Law imposes liability on nuclear operators as well. Article 70 of Chapter IX prescribes nuclear liability for ultra hazardous

184. Channeling in the nuclear law means that "all liability is channeled to the nuclear operator; no other entity may be held liable for nuclear damage." See Schwartz, *supra* note 87 and accompanying text.

185. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 9.

186. *Id.*

187. *Id.*

188. Product Quality Law, *supra* note 102, arts. 41–42.

189. *Id.*

190. The PQA states that "where laws or administrative regulations provide otherwise on liability for damages caused by nuclear facilities and nuclear products, those rules shall apply." *Id.* art. 73.

191. See *supra* Part III.B.



liability.<sup>192</sup> Both the general provisions of Chapter IX and the specific provision on nuclear liability in Article 70 may apply. The general provisions of Chapter IX prescribe that the parties undertaking ultra hazardous activities shall be held liable for damage that they caused.<sup>193</sup> Article 70 requires nuclear operators to be liable for nuclear damage, but it does not explain the term “nuclear operators.”<sup>194</sup> Moreover, the Tort Law does not exclude the liability of other parties.

The 2007 Reply defines nuclear operators as:

The organizations within the territory of the People’s Republic of China which have obtained legal personality according to law, and operate nuclear power stations, civil research reactors and/or civil engineering test reactors, or engaged in the production and transportation of civil nuclear fuels and the storage, transportation and post-treatment of spent fuels and have nuclear installations.<sup>195</sup>

This definition suggests that the 2007 Reply applies not only to nuclear power plants, but to other civil nuclear installations as well.

As mentioned above, only three parties are licensed to own and operate nuclear power plants in China: CNNC, CGNPC and CPIC.<sup>196</sup> The 2007 Reply contains provisions that further clarify which nuclear operators might be held liable.<sup>197</sup> Nuclear installations owned by the same operator at the same site are treated as one nuclear installation.<sup>198</sup> If a nuclear accident involves more than two operators and their respective liability cannot be clearly determined, the operators are held jointly and severally liable.<sup>199</sup>

#### *D. Limitations on Liability: Magnitude, Time, and Jurisdiction*

The liability of nuclear operators is limited in terms of magnitude, time, and jurisdiction. Under the 1986 Reply, the operators’ liability is capped at RMB 18 million (5.21 million U.S. dollars in 1986).<sup>200</sup> The 1986 Reply does not differentiate between the operator types. The 2007 Reply capped liability based on the activities of the operator; the operators of

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192. 2009 Tort Law, *supra* note 92, art. 70.

193. *Id.* art. 69.

194. *Id.*

195. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 1.

196. *See supra* Part II.C.

197. *See* 2007 STATE COUNCIL REPLY, *supra* note 12, arts. 1–2.

198. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 4.

199. *Id.* art. 5.

200. 1986 STATE COUNCIL REPLY, *supra* note 12, art. 3.

nuclear power plants and the operators of spent fuel storage, transportation, and post-treatment are liable up to RMB 300 million (47.13 million U.S. dollars in 2011); other operators are only liable up to RMB 100 million (15.71 million U.S. dollar in 2011).<sup>201</sup> Although the award cap was increased by the 2007 Reply, the cap is still low in comparison to liability caps imposed in the U.S. and the second generation of international nuclear liability conventions.<sup>202</sup>

Under the 2009 Tort Law, neither the general chapters (Chapters I–IV) nor the specific chapter on environmental liability (Chapter VIII) provide a provision concerning a cap on liability. Caps are allowed in Chapter IX for liability for ultra hazardous activities.<sup>203</sup> According to Article 77 of Chapter IX, if other acts allow for a cap on liability for ultra-hazardous activities, those acts shall apply.<sup>204</sup> Unfortunately, it is unclear whether the two State Council replies qualify as other acts since they are still only normative rules.<sup>205</sup>

In addition to monetary caps, the 1986 Reply also limits the operators' liability in terms of time and jurisdiction. Because the 2007 Reply does not contain a provision on the prescription period, the related provisions in the 1986 Reply are still applicable. According to the 1986 Reply, victims should bring their claims within three years from the day they knew or should have known about the nuclear accident damage or within ten years after the occurrence of the accident.<sup>206</sup> This prescription period is quite short in the context of nuclear damage since certain types of damage, especially personal injury, may not manifest themselves for decades.

Finally, a nuclear operator's liability is limited by jurisdictional requirements. For a nuclear accident occurring within the territory of China, only the court located where the nuclear accident occurred has jurisdiction over the claims.<sup>207</sup> The 2007 Reply provides that:

Where a nuclear accident causes damage across the border of the People's Republic of China, such damage shall be handled in

201. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 7.

202. For example, in the U.S., nuclear operators for power plants are asked to provide primary financial protection up to \$375 million. Amounts of Financial Protections for Certain Reactors, 10 C.F.R. § 140.11(4) (1960). The original Paris Convention requires operators to provide financial coverage up to 15 million SDRs (subject to changes by Contracting Parties). Paris Convention of 1960, *supra* note 122, art. 7. This requirement is increased to 700 million Euro. Paris Convention of 2004, *supra* note 183, art. 7.

203. 2009 Tort Law, *supra* note 92, ch. IX.

204. *Id.* art. 77.

205. *See supra* Part III.B.

206. 1986 STATE COUNCIL REPLY, *supra* note 12, art. 6.

207. *Id.* art. 7.

accordance with the treaty or protocol between the People's Republic of China and the relevant country. If there is no such treaty or protocol, such damage shall be handled according to the principle of reciprocity.<sup>208</sup>

This provision provides a singular approach to addressing the issue of trans-boundary damage. It is unclear what the effects of the principle of reciprocity would be when foreign law establishes a different regime than China.

#### *E. Financial Security*

Nuclear damage is a high magnitude, low frequency risk. Even though liability is capped, financial instruments are necessary to guarantee that operators have the capacity to meet their liability requirements in case damage does occur.<sup>209</sup> The 1986 Reply has no specific requirements about financial security. With the fast development of China's nuclear industry and the increased liability cap, the necessity of financial security has started to receive more attention.<sup>210</sup> Under the 2007 Reply, operators are required to make appropriate financial arrangements to ensure timely and effective compensation in case of damage.<sup>211</sup> Before an operator begins nuclear power plant operations or the storage, transportation, or post-treatment of spent fuel operations, the operator must purchase sufficient insurance to cover its limits of liability.<sup>212</sup> The 2007 Reply does not clarify what kind of financial security mechanisms operators can use. In practice, operators of nuclear power plants typically choose to realize their financial responsibility by seeking liability insurance coverage.<sup>213</sup>

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208. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 3.

209. For a general discussion about the necessity of financial instruments to compensate for environmental damage, see Alberto Monti, *Environmental Risk: a Comparative Law and Economics Approach to Liability and Insurance*, 9 E.R.P.L. 51, 65–67 (2001); Bidénam Kambia-Chopin, *Environmental Risks, the Judgment-Proof Problem and Financial Responsibility*, 30 EUR. J. L. ECON. 77, 84 (2010). For the discussion of the necessity to introduce financial security for nuclear liability, see Zhou Zhiming & Liu Chunsheng, *Present Status and Prospects of the Compensation System for Nuclear Damage in China*, in NUCLEAR ACCIDENTS: LIABILITY AND GUARANTEES (OECD/NEA) 281 (1992).

210. There is discussion among scholars concerning the importance of financial security. See, e.g., Cai Xianfeng, *supra* note 11; Li Yayun, *supra* note 124; He Liu, 贺柳, 我国核第三者责任保险制度刍议, 保险研究 [*Nuclear Liability Insurance in China*], 383 INSURANCE STUDIES, 92 (2011) (China).

211. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 8.

212. *Id.*

213. Jia Ying, 贾颖, 浅谈我国核责任保险, 中国保险, [*Nuclear Liability Insurance in China*], 281 CHINA INSURANCE [CHINA INS.] 47, 48 (2011) (China).

In addition to the cap on liability, the two State Council replies require the government to provide indemnity. For example, under the 1986 Reply, if the nuclear damage exceeds the cap of liability (RMB 18 million), the government shall provide necessary indemnity up to RMB 300 million (86.89 million U.S. dollars in 1986).<sup>214</sup> Under the 2007 Reply, the government indemnity was increased to RMB 800 million (125.68 million U.S. dollars in 2011).<sup>215</sup> The 2007 Reply allows additional financial indemnity if the damage results from an extraordinary nuclear accident and the increase is approved by the State Council.<sup>216</sup>

#### F. Nuclear Insurance

In China the operators of nuclear power plants are required to purchase insurance to cover their potential liability.<sup>217</sup> In the early developmental stages of China's nuclear program, only the People's Insurance Company of China ("PICC") provided liability insurance.<sup>218</sup> The capacity of this one insurer, however, was very limited.<sup>219</sup> Similar to other jurisdictions,<sup>220</sup> the insurers decided to pool together to provide insurance coverage for nuclear liability. In 1999, four large insurers in China joined forces to provide nuclear insurance through a pool—the China Nuclear Insurance Pool ("CNIP").<sup>221</sup> In 2011, CNIP had twenty-three members.<sup>222</sup>

The CNIP provides three types of nuclear insurance products: nuclear material insurance, nuclear liability insurance, and liability insurance for the transportation of nuclear substances.<sup>223</sup> Nuclear material insurance covers property and machine damage caused by natural disasters, radiation

214. 1986 STATE COUNCIL REPLY, *supra* note 12, art. 3.

215. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 7.

216. *Id.*

217. *Id.* art. 8.

218. Zheng Hongliang, 郑宏亮, 关于发展我国核保险市场的若干探讨, 上海保险 [On the Development of China's Nuclear Insurance Market], 2 SHANGHAI INSURANCE [SHANGHAI INS.] 15, 15 (2002).

219. *Id.*

220. For example, in the U.S., nuclear liability insurance is provided by a pool: American Nuclear Insurers (ANI). For detailed information about the ANI, see Michael Faure & Tom vanden Borre, *infra* note 242, at 248–54. Assuratomie in France, the British Nuclear Insurers in the UK, and Syban in Belgium are also such examples. See Michael Faure & Karine Fiore, *The Civil Liability of European Nuclear Operators: Which Coverage for the New 2004 Protocols? Evidence from France*, 8 INT'L ENVTL. AGREEMENTS: POLITICS, LAW AND ECON. 227, 236 (2008).

221. Zheng Hongliang, *supra* note 218, at 15.

222. *Members of China Nuclear Pool Has Increased to 23* (中国核工体成员公司增至23家) (Nov. 8, 2011) (China), available at [http://www.cpcr.com.cn/zbxxx/201111/t20111112\\_23593.shtml](http://www.cpcr.com.cn/zbxxx/201111/t20111112_23593.shtml).

223. *China Nuclear Insurance Pool Insurance Policies* (核共体保险业务范围) (Jan. 16, 2009), available at [http://www.chinare.com.cn/zghgt/hbyw/201212/t20121203\\_26042.shtml](http://www.chinare.com.cn/zghgt/hbyw/201212/t20121203_26042.shtml).

and other nuclear risks, and nuclear accidents.<sup>224</sup> The coverage is typically between 1 and 1.6 billion dollars.<sup>225</sup> Nuclear liability insurance covers the operator's nuclear liability based on the applicable law.<sup>226</sup> The insured amount is the required liability for nuclear operators, approximately \$45 million for nuclear power plants.<sup>227</sup> Both nuclear material insurance and nuclear liability insurance policies exclude the damage caused by war, insurrection, grave natural disasters, and terrorism.<sup>228</sup> Under the 2007 Reply, damage caused by natural disaster and terrorism is not a valid defense.<sup>229</sup> Explained literally, the government is only indemnified if the damage exceeds the cap of the operator's liability. Therefore, the operator needs to compensate for the damage caused by a grave natural disaster or terrorist act up to his liability limit.

Before providing insurance coverage to nuclear operators for the first time, the CNIP will examine the risk that nuclear installations impose.<sup>230</sup> After that, the CNIP will examine the nuclear facility periodically, usually every three to five years.<sup>231</sup> In addition to nuclear material insurance and nuclear liability insurance, CNIP provides liability insurance for the transportation of nuclear substances.<sup>232</sup> The insurance clause is determined by the type and quantity of substances and the distance, routes, and countries or districts that the transporters travel through.<sup>233</sup>

## V. CRITICAL EVALUATION AND COMPARISON

Comparing the features of China's nuclear liability regime with the international regime and the U.S. Price-Anderson Act lends itself to interesting observations. It is somewhat difficult to compare China to those other regimes because there is still a large degree of uncertainty surrounding the precise scope of nuclear liability in China. For example, Article 70 of the Tort Liability Act of 2009 explicitly provides for a strict liability standard for nuclear accidents but does not provide any details on the precise meaning and implementation of this nuclear liability.<sup>234</sup> In that

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224. *Id.*

225. *Id.*

226. *Id.*

227. *Id.*

228. *China Nuclear Insurance Pool Insurance Policies*, *supra* note 223.

229. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 6.

230. *Id.*

231. *Id.*

232. *Id.*

233. *See supra* note 223.

234. 2009 Tort Law, *supra* note 92, art. 70.

respect, one must refer to the two State Council replies whose legal statuses are dubious.<sup>235</sup> China's non-cohesive nuclear liability regime structure hinders all relevant parties from knowing with certainty what remedies—if any—are available to victims in China as compared to the international regime or the U.S. Price-Anderson Act.<sup>236</sup> The replies of the State Council do, however, provide enough detail to understand the scope of the Chinese nuclear liability regime with more certainty.

The international treaty system can be divided into two regimes. The first regulates civil liability for damage caused by nuclear accidents.<sup>237</sup> It was established under the auspices of the Organization for Economic Cooperation and Development's Nuclear Energy Association ("OECD"/"NEA") and consists of the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960 (the "Paris Convention") and the Brussels Supplementary Convention to the Paris Convention on Third Party Liability in the Field of Nuclear Energy of 31 January 1963 (the "Brussels Supplementary Convention").<sup>238</sup> The second nuclear liability treaty regime was developed under the auspices of the IAEA: the Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963.<sup>239</sup> The legal literature commented on these international regimes in detail, and the regimes have also been the subject of mounting criticism.<sup>240</sup>

The U.S. did not join the international conventions, but adopted its own regulatory system, the Price-Anderson Act of 1957.<sup>241</sup> There are a few remarkable differences not only between China and the international regime, but also between the international regime and the U.S. Price-Anderson Act.<sup>242</sup> There is one issue, however, on which the three regimes do align. Under the Chinese regime and the international regime, a strict liability rule applies.<sup>243</sup> In the U.S., when a nuclear accident qualifies as an Extraordinary Nuclear Occurrence ("ENO"), thereby triggering the

235. See *supra* Part IV.D.

236. See *supra* Part III.B (discussing the various legal norms and different hierarchical orders of these various legal norms).

237. See *supra* note 107.

238. *Id.*

239. *Id.*

240. See van den Borre, *supra* note 87, 294–99.

241. Price-Anderson Act, 42 U.S.C. § 2210 (1957).

242. See Michael G. Faure & Tom van den Borre, *Compensating Nuclear Damage: A Comparative Economic Analysis of the U.S. and International Liability Schemes*, 33 WM. & MARY ENVTL. L. & POL'Y REV. 219 (2008) (discussing the differences between the U.S. and international liability schemes for compensating nuclear damage).

243. For Chinese regime, see *supra* Part IV.B. For a discussion of the international regime, see Tom Vanden Borre, *Nuclear Liability: An Anachronism in EU Energy Policy?*, in EUROPEAN ENERGY LAW REPORT VII 184–86 (Martha Roggenkamp & Ulf Hammer eds., 2010).

application of the federal Price-Anderson Act, a strict liability standard applies.<sup>244</sup> But for nuclear accidents that do not qualify as an ENO, state law applies.<sup>245</sup> Some states require negligence or fault to trigger liability.<sup>246</sup>

Of greater importance is the question of who can be held liable under these regimes. Under the international regime, exclusive civil liability exists for the operator of the nuclear power plant, also referred to as the channeling of liability.<sup>247</sup> This rule is debatable from an economic perspective, particularly because channeling excludes holding other parties liable who likely contributed to the risk.<sup>248</sup>

Notably, the U.S. requested the introduction of the principle of channeling to the international treaty regime.<sup>249</sup> Because the U.S. was the original manufacturer of nuclear technology and material, U.S. suppliers feared they would be held liable for nuclear accidents that occurred at facilities they supplied outside the U.S., namely in Europe.<sup>250</sup> A channeling of liability was introduced in international conventions to prevent U.S. suppliers from being held liable.<sup>251</sup> The same reasoning was advanced in China to justify the channeling of liability there.<sup>252</sup> Foreign suppliers feared being held liable for delivering nuclear material to China.<sup>253</sup> The 1986 Reply channeled liability to Chinese operators excluding the liability of foreign suppliers.<sup>254</sup> This was analogous to

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244. 42 U.S.C. § 2210(n). This provision requires the nuclear plant owner to waive certain defenses they might otherwise have under local tort law if an accident comprises an ENO. This waiver of defenses makes this liability strict. For the discussion of strict liability under the PAA, see Donald Jose & Michael Garza, *The Price-Anderson Public Liability Action and Strict Liability*, BEPRESS LEGAL SERIES 6–7 (2007), available at <http://law.bepress.com/expresso/eps/2022/>.

245. The PAA does not preempt state law. The state law still applies if it is not inconsistent with the PAA. See 42 U.S.C. § 2014(h). The PAA only waives certain defenses under the state law when a nuclear accident qualifies as an ENO. *Id.* § 2210(n). Therefore, under other conditions, the State law still applies.

246. There is some case law that requires the establishment of fault or violation of due care standards. See *O'Connor v. Commonwealth Edison Co.*, 13 F.3d 1090 (7th Cir. 1994); *In re TMI Gen. Pub. Utils. Corp.*, 67 F.3d 1103 (3d Cir. 1995); *Cook v. Rockwell Int'l Corp.*, 273 F. Supp. 2d 1175 (D. Colo. 2003); *In re Hanford Nuclear Reservation Litigation*, 350 F. Supp. 2d 871, 875 (E.D. Wash. 2004).

247. Nobert Pelzer, *Learning the Hard Way: Did the Lessons Taught by the Chernobyl Nuclear Accident Contributing to Improving Nuclear Law?*, in *INTERNATIONAL NUCLEAR LAW IN THE POST-CHERNOBYL PERIOD* (OECD) 100 (2006); see also *supra* Part IV.C (defining and discussing the principle of channeling of liability).

248. See Faure & Fiore, *supra* note 261, at 230.

249. van den Borre, *supra* note 87, at 262–63.

250. *Id.*

251. *Id.* at 263–66.

252. Cai Xianfeng, *supra* note 125, at 291.

253. *Id.*

254. 1986 STATE COUNCIL REPLY, *supra* note 12, art. 2.

international conventions channeling liability away from U.S. suppliers.<sup>255</sup> The system established under the U.S. Price-Anderson Act does not channel liability (whereby the liability of other parties who could have caused a nuclear accident is excluded), but a so-called economic channeling process takes place through the American Nuclear Insurers (“ANI”).<sup>256</sup> ANI provides a so-called omnibus coverage for all parties involved in the nuclear operation, creating its own type of liability channeling.<sup>257</sup>

Critics of the international regime also criticize its financial cap of liability.<sup>258</sup> In pursuance of the conventions, nuclear operators have a cap amount to which they can be held civilly liable for a nuclear accident.<sup>259</sup> The Paris Convention first fixed the amount in 1960, but it has been modified several times.<sup>260</sup> Before the last modifying protocols of the Paris and Brussels Conventions, an operator’s liability limit in a country like France was fixed at € 91 million (116 million USD).<sup>261</sup> The latest protocol from 2004 now caps the amount at € 700 million (893 million USD), but it has yet to enter into force.<sup>262</sup> Critics argue that even € 700 million is likely incredibly insufficient to cover all of the victims of a nuclear accident.<sup>263</sup>

The third source of criticism stems from the provision in the Brussels Convention that “provides a complementary mechanism of compensation based on public funds.”<sup>264</sup> The complementary mechanism applies in cases where the liability required from operators is insufficient to cover the costs to the victims.<sup>265</sup> The Brussels Convention adds two risk layers, one layer consisting of aid by the national state and another layer consisting of aid by all parties to the Convention.<sup>266</sup> Since the precise amount depends on national implementation, the amounts available for compensation differ.<sup>267</sup> For example, in France, the total amount available to victims under the Paris and Brussels Conventions consisted of € 381 million.<sup>268</sup> After the

255. van den Borre, *supra* note 87, at 262–63.

256. *Id.* at 300.

257. *Id.* at 299–302.

258. *Id.* at 297.

259. Paris Convention of 2004, *supra* note 183, art. 7.

260. Paris Convention of 1960, *supra* note 122, art. 3.

261. See Michael G. Faure & Karine Fiore, *An Economic Analysis of a Nuclear Liability Subsidy*, 26 PACE ENVTL. L. REV. 419, 427 (2009).

262. *Id.*

263. *Id.* at 428.

264. *Id.*

265. *Id.*

266. *Id.*

267. Faure & Fiore, *supra* note 261, at 429–30.

268. *Id.* This allocation breaks down to € 91 million based on the operator’s liability cap, € 140



modification protocol (when it would enter into force), the total amount of coverage available would be € 1.5 billion.<sup>269</sup> Critics within the legal literature world argue that this level of government intervention would provide a generous subsidy to the nuclear operator that caused a devastating nuclear accident.<sup>270</sup>

Since 1975, the U.S. regime does not include government compensation through public funds.<sup>271</sup> The U.S. Price-Anderson Act capped the first layer of an operator's liability at \$60 million, which is then supplemented by contributions that all operators make via retroactive premiums.<sup>272</sup> Today, the individual liability of a nuclear operator is \$375 million supplemented with a second layer of retrospective premiums of \$11.86 billion, leading to a total amount of \$12.2 billion without any government intervention.<sup>273</sup> Because there is, in principle, no government intervention, the U.S. Price-Anderson Act shows less inefficiency in comparison to the international regime.<sup>274</sup>

As indicated above,<sup>275</sup> the Chinese regime contains many of the same inefficiencies as the international regime. Not only is there a relatively low financial cap (at least compared to the international regime and certainly to the U.S. Price-Anderson Act), but there is also government indemnity.<sup>276</sup> Of course, state intervention for compensation in China is perhaps, in principle, not that different from operators' liability. We indicated above

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million based on the state's intervention, and € 150 million consisting of the contracting parties' coverage. *Id.* at 430.

269. This consists of € 700 million for the operator's liability, € 500 million of state's intervention, and € 300 million of all contracting parties. *Id.*

270. See, e.g., Faure & Fiore, *supra* note 261, at 227–48 (discussing the different options for nuclear liability insurance and optimal way to cover the costs operators' liability limits).

271. Faure & Vanden, *supra* note 242, at 242–43.

272. Pub. L. No. 94-197, § 3, 89 Stat. 1111 (1975).

273. See Amounts of Financial Protections for Certain Reactors, 10 C.F.R. § 140.11 (1960); see also *SFP Policy*, AM. NUCLEAR INSURERS, available at <http://www.amnucins.com/SFP.html> (last visited May 30, 2012).

274. This depends on whether the amount of \$12.2 billion would be sufficient to cover the costs of an average nuclear incident. See Faure & Borre, *supra* note 242 (detailing the comparison between the international regime and the U.S. Price-Anderson Act).

275. See *supra* Part IV.E.

276. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 7. It states specifically:

For the operators of nuclear power stations and the operators of spent fuel storage, transportation and post-treatment, the maximum amount of compensation for the damages caused by one nuclear accident is RMB 300 million; and for other operators the maximum amount of compensation for the damages caused by one nuclear accident is RMB 100 million. Where the total amount of compensation payable for the damages caused by a nuclear accident exceeds the relevant maximum amount of compensation specified above, the State shall provide a financial indemnity up to RMB 800 million.

*Id.*; see also *supra* Part IV.E.

that only three state-owned enterprises are engaged in the operation of nuclear power plants in China.<sup>277</sup> But even those three state-owned enterprises are commercial parties that seek to maximize profits. Consequently, it may be important to expose the Chinese operators to the full social costs of a nuclear accident in order to force them to internalize externalities and to correctly price nuclear power, including the true social costs.

Like the international regime and the U.S. Price-Anderson Act, China also requires financial security for the amount due from the operator.<sup>278</sup> Moreover, analogous to the U.S. and many other legal systems that follow the international treaties, insurance companies have joined forces via a pooling regime.<sup>279</sup> In this respect, China's tendency to compensate for nuclear damage via a pool of nuclear power plant operators is predominantly in line with international tendencies.<sup>280</sup>

## VI. CONCLUDING REMARKS

China has been a nuclear nation for many years now. Since the start of China's economic development in the early 1980s, the use of nuclear energy has shifted from military use to commercial use.<sup>281</sup> Given China's enormous demand for energy, the Chinese government made plans to substantially increase nuclear power production. Between 2005 and 2020, China plans to construct fifty-two new power plants.<sup>282</sup> The construction of twenty-nine has already started.<sup>283</sup> China's dependence on nuclear energy will likely increase in the future given its commitment to reduce carbon dioxide emissions.<sup>284</sup>

277. *See supra* Part II.C.

278. 2007 STATE COUNCIL REPLY, *supra* note 12, art. 8.

279. *See supra* Part IV.F.

280. Pooling by nuclear power plant operators, however, is criticized from an economic perspective for limiting competition. The European competition authorities, as well as several other authorities, critically review nuclear pools. *See* Michael Faure & Roger van den Bergh, *Competition on the European Market for Liability Insurance and Efficient Accident Law*, 9 MAASTRICHT J. OF EUR. AND COMP. L. 279 (2002).

281. *See supra* Part II.A.

282. *Nuclear Power in China*, *supra* note 44.

283. *Id.*

284. The development of nuclear power is even faster than the aim set in its medium- and long-term development plan for nuclear power. Therefore, the China's National Energy Administration further increased the aim of nuclear development in 2009. *See* Zhang ZhongXiang, *China in the Transition to a Low-Carbon Economy*, 38 ENERGY POL'Y 6638, 6647 (2010); *see also* Zhou Sheng & Zhang Xiliang, *Nuclear Energy Development in China: A Study of Opportunities and Challenges*, 35 ENERGY 4282, 4286 (2010) (discussing opportunities and drivers of nuclear energy development in China over the past decade).

This increasing use of nuclear energy raises the issue of victim compensation in the event of a nuclear accident. How would victims be compensated if there were a tragic nuclear accident? At first blush, this question may seem primarily of interest to China given the size of China's territory, but the effects of the Chernobyl incident of April 26, 1986 were felt worldwide.<sup>285</sup> Thus, policies related to victim compensation may affect both victims living in China and victims living abroad, even if the nuclear accident occurred in Chinese territory.

China has not joined any of the international treaty regimes concerning nuclear liability. But that does not necessarily mean that China would only provide weak protection for victims of nuclear accidents. After all, the international treaty regimes have been seriously criticized, *inter alia*, for imposing financial caps on the liability of operators and providing insufficient compensation.<sup>286</sup> Other large nations such as the U.S. have also not joined the international treaties. The U.S. implemented its own regime via the Price-Anderson Act.<sup>287</sup> The nuclear disaster at Fukushima<sup>288</sup> illustrates this point. Japan did not join any of the international treaties, but it has an elaborate nuclear liability act with unlimited operator liability and significant minimum mandatory coverage.<sup>289</sup>

The problem is, unlike in the U.S. or in Japan, China has no general nuclear liability act that would regulate the compensation rights of victims. Since 1984, China has been drafting an act that would regulate nuclear energy and also deal with its liability issues. Thus far, though, this act has not been promulgated.<sup>290</sup> Consequently, the current legal framework regulating compensation for victims of nuclear accidents consists of a collection of measures. The general rules of tort law, such as those laid out in the GPCL and the new Tort Law of 2009, do apply. But these rules only vaguely introduce a strict liability rule without further detailing how courts should implement it.<sup>291</sup> The two replies of the State Council provide these details, but their legal statuses are currently debated.<sup>292</sup>

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285. For detailed research about the impact of Chernobyl accident, see OECD/NEA, CHERNOBYL: ASSESSMENT OF RADIOLOGICAL AND HEALTH IMPACTS (2002), available at <http://www.oecd-nea.org/rp/reports/2003/nea3508-chernobyl.pdf>.

286. See Faure & Borre, *supra* note 242, at 265–69.

287. See *supra* Part V.

288. See *supra* Part I.

289. For a detailed analysis of the compensation system for nuclear damage in Japan and the compensation system of the Fukushima incident, see Julius Weitzdörfer, *supra* note 3.

290. See *supra* Part III.A.

291. See *supra* Part III.A.

292. See *supra* Part III.B.

China is predominantly in line with the trends of the international treaties as far as content is concerned; a financial cap is imposed upon the nuclear power plant operators' liability,<sup>293</sup> but the operators are held strictly liable, and liability is channeled to them.<sup>294</sup> Operators have a duty to seek financial coverage, and they do so in practice by seeking insurance coverage from a pool of nuclear insurers.<sup>295</sup> In the event that damage exceeds the cap of liability, the government will provide an indemnity.<sup>296</sup> The potential liability of nuclear operators in China is small compared to the international regime, especially compared to nuclear operators in the U.S. under the Price-Anderson Act, but the Chinese government is committed to providing additional financial indemnity. Consequently, the same criticisms that apply to the international regime also apply to the Chinese model, as the financial cap prevents operators from being fully exposed to the social costs of their activity. In fact, the cap constitutes a subsidy for nuclear energy, and as a result, relative prices of nuclear energy will be too low.

Given the increasing importance of nuclear energy in China, it is highly likely that China will implement its plans to introduce one all encompassing regulation on nuclear energy, including nuclear liability. In that respect, China can learn valuable lessons from an international comparison, especially with the U.S. Price-Anderson Act. It might encourage operators to internalize the costs of nuclear energy production, and would thus be more in line with an economic perspective on nuclear liability.

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293. See 2007 STATE COUNCIL REPLY, *supra* note 12, art. 7.

294. *Id.* art. 2.

295. See *supra* Part IV.F.

296. See *supra* Part IV.E.