

UNCHARTED WATERS: ASSESSING CHINA'S INTENTIONS TO DEPLOY FLOATING NUCLEAR POWER PLANTS IN THE SOUTH CHINA SEA

JUNE 2023

**Jonathan Deemer,
Omar Pimentel, Mi Jin Ryu,
Miku Yamada, and Edward Jenner**

Center for Global Security Research
LAWRENCE LIVERMORE NATIONAL LABORATORY

Uncharted Waters: Assessing China's Intentions to Deploy Floating Nuclear Plants in the South China Sea

Jonathan Deemer, Omar Pimentel, Mi Jin Ryu, Miku Yamada, and Edward Jenner¹

Ford Dorsey Master's in International Policy at Stanford University and the Center for Global Security Research²

Background

This paper was a capstone project under Stanford University's Ford Dorsey Master's in International Policy (MIP) program's Policy Change Studio. The Center for Global Security Research (CGSR) at Lawrence Livermore National Laboratory was a project partner and provided MIP students with the policy problem to address—Chinese deployment of floating nuclear power plants in the South China Sea. Students were required to use the MIP Problem-Solving Framework to address the policy issue and provide recommendations. The MIP students conducted literature reviews, research, and interviews with experts on a host of related issues. Dr. Edward Jenner, a CGSR postdoctoral fellow, provided guidance, expertise, and feedback throughout the course of the project to help shape the research problem and identify solutions.

Executive Summary

This executive summary provides an overview of the research project conducted by MIP students on the implications of China's plans to develop and deploy floating nuclear power plants (FNPPs) in the South China Sea. The project aimed to analyze the regional security and safety concerns associated with these plans and formulate policy recommendations.

The People's Republic of China (PRC) is currently developing FNPPs and has expressed intentions to potentially deploy up to 20 of them in the South China Sea. The PRC is currently building two prototypes, the ACP100S (125MWe) and ACPR50S (50MWe), both of which are nuclear reactors built on non-self-propelled barges with a two and three year refueling cycle. These FNPPs are Pressurized Water Reactors and utilize a passive cooling system. The proposed uses of these FNPPs include powering military bases, desalination, heating, and supporting sea oil drilling activities.

The research project identified three key implications of Chinese FNPPs in the South China Sea. Firstly, the deployment of FNPPs consolidates the PRC's de facto control over wide swaths of

¹ *The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or Lawrence Livermore National Security, LLC, and shall not be used for advertising or product endorsement purposes.*

² *Edward Jenner is also a postdoctoral fellow in Technology and International Security at the UC Institute on Global Conflict and Cooperation (IGCC) based in Washington, D.C.*

the South China Sea. This can heighten geopolitical disputes and potential conflicts. Secondly, it accelerates further militarization of the South China Sea, as it allows the People’s Liberation Army to increase its logistical capabilities at a minimum and allows for new advanced military systems to be introduced into the South China Sea at a maximum. Lastly, the presence of FNPPs in a contested region raises safety concerns. Accidents or failures in these FNPPs could have severe consequences for human safety, the marine environment, and exacerbate tensions among regional actors.

Based on the research findings, several policy recommendations are proposed in a phased approach:

Phase I: Track 2 Dialogue - Building on Existing Dialogues to Raise Awareness

In the first phase of our policy recommendations, we propose initiating a Track 2 dialogue to raise awareness about the implications of Chinese FNPPs in the South China Sea. This phase focuses on leveraging existing dialogues and platforms to engage regional stakeholders, academic experts, and policymakers in discussions outside of formal diplomatic channels. By building on these existing dialogues, we aim to foster a better understanding of the concerns associated with Chinese FNPPs and promote knowledge sharing among key stakeholders.

Phase II: Bilateral Meetings and Capacity Building - Providing ASEAN Countries with Information and Monitoring Capabilities

The second phase of our policy recommendations involves conducting bilateral meetings and capacity-building efforts. During these meetings, the U.S. government and regional allies will provide countries within the Association of Southeast Asian Nations (ASEAN) with comprehensive information about Chinese FNPPs, their potential implications, and safety concerns. This information sharing will enable ASEAN countries to make informed decisions and enhance their understanding of the risks and benefits associated with FNPP deployments. Additionally, we will work towards bolstering the monitoring capabilities of ASEAN countries, allowing them to effectively assess the activities and impacts of FNPPs in the region.

Phase III: Discussion in International Fora - Addressing Regulatory Loopholes of FNPPs

In the third phase, we propose conducting discussions in international fora to address the regulatory loopholes surrounding FNPPs. These discussions will bring together relevant policymakers and experts at the International Atomic Energy Agency (IAEA) and the International Maritime Organization (IMO), to examine and identify gaps in the existing regulatory frameworks governing FNPPs. By highlighting the importance of robust regulations and safety standards, we aim to promote responsible and sustainable deployment practices of FNPPs in the South China Sea.

Phase IV: ASEAN+ Summits - Officially Addressing the Issue at ASEAN+ Summit

In the final phase of our policy recommendations, we suggest formally addressing the issue of Chinese FNPPs at ASEAN+ Summits. This platform provides a valuable opportunity for high-level discussions among ASEAN member states and their dialogue partners. By placing the topic on the agenda, we can ensure that it receives the necessary attention and is addressed collectively by regional leaders. Through open dialogue, cooperation, and the formulation of joint approaches, ASEAN+ Summits can serve as a catalyst for effective regional responses to the challenges posed by Chinese FNPP deployments.

By implementing this phased approach, which includes Track 2 dialogues, bilateral meetings, discussions in international fora, and official address at ASEAN+ Summits, we can foster awareness, knowledge sharing, capacity building, and collective action to navigate the implications of Chinese FNPPs in the South China Sea. These policy recommendations aim to promote regional stability and enhance safety standards.

Addressing the challenges posed by Chinese FNPPs in the South China Sea requires proactive engagement, multilateral dialogue, and a coordinated approach among relevant stakeholders. By implementing the policy recommendations outlined in this report, policymakers can work towards mitigating the risks and safeguarding regional stability, security, and safety in the South China Sea.

Introduction

The People's Republic of PRC (PRC) has laid claim to vast swaths of territory in the South China Sea. In violation of other Southeast Asian nations' territorial claims and rulings from international bodies, the PRC has continued to assert these claims, based on its declared right to the territory within the so-called "Nine-Dash Line." This has been the cause of numerous standoffs between PRC and Southeast Asian countries in the region. Furthermore, the PRC has constructed artificial islands in these waters on which it locates military bases.

In 2016, the *China Securities Journal* reported that up to 20 floating nuclear power plants (FNPPs) could eventually be built in the region as the country seeks to "speed up the commercial development" of the South China Sea.³ Assuming a definition of FNPPs that exclude nuclear-powered military vessels, currently, only one FNPP exists in use worldwide: the Russian vessel *Akademik Lomonosov*. This FNPP is used to power the Russian Arctic port city of Pevek. PRC authorities, in conjunction with Chinese companies, are currently completing work on at least two prototypes: the ACPR50S and the ACP100S. Both the ACPR50S and ACP100S could serve multiple purposes, including energy supply for coastlands, islands, offshore oil drilling, and desalination.

Alongside the Center for Global Security Research, our team has investigated how the PRC's deployment of FNPPs in the South China Sea will impact security and safety considerations for individual Southeast Asian countries as well as regional and global stability at large. This is relevant to the United States and its institutions not only because of its potential impact on the strategic balance of power in the region with respect to its number-one competitor, but also because the development implicates a host of safety and nonproliferation concerns.

Floating Nuclear Power Plants with Small Modular Reactors

An FNPP is an offshore site with one or more nuclear reactors loaded onto a platform such as a barge or conventional ship. This project specifically focuses on FNPPs equipped with small modular reactors (SMRs) but excludes nuclear-powered military vessels. SMRs are advanced nuclear reactors capable of generating up to 300 megawatts electric [MW(e)],⁴ roughly one-third of large, conventional land-based reactors.

FNPPs are believed to offer several advantages over conventional nuclear power plants (NPPs). They are considered safer, less expensive, easier to deploy, and have multiple use cases. Efforts have been made to develop passive safety systems in order to reduce and eliminate the risks of nuclear accidents. Most advanced SMRs incorporate passive safety features that either eliminate

³ Reuters Staff, "China media again touts plans to float nuclear reactors in disputed South China Sea" (July 15, 2016). <https://www.reuters.com/article/us-southPRCsea-ruling-PRC-nuclear-idUSKCN0ZV0UH>. Accessed July 25, 2023.

⁴ "What are Small Modular Reactors (SMRs)?" IAEA (2021). <https://www.iaea.org/newscenter/news/what-are-small-modular-reactors-smrs>. Accessed July 25, 2023.

the cause of accidents or significantly decrease the likelihood of such events.⁵ FNPPs are also less vulnerable to earthquakes and tsunamis as seismic waves are less disruptive in deep water. Additionally, FNPPs are projected to require less investment and time to construct compared to larger NPPs. They can be assembled at a factory and be transported to the final destination, including areas that are difficult to reach. Finally, FNPPs possess multifaceted capabilities. They can generate electricity or heat while simultaneously providing drinkable water using desalination technology. They may also be able to produce hydrogen for industrial purposes. They can also be utilized for natural disaster responses, as FNPPs can be swiftly transported to the affected area to provide power in the aftermath of an emergency.

Chinese FNPP projects

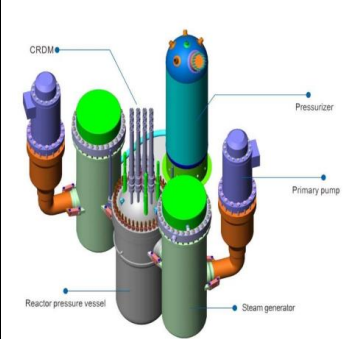

In 2014, the Chinese government-initiated research on FNPPs in collaboration with Russia's Rosatom State Nuclear Energy Corporation, which developed the world's only operational FNPP, the *Akademik Lomonosov*. In May 2014, the China Atomic Energy Authority (CAEA) signed an agreement with Rosatom to construct Chinese FNPPs. Plans to develop offshore FNPPs were included in the 13th Five-Year Plan (2016-2020), prompting Chinese nuclear energy companies to develop their own FNPPs using domestic technologies and knowledge. Two state-owned nuclear energy companies, China General Nuclear Power Group (CGN) and China National Nuclear Corporation (CNNC), developed designs for FNPP prototypes, the ACPR50S and ACP100S, which were both approved by the National Development and Reform Commission (NDRC). Subsequently, CNNC and CGN signed agreements with China State Shipbuilding Corporation (CSSC) and China Shipbuilding Industry Corporation (CSIC), respectively, to develop the offshore platform for FNPPs.

The ACPR 50S being built by CGN features a loop-type pressurized water reactor. It can produce up to 50 MW(e) or 200 megawatts thermal [MW(t)]. On the other hand, the ACP 100S being developed by CNNC utilizes an integral pressurized water reactor. It can generate up to 125 MW(e)/ 385 MW(t). Both types have a refueling cycle of at least 24 months, a significant improvement from current sustainment requirements for the artificial islands in the South China Sea. Both designs employ low-enriched uranium (LEU) UF₆ pellets as fuel. The ACPR 50S is currently in the Detailed Design stage, while the ACP 100S is in the Basic Design stage with a target construction of 2024.⁶ Both ACPR 50S and ACP 100S are designed for multi-purposes, including power supply for coastlands and islands, energy supply for offshore oil drilling, and desalination.

⁵ D.T. Ingersoll, "Passive safety features for small modular reactors," International Seminar On Nuclear War And Planetary Emergencies — 43rd Session (2011), pp113–121. https://doi.org/10.1142/9789814365932_0012. Accessed July 25, 2023.

⁶ IAEA, *Advances in Small Modular Reactor Technology Developments* (2022). https://aris.iaea.org/Publications/SMR_booklet_2022.pdf. Accessed July 25, 2023.

Table 1: Features of the ACPR 50S and ACP 100S

Parameter	ACPR 50S	ACP 100S
Technology developer	China General Nuclear Power Group (CGNPC)	China National Nuclear Corporation (CNNC) / Nuclear Power Institute of China (NPIC)
Reactor type	Loop type PWR (pressurized water reactor)	Integral PWR
Coolant / moderator	Light water / light water	Light water / light water
Thermal/electric capacity MW(t) / MW(e)	200 / 50	385 / 125
Primary circulation	Forced circulation	Forced circulation
Fuel type/assembly array	UO2 pellet / 17 x 17 square	UO2 / 17 x 17 square
Fuel assemblies in the core	37	57
Fuel enrichment (%)	< 5	< 4.95
Refueling cycle (months)	30	24
Approach to safety system	Passive	Passive + Active
Design life (years)	40	40
Fuel cycle requirements	60 months	Shore refueling, temporarily stored in the spent fuel pool
Design status	Detailed design	Basic design
		

Source: IAEA⁷, 2022

⁷ ARIS - Publication. (September 2022). *Advances in Small Modular Reactor Technology Developments (2022)*. https://aris.iaea.org/Publications/SMR_booklet_2022.pdf

Potential Deployment in the South China Sea

On July 19, 2016, China's National Nuclear Safety Administration announced that China will build 20 FNPPs on islands and reefs in the South China Sea.⁸ The PRC government has not made public announcements either making further commitments or revising these plans. According to Dr. Pankaj Jha, a professor at Jindal School of International Affairs in India, as of May 2023, two FNPPs are under trial phases in Bohai Sea, in northeastern China. Based on this development, it is speculated that the PRC might deploy three FNPPs in the South China Sea by 2025.⁹ As the two prototypes are reaching completion in regard to their design and technologies, the decision and timeline to deploy FNPPs in the South China Sea is primarily driven by the willingness of the Chinese leadership, rather than a question of capabilities.

However, on May 31, 2023, the *South China Morning Post* reported that plans to deploy the ACP 100S in the South China Sea had been suspended, stating that the final approval for construction has been withheld due to concerns regarding safety and feasibility.¹⁰ A researcher based in Beijing mentioned that there is a growing concern in Beijing that the United States would attack Chinese infrastructure in the South China Sea, and that the sinking of a FNPP could spark a disaster much worse than the unexplained underwater explosions that damaged the Nord Stream 1 and Nord Stream 2 natural gas pipelines in September 2022. The article also highlighted that the deployment of military vessels for protection could escalate tensions with neighboring countries. However, the article does not mention if the ACP50S project is similarly suspended, and the temporary postponement of deploying ACP100S does not necessarily mean that the Chinese government will abandon its plans to commission FNPPs in the South China Sea in the future. Rather, the article concludes by stating researchers have suggested situating the FNPPs closer to the Chinese mainland in the short-term, and that the PRC could later build a more powerful model for the South China Sea and beyond.

South China Sea: Highly Contested and Economically Critical Waters

The critical difference between Russia's *Akademik Lomonosov* and Chinese plans to deploy FNPPs is their respective installation locations. While Russia operates its FNPPs within territorial seas in the Arctic, the PRC has announced its intention to deploy FNPPs in the highly disputed and busy waters of the South China Sea. The South China Sea is one of the most heavily disputed regions globally, with claims of partial or complete sovereignty from China, Taiwan, the Philippines, Malaysia, Vietnam, and Brunei. Of these claimants, only Brunei has not constructed reefs and

⁸ China National Nuclear Safety Administration, *China's Plans to Build Floating Nuclear Power Plants in South China Sea* (2016). https://nnsa.mee.gov.cn/ywdt/yjzx/201607/t20160719_360909.html (currently unavailable to visit. Please refer to Appendix 2 at p28) [Note – is best to write “Accessed [date you visited site.] here]

⁹ Prof. P. Jha, “China floating nuclear power plants in South China Sea,” *Modern Diplomacy* (April 6, 2023). <https://moderndiplomacy.eu/2023/04/04/PRC-floating-nuclear-power-plants-in-south-PRC-sea/>. Accessed July 25, 2023.

¹⁰ S. Chen, S., and S. Chen, “China suspends plan to build floating nuclear reactors in the South China Sea,” *South China Morning Post* (May 31 2023).. <https://www.scmp.com/news/china/science/article/3222289/china-suspends-plan-build-floating-nuclear-reactors-south-china-sea>. Accessed July 25, 2023.

islands in the area.¹¹ The PRC asserts vast swaths of territory in the South China Sea based on its asserted right to the territory within the so-called “Nine-Dash Line,” with none of the other claimants asserting claims as extensive as China’s.

Figure 1: Disputed Claims over the South China Sea



Source: Center for Strategic and International Studies, Permanent Court of Arbitration

The PRC has constructed artificial islands in the Spratly and Paracel Islands, where it has established military bases equipped with radars, cruise missiles, and fighter jets. Furthermore, the China Coast Guard (CCG) has increased its patrolling activities across the South China Sea, as reported by the Asia Maritime Transparency Initiative (AMTI), with nearly daily patrols observed at key artificial islands, such as Scarborough Shoal and Vanguard Bank in 2022.¹²

Moreover, the South China Sea serves as critical shipping lanes not only for claimant countries but also for other actors such as the United States, Japan, and the Republic of Korea (ROK). The CSIS ChinaPower Project estimated that trade worth \$3.4 trillion traveled through the South China Sea in 2016,¹³ which is roughly one third of global trade. Additionally, the region is a resource-abundant region with untapped oil and natural gas and rich fishing grounds. In 2013,

¹¹ Air University (AU), “Historically Mine: The (Potentially) Legal Basis for China’s Sovereign” (March 8, 2021). <https://www.airuniversity.af.edu/JIPA/Display/Article/2528218/historically-mine-the-potentially-legal-basis-for-chinas-sovereignty-claims-to/#sdendnote31sym>. Accessed July 25, 2023.

¹² Asia Maritime Transparency Initiative, “Flooding the Zone: China Coast Guard Patrols in 2022” (January 30, 2023).. <https://amti.csis.org/flooding-the-zone-china-coast-guard-patrols-in-2022/>. Accessed July 25, 2023.

¹³ J. Schrag, “How Much Trade Transits the South China Sea?” ChinaPower Project ((January 25, 2021). [Chinahttps://chinapower.csis.org/much-trade-transits-south-china-sea/#easy-footnote-bottom-1-3073](https://chinapower.csis.org/much-trade-transits-south-china-sea/#easy-footnote-bottom-1-3073). Accessed July 25, 2023.

the Energy Information Administration (EIA) estimated the South China Sea contained 11 billion barrels of oil and 190 trillion cubic feet of natural gas in proved and probable reserves.¹⁴ The fishery industry is also a vital source of employment and economic growth in the region with an estimated 1.72 million fishing boats and 5.4 million people employed in the South China Sea.¹⁵

PRC's interests in deploying FNPPs in the South China Sea

The PRC has multiple motivations for pursuing FNPP technologies, including technological advancement, strengthening strategic influence, and bolstering military capabilities.

Firstly, the PRC aims to play a leading role in FNPP and SMR technology with the intention of potentially dominating the market as an exporter. Considering the growing demand of low-carbon clean energy, the SMR and FNPP markets are expected to expand in the coming years. Secondly, deploying FNPPs in the South China Sea would allow the PRC to solidify its presence and potentially enhance its influence in the region. It is noteworthy that FNPPs will provide energy and drinking water for the artificial islands, as currently fresh water must be delivered by small boats. This strategic move would enhance the PRC to support its activities on artificial islands by providing a sustainable source of energy and drinking water, as well as facilitating energy excavation efforts.

Lastly, having FNPPs would significantly enhance the logistical and military capabilities of the People's Liberation Army (PLA). China's National Nuclear Safety Administration has stated that having FNPPs in each of the islands and reefs in the South China Sea is equivalent to a nuclear-powered aircraft carrier.¹⁶ Traditionally, remote areas require the transportation of diesel fuel for power generation, while ships are needed to supply officers and military personnel with bottled water. However, supplier ships to artificial islands are hindered by adverse weather conditions, and can be the target of a low-intensity attack by adversaries. FNPPs, on the other hand, would ensure a stable supply of power and drinking water. Moreover, as the energy generated by 20 FNPPs is far more than what is needed for the current infrastructure on the artificial islands, the PRC may use this to station energy-intensive weapons systems on these islands. Additionally, the PRC seeks to acquire advanced reactor technologies for nuclear-powered ships. Enhancing their civil nuclear capabilities, including investment in FNPPs toward this goal is an integral part of the PRC's "military-civil fusion" efforts.

Our analysis of Chinese intentions closely echoes what has been stated by Chinese officials. Wang Yiren, the former deputy director of China's State Administration of National Defense Science, Technology and Industry for National Defence (SASTIND), identified three primary

¹⁴ "International, South China Sea," U.S. Energy Information Administration (EIA) https://www.eia.gov/international/analysis/regions-of-interest/South_China_Sea. Accessed July 25, 2023.

¹⁵ R. Baker, E. Rees, and A. Harnagel, "Fish: The Overlooked Destabilizer in the South China Sea" (February 12, 2016). <https://worldview.stratfor.com/article/fish-overlooked-destabilizer-south-china-sea>. Accessed July 25, 2023.

¹⁶ China National Nuclear Safety Administration, "China' Plans to Build Floating Nuclear Power Plants in South China Sea" (2016). https://nnsa.mee.gov.cn/ywdt/yjzx/201607/t20160719_360909.html (currently unavailable to visit. Please refer to Appendix 2 at p28).

applications from FNPPs: resource exploitation, providing power and water supply to officers and military personnel stationed in the Spratly and Paracel islands, and the broader application of FNPP technologies, including their potential use in the development of nuclear-powered ships.¹⁷ Furthermore, the official website of the PRC also mentioned the utilization of FNPPs for island development.¹⁸ In summary, the PRC's pursuit of FNPP technologies is driven by its desire for technological innovation, expanded influence across the South China Sea, and strengthened military capabilities.

Problem Definition and Evolution

Based on our analysis of the PRC's intentions and potential impacts on the region, we ultimately defined the problem as such: **the PRC's opaque plans to deploy FNPPs to the South China Sea will pose strategic, security, and safety risks to the region.** While our initial problem statement ("Chinese plans to build FNPPs in the South China Sea pose regional security concerns") focused solely on the regional security implications, upon analyses and conducting interviews with regional experts, we concluded that the PRC's plans to deploy FNPPs South China Sea, as well as the non-transparent manner of these plans present an array of complex challenges that possess strategic, security, and safety dimensions. This section delves into these complexities to furnish a nuanced understanding of these implications.

Strategic Risks

PRC's FNPP deployment reinforces its de facto control over the contested waters of the South China Sea. In contradiction to prevailing international court rulings, FNPPs offer a solid anchor point to validate and bolster the PRC's territorial claims. It enables PRC to potentially conduct commercial activities on the artificial islands, due to the sustained provision of drinking water and energy, to further expand oil and gas excavation efforts, and to impede activities of other claimants in the waters by the presence of these nuclear reactors.

In effect, it threatens to exacerbate territorial tensions, thereby constraining the potential for peaceful resolution and unsettling the region's stability. Moreover, it undermines the rule-based order in the South China Sea.

Security Risks

The security implications of deploying FNPPs in the South China Sea are two-pronged, revolving chiefly around the operations of the PRC's People's Liberation Army (PLA). First, FNPPs can considerably improve logistical operations by offering a dependable and autonomous energy source for the contested islands, which presently hinge on regular and logistically taxing diesel

¹⁷ 中国政府网,“核工业发展 安全有保证_政策解读”(2017). https://www.gov.cn/zhengce/2017-02/16/content_5168341.htm#2. Accessed July 25, 2023.

¹⁸ 杜畅,“我国海上浮动核电站年底开建示范堆_滚动新闻_中国政府网”(2016). https://www.gov.cn/xinwen/2016-02/03/content_5038615.htm. Accessed July 25, 2023.

refueling journeys from the mainland. Such islands would be less susceptible to supply disruptions in times of conflict or emergencies.

Secondly, and perhaps more worryingly, FNPPs could facilitate the expansion of the PLA's military capabilities. Surplus energy from these plants might be rerouted to power advanced military systems on these islands, including energy-intensive weapons such as directed energy weapons. Additionally, FNPPs open the door for the potential transfer and advancement of nuclear technology, thereby potentially enhancing the PLA's nuclear capabilities. This development could upset the delicate balance of power in the region, raising alarm for other regional powers and the international community.

Safety Risks

The deployment of FNPPs in the disputed, densely trafficked waters of the South China Sea also raises substantial safety concerns. The region, functioning as a critical artery for international commerce, could be severely affected in the event of an FNPP-related incident.

Radiation leaks, intentional targeting, or even the threat perception thereof, could profoundly disrupt shipping and fishing operations. Such disruptions could inflict considerable damage on the regional economy and pose a direct risk to maritime safety. Additionally, these activities could destabilize the South China Sea's delicate marine ecosystem, leading to irreparable environmental damage.

In summation, the strategic risks arising from solidifying the PRC's territorial grip, security risks associated with bolstering the PLA's capabilities, and safety risks posed by FNPP deployment to these contested waters, intertwine to form a multifaceted challenge.

Analysis of Key Causes

The overarching cause of the problem outlined in the previous section can be summarized as the lack of measures taken by ASEAN and others affected/interested to assess, mitigate, delay, and/or deter (if possible) PRC's FNPP deployment. The current regional and global landscape allows the PRC to pursue development and deployment of FNPPs without costs. This is enabled by (1) regional inaction and (2) regulatory loopholes.

Regional Inaction

Currently, ASEAN states have not publicly voiced their concerns on this issue, despite the negative impact this deployment would have on Vietnam, the Philippines, and others. This is largely due to the contrasting views on this issue within the ASEAN states, and the lack of capabilities that would allow countries to take a stronger stance.

Divided Stance among ASEAN Countries

Given the military capacity and economic power of the PRC, it is virtually impossible for any individual regional country to take unitary action to push back on PRC actions. Nonetheless,

Southeast Asia is arguably the most important region for the PRC, and ASEAN is the PRC's top trading partner. Thus, if ASEAN could build a united stance on PRC actions, this could cause the PRC to take this into consideration. However, ASEAN's consensus-based decision making mechanisms are often criticized as dysfunctional, due to the divergent interests and priorities of its member states that impede progress on critical issues. This is especially salient in issues regarding the South China Sea. Yuzawa Takeshi, an expert on ASEAN diplomacy, has characterized its South China Sea policies as aiming to "manage" rather than "solve" challenges or problems.¹⁹ Furthermore, while the most contentious territorial dispute in the South China Sea is the PRC's insistence on its control over the Nine-Dash Line, there are also a number of competing claims among Southeast Asian countries other than the PRC, as mentioned above. This further complicates building a united stance on PRC actions in the South China Sea.

Particularly on the issue of FNPP deployment, the lack of information and awareness exacerbates the divide among ASEAN countries. There is no shared understanding of the risks, and there is a stark difference between countries that are highly concerned about this issue and those who lack a basic understanding and interest of PRC's plans. Fundamentally, how countries view this issue is strongly colored by their relations with the PRC. There is a wide range, from the Philippines (which is an ally of the United States and is increasingly strengthening defense cooperation with the United States and other allies), to Cambodia and Laos, which are very close to the PRC.

Insufficient Strategic Capabilities

Beyond the lack of a united stance, another challenge for ASEAN states is their insufficient capabilities to monitor, assess, and potentially respond to PRC actions. The PRC has dramatically improved its intelligence, surveillance, and reconnaissance capabilities, allowing Chinese maritime forces to rapidly react to events, and intercept ships easily.²⁰ In the South China Sea, it has built surveillance platforms under its "Blue Ocean Information Network," which greatly increased PRC's radar coverage.²¹ This allows the PRC to better assert its sovereignty over much of the South China Sea, and monitor the activities of Southeast Asian countries. Compared to the PRC, the maritime domain awareness of ASEAN states is limited, and this prevents them from effectively monitoring, assessing, and potentially pushing back against coercive Chinese actions.

¹⁹ T. Yuzawa, "ASEAN の対南シナ海外交の効用と限界—ルール形成の取り組みを中心に," *Asian Studies* (2017). https://doi.org/10.11479/asianstudies.63.4_39. Accessed July 25, 2023.

²⁰ F. Chang, "China's Maritime Intelligence, Surveillance, and Reconnaissance Capability in the South China Sea," Foreign Policy Research Institute (May 5, 2021). <https://www.fpri.org/article/2021/05/chinas-maritime-intelligence-surveillance-and-reconnaissance-capability-in-the-south-china-sea/>. Accessed July 25, 2023.

²¹ H.I. Sutton, "China Builds Surveillance Network in South China Sea," *Forbes* (August 5, 2020). <https://www.forbes.com/sites/hisutton/2020/08/05/china-builds-surveillance-network-in-international-waters-of-south-china-sea/?sh=6ab16c8c74f3>. Accessed July 25, 2023.

Regulatory Loopholes

The two prototypes of FNPPs developed by the PRC are utilizing passive safety features to improve safety²². However, safe and responsible operation of civil nuclear energy requires a combination of laws and standards, coupled with safety design features and a strong safety culture. The IAEA’s Convention on Nuclear Safety is a key instrument that governs safety rules at nuclear power plants and creates obligations for state parties to implement certain rules and standards, including site selection, operation and safety verification, and emergency preparedness. Other conventions necessitate nuclear-powered ships to carry documents and observe special precautionary measures in territorial seas, and conduct safety assessments to ensure that there are no “unreasonable radiation” or other hazards. However, such conventions were not developed with FNPPs in mind, and there are gaps in existing regulations, such as only applying to “land-based” nuclear power plants (Table 2). While concerns have been muted regarding Russia’s deployment of *Akademik Lomonosov* in the Arctic, deployment of FNPPs in the busy and contested waters of the South China Sea warrants further exploration of the safety risks arising from regulatory loopholes.

Table 2: Existing Regulatory Frameworks for Civil Nuclear Energy and Applicability to FNPPs

Conventions/ Articles	Purpose	Applicability to FNPPs
IAEA Convention on Nuclear Safety	Safety regulations for site selection, design, construction, and operation of nuclear facilities	No (Only covers “land-based civil nuclear power plants”)
IAEA Convention on Early Notification of a Nuclear Accident	Stipulates immediate notification of member states and assistance provision in case of accidents with transboundary effects	Applicable
UN Convention of the Law of the Sea (Article 23)	Requires “foreign nuclear-powered ships and ships carrying nuclear... substances” to carry documents and observe special precautionary measures in territorial seas	Unclear (Both due to territorial disputes in South China Sea, and whether FNPPs can be defined as “ships”)
IMO International Convention for the Safety of Life at Sea (Chapter VIII)	Requirements for nuclear-powered ships, with focus on radiation hazards	Unclear (Whether FNPPs can be defined as nuclear-powered “ships”)

²² In reference 10, it was noted that China reviewed the ACP 100S and found it not sufficiently safe for deployment. However, it and the ACPR 50S still are utilizing passive safety features that should improve safety. The article did not state where specifically safety was insufficient, but hinted that the vulnerability of a facility at sea, not necessarily the facility itself, was the cause for concern.

Proposed Solutions

To address the problem outlined in the section above, we propose that the U.S. government take a phased approach, in collaboration with allies. Firstly, the U.S. Department of State should sponsor a Track 2 dialogue on this issue to raise awareness. Secondly, the U.S. government and governments of U.S. allies should include this issue in bilateral meetings with ASEAN countries and increase capacity-building efforts to provide ASEAN governments with information and monitoring capabilities. Thirdly, the U.S. government should lead discussions in international fora on the regulatory issues surrounding FNPP deployment. Finally, once there is increased regional and international understanding on this issue, the U.S. government should encourage ASEAN countries to officially address this issue at ASEAN summits, as well as include it in U.S.-ASEAN summits.

By gradually raising awareness, equipping regional countries with the information and capability to continuously monitor and assess developments, and creating a united stance on this issue within ASEAN, this approach will incur costs on the PRC to pursue deployment of FNPPs in the South China Sea.

Phase I: Track 2 Dialogue

Given the varying degrees of awareness and concern regarding this issue among regional actors, a dialogue where non-governmental actors could discuss the multifaceted issues surrounding FNPP deployment in the South China Sea would be a useful avenue to build a shared understanding of the problems. There are currently Track 2 efforts that discuss related issues, but there is no dialogue specifically dedicated to this issue. Thus, the U.S. government should support think tanks, preferably one in the region, to host dialogues specifically focused on this.

The main goals of such a dialogue would be to build a shared understanding of the potential risks and benefits of deployment of FNPPs in the South China Sea, and to invite Chinese participants to share information on this issue to increase transparency and foster confidence among concerned parties. It is important to include Chinese participants in such a dialogue to allow them the opportunity to share information and their positions, and to signal that these dialogues and efforts are not meant to be confrontational, but rather to build confidence in order to mitigate risks. Target outcomes from these dialogues would be (1) publications on this issue that could inform official government messaging and (2) a draft code of conduct on the deployment of this issue.

While Track 2 dialogues are useful for fostering open and honest conversations, the problem remains that none of the parties at any such dialogue have the direct authority to implement any solutions or measures agreed to at a summit. Therefore, once there is a shared awareness and understanding of this issue, the U.S. government should also pursue official bilateral meetings and capacity building.

Phase II: Bilateral Meetings and Capacity Building

Bilateral Meetings

As there is heightened understanding on this issue, the U.S. government should raise this issue in official meetings with ASEAN countries. Furthermore, it should encourage regional allies such as Japan, the ROK, and Australia to also include this issue on the agenda for bilateral meetings with ASEAN countries. Concerns regarding the situation in the South China Sea is already a key issue in these meetings, and discussions on FNPP deployment should be addressed under this agenda.

The goal for summits and ministerial meetings is to create an official consensus on the risks involved with FNPP deployment in the South China Sea, and to identify and support governments that could champion this issue within ASEAN. This will likely be Vietnam, which is most concerned about the impact of FNPPs on their shipping and fisheries, given their proximity to expected deployments, and the Philippines, which is heavily impacted by the PRC's coercive actions in the South China Sea, and is actively engaging in defense cooperation with the United States and regional allies. The target outcome to include language on these risks in joint statements and remarks. The language should at minimum acknowledge that the plans to deploy FNPPs could further complicate the South China Sea issue, and at maximum discuss the specific risks outlined above. At working-level meetings, governments should explicitly discuss specific risks of FNPP deployment, and share intelligence on PRC plans.

Capacity Building

Beyond discussing this issue at meetings, the U.S. government should engage in substantive cooperation with regional governments to strengthen monitoring and response capabilities. One avenue for cooperation that experts from ASEAN countries repeatedly highlighted in interviews is increased capacity building in maritime domain awareness (MDA). There is already significant MDA capacity building conducted by the U.S. government, Japan, and other U.S. allies in the region, such as equipment transfer of Coast Guard patrol vessels and surveillance radars, and Coast Guard training. In May 2022, President Biden announced \$60 million USD worth of new regional maritime initiatives at the U.S.-ASEAN Special Summit, which included deploying a U.S. Coast Guard attaché to the U.S. Mission to ASEAN, expanding U.S. Coast Guard support to Southeast Asian maritime law enforcement agencies, and deploying cutters.²³ However, there remains a stark gap between the MDA capabilities of ASEAN countries, and the PRC, especially as the PRC continues to invest heavily in maritime surveillance capabilities in the South China Sea such as underwater cables and radars. The U.S. government and regional allies can help ASEAN countries close this gap by accelerating joint capacity-building efforts through the Indo-Pacific Partnership for Maritime Domain Awareness (IPMDA), which was launched in May 2022 by the Quadrilateral Security Dialogue (Quad) to provide technology and training to support enhanced, shared maritime domain awareness in South Asia, Southeast Asia, and the

²³ The White House, "Fact Sheet: U.S.-ASEAN Special Summit in Washington, DC" (May 12, 2022). <https://www.whitehouse.gov/briefing-room/statements-releases/2022/05/12/fact-sheet-u-s-asean-special-summit-in-washington-dc/>. Accessed July 25, 2023.

Pacific.²⁴ Quad governments—which include the United States, Australia, Japan, and India—should continue to provide both equipment such as patrol vessels, radars, sensors, and satellites, as well as sharing maritime domain data to allow better tracking and anomaly detection of vessels and FNPPs once they are in the deployment phase.

Phase III: Discussions in International Fora

There is also a need for international discussions on strengthening the regulatory framework surrounding FNPPs. As discussed above, current conventions are insufficient to govern the safe deployment of FNPPs. Thus, there should be efforts to assess the regulatory issues of FNPP deployment, and especially in cases of deployment of contested waters, and close regulatory loopholes through revising existing conventions and guidelines.

The IAEA has already begun to look into this issue. In 2013, it released a preliminary report on the “Legal and Institutional Issues of Transportable Nuclear Power Plants,” which recommends careful consideration on the applicability of existing legal instruments on nuclear safety and nuclear security to Transportable Nuclear Power Plants (TNPPs), which include FNPPs.²⁵ From 2021-2022, it also held two technical meetings to discuss design safety aspects and security considerations for TNPPs.²⁶ Now that a decade has passed from the preliminary study and there have been considerable developments in FNPPs, further discussions are required.

One complication is that the PRC is a quasi-permanent member of the IAEA Board of Governors, which is responsible for approving safeguards agreements and publication of safety standards. Two avenues that could be pursued are General Conference Resolutions and Review Meetings of the Contracting Parties to the Convention on Nuclear Safety. The 2022 Resolution on Nuclear and Radiation Safety noted that the IAEA needs to continue to keep abreast of safety matters related to TNPPs, and that ongoing TNPP plans should be developed in pursuant to the existing safety frameworks for nuclear power plants.²⁷ However, this does not acknowledge the gray areas and loopholes for TNPPs/FNPPs under existing frameworks and the need to revise such frameworks. The U.S. representatives to the IAEA should cooperate with other governments concerned about FNPPs, including countries concerned about Russia’s deployment of FNPPs, such as Norway, to push for clarification of the applicability of existing conventions to FNPPs and development of additional requirements.

²⁴ The White House, “Fact Sheet: Quad Leaders’ Tokyo Summit 2022” (May 23, 2022). <https://www.whitehouse.gov/briefing-room/statements-releases/2022/05/23/fact-sheet-quad-leaders-tokyo-summit-2022/>. Accessed July 25, 2023.

²⁵ IAEA. *Legal and Institutional Issues of Transportable Nuclear Power Plants: A Preliminary Study*, IAEA Nuclear Energy Series No. NG-T-3.5, IAEA (2013), Vienna.

²⁶ IAEA, “New IAEA Publication on Safety and Security Considerations for Transportable Nuclear Power Plants” (June 1-3, 2022). <https://nucleus.iaea.org/sites/gsan/Documents/P17.%20Whats%20next%20new%20IAEA%20publication%20on%20safety%20and%20security%20considerations%20for%20TNPPs%20rev.2.pdf>. [https://nucleus.iaea.org/sites/gsan/Documents/P17. Whats next new IAEA publication on safety and security considerations for TNPPs rev.2.pdf](https://nucleus.iaea.org/sites/gsan/Documents/P17.%20Whats%20next%20new%20IAEA%20publication%20on%20safety%20and%20security%20considerations%20for%20TNPPs%20rev.2.pdf). Accessed July 25, 2023.

²⁷ IAEA, “General Conference Resolution on Nuclear and Radiation Safety” (September 2022).. <https://www.iaea.org/sites/default/files/gc/gc66-res6.pdf>. Accessed July 25, 2023.

The IAEA should also engage in dialogue with the International Maritime Organization (IMO), which develops maritime regulations and standards for the transport of dangerous cargo, such as nuclear ships.

Phase IV: ASEAN+ Summits

In the final phase, the U.S. government should encourage ASEAN countries to officially address this issue at ASEAN summits, as well as ASEAN+ summits with the United States, Japan, the ROK and others. The countries identified as champions of this issue in Phase II would lead efforts to specifically discuss FNPP deployment in the South China Sea in ASEAN+ summits. The goal would be to consolidate a unified stance within ASEAN and with regional allies on the risks of FNPP deployment and to release a Joint ASEAN statement that firstly acknowledges the issue, and secondly, express concern about this issue. The key challenge would be overcoming the resistance of governments such as Cambodia and Laos, who are not directly impacted by this issue and are wary of alienating the PRC. The hope is that this could be overcome by gradually building up an understanding that safety risks would affect the entire region due to the impact on food security and trade, and that it is in the interests of all countries to have increased transparency and stricter standards in the first three phases.

Other Solutions Considered

Throughout our research, we deliberated other approaches that could also be beneficial for the goal of raising costs for the PRC to proceed with their plans. Here we will briefly discuss two of such approaches.

Increased U.S. and Partner Naval Activity in and around FNPP Deployment Sites

The use of Freedom of Navigation Operations (FONOPS) is one of the U.S. Navy's most powerful tools to send a military message. Increasing FONOP frequency in and around the locations of FNPP deployment, potentially in partnership with partner navies, such as the Philippines, would reinforce U.S. and international insistence that PRC territorial claims are against international law and U.S. and other naval vessels have an absolute right to transit those waters. However, there is a risk of escalation if this solution were implemented, as the PRC might view U.S. Navy vessels as threatening their military installations. Furthermore, it may alienate ASEAN countries. Through our interviews and fieldwork in the region, ASEAN countries' concerns became salient, and they may view such actions as excessively confrontational vis-a-vis the PRC.

Limiting Technology Transfers to the PRC

PRC's nuclear sector has been diverting foreign-acquired technology to help develop FNPPs. The nuclear industry is a key focus of the "military-civil fusion" effort, and the Chinese military is using civil nuclear software of other countries to research and design FNPPs.²⁸ The U.S.

²⁸ U.S. Department of State, "Competitive Strategy vis-a-vis China: The Case Study of Civil-Nuclear Cooperation," Remarks by Dr. Christopher Ashley Ford, Assistant Secretary Bureau of International Security and Nonproliferation

government views these efforts by the PRC as a risk, and there have been continuous efforts to address them through a policy revision on civil nuclear exports to the PRC in October 2018 and broad export license policy changes. While it is crucial to continue to review these policies—as the FNPP prototypes are nearing completion and (as of now) we perceive the deployment of FNPPs in the South China Sea is more contingent on the will of the CCP rather than the PRC’s technological capabilities—we focused on the approach outlined above.

Plan for Implementation

Stakeholder Engagement and Support

The first step in this implementation plan will be to identify and engage with key stakeholders who have the institutional capabilities to facilitate and lead efforts. This will necessitate a different list of stakeholders at each phase of the plan, and will rely a great deal on advocates’ ability to navigate institutional politics.

At the Phase I level, there is a long list of potential think tanks, many of which are associated with universities, which might be interested in engaging on the issue. That list is provided in [Appendix 1](#). Organizations that are well positioned to host and lead these dialogues are the Honolulu-based Pacific Forum, which has conducted studies on the development of SMRs in the Indo-Pacific, Hanoi-based Diplomatic Academy of Vietnam, which hosts an annual South China Sea Conference with regional stakeholders, including Chinese experts, the Council for Security Cooperation in the Asia-Pacific, and the Center for Strategic and International Studies, whose Asia Maritime Transparency Initiative is the leading source for information regarding the South China Sea.

In bilateral meetings, the necessary stakeholders would be the governments of the two countries in question. Similarly, at discussions at the IAEA or IMO, or an ASEAN summit, the players are limited in number, as they are limited to member states and professional staff in the case of the IAEA. As a result, the question becomes not which stakeholders to engage with but how to do so. At international fora, the best way to engage with the necessary parties is to choose institutional champions who are most committed to the issue and let them lead the charge.

At the IAEA, the United States can cooperate with other countries interested in the regulatory issues of FNPPs, such as Norway, as mentioned in the section above. At ASEAN summits, the Philippines is a likely candidate for leading with respect to the strategic issues and Vietnam with respect to the safety issues. Those champions could be identified and supported during the bilateral meetings, so that they would have enough sway within the organization to be effective while also being directionally aligned with the broader objective of the policy proposal.

(June 24, 2019). <https://2017-2021.state.gov/competitive-strategy-vis-a-vis-china-the-case-study-of-civil-nuclear-cooperation/index.html>. Accessed July 25, 2023.

Resource Identification

Resourcing for dialogues at the Track 2 level, bilateral dialogue level, and international forum can come from a variety of sources, including private entities, state governments directly, and state governments indirectly via international organizations. At the Track 2 level, where non-governmental organizations, think tanks, and academic institutions play a significant role, funding is often obtained through private entities such as foundations, corporate sponsorships, and individual donors. These private entities may have a vested interest in promoting dialogue and understanding in the region, either due to their business interests or their commitment to regional stability.

At the bilateral dialogue level, funding primarily comes from the respective state governments involved. These governments allocate resources to support the dialogue process, covering expenses such as venue rentals, travel costs, accommodation, and logistical arrangements. Because state governments recognize the importance of engaging in bilateral dialogues to address shared concerns, enhance cooperation, and build mutual trust, they directly fund these dialogues as part of their diplomatic efforts to manage conflicts, improve relations, and pursue common objectives. Regarding the MDA capacity-building efforts, the United States and regional allies can take advantage of the heightened interest in further expanding capacity-building under the IPMDA.

At the international forum level, funding is typically a combination of state government contributions and support from international organizations. State governments may allocate funds directly to host or co-host international forums, as they see these gatherings as opportunities to showcase their engagement and leadership on regional issues. Additionally, international organizations like the United Nations, ASEAN, or IAEA can provide financial support for the organization and implementation of such dialogues. These organizations often have dedicated funds or programs aimed at promoting dialogue, conflict resolution, and regional cooperation, making them valuable partners in funding and facilitating discussions at the international level.

The common thread that runs throughout these funding mechanisms is the degree to which they hinge on interested parties' ability to convince those with the funds that this is a worthwhile investment. All told, the resources needed to establish these recommendations are relatively modest. It will simply be a matter of will.

Messaging and Communication

The United States should carefully tailor messaging strategies to address the diverse interests and concerns of the participating countries for implementing a regional dialogue among Southeast Asian states, or their respective non-governmental organizations. A differentiated approach based on the extent to which a given country is involved with China, either economically or otherwise, would be crucial in shaping this strategy. For countries with closer ties to China, the messaging should primarily emphasize safety issues associated with FNPPs. By highlighting potential risks and ensuring robust safety measures, these countries can be

encouraged to participate in the dialogue without feeling that their strategic interests or territorial claims are being compromised.

On the other hand, for countries less intertwined with China and with stronger strategic interests or territorial claims in the South China Sea, the messaging strategy should focus on both safety issues as well as the broader strategic implications on territorial claims. In addition to addressing safety concerns, the messaging should highlight how participating in the dialogue can provide an opportunity to assert sovereignty, protect national interests, and promote regional stability. By framing the dialogue as a platform to address both safety and strategic concerns, these countries can be motivated to engage in the discussions and contribute constructively to finding mutually acceptable solutions. Overall, the messaging strategy for the regional dialogue should strike a delicate balance between the two approaches, tailored to the specific interests and concerns of each Southeast Asian state. This means acknowledging the differentiated needs and sensitivities of countries based on their relationships with China, and customizing the messaging to address those concerns.

The messaging for discussion at the international fora level needs to be equally as nuanced, if not more, given the role China plays in many international bodies, including and especially the IAEA. This phase of the solution set is in the long-term, and will occur after many of the other messaging plans have run their course, so in some sense it will be dependent on the ways in which those initial messaging campaigns have played out. However, developing stricter rules for FNPPs can be done in a way that does not necessarily single out Chinese actions, especially as many countries are studying and expressing interest in developing FNPPs in the future.

Outcome Evaluation

Given that this is a much more qualitative than quantitative solution, the outputs will be similarly qualitative. The primary desired outcome is to increase cooperation and transparency on the issue for ASEAN and additional interested parties. Though a delay or even deterring Chinese FNPP deployments in the South China Sea would be desirable for many parties, there is not consensus if that is possible or not. However, through the increase in dialogue on the issue which this research argues for, that answer will be knowable. Though that might make evaluation metrics and indicators less clear than they otherwise might be in a financial setting, for example, they should still play a crucial role in assessing the success of a tiered dialogue strategy like we have described in this report. Firstly, the regularity of such dialogues will be an important metric. The frequency and consistency of dialogues at all levels can indicate the sustained commitment of the participating countries towards addressing the FNPP issue. At the Track 2 level, these dialogues would ideally occur on an annual basis, and would see a growth in participants.

Secondly, the cohesiveness and coherence of the outputs from these dialogues can be a significant indicator. The success of the strategy lies in the ability to generate meaningful and actionable outcomes. Evaluating the extent to which the outputs, such as joint statements, agreements, or recommendations, reflect a consensus or convergence of viewpoints can provide insight into the effectiveness of the dialogues. Coherence in the outputs suggests that

participating countries have been able to bridge differences, build trust, and develop shared approaches towards the FNPP issue.

Thirdly, tangible changes on the ground regarding the deployment and management of FNPPs can be a critical measure of success. This can include factors such as the implementation of enhanced safety standards, the establishment of regulatory frameworks, or the adoption of cooperative mechanisms for monitoring and oversight. Assessing whether the dialogues have contributed to practical steps towards ensuring the safe and responsible deployment of FNPPs can indicate the effectiveness of the strategy in addressing the concerns of all stakeholders.

Other evaluation metrics, though less tangible, could also be considered, such as the level of transparency and information sharing achieved through the dialogues, the relative increase of maritime domain awareness of U.S. allies and interested parties in the region, and the overall impact on regional stability and security, however one measures that difficult metric.

Conclusion

China's plans to deploy FNPPs in the South China Sea has the potential to significantly worsen the already fraught security environment and introduces new safety risks that could have a catastrophic impact on the marine ecosystem, regional economies, and global trade.

Through collaboration with our partner, the Center for Global Security Research, and through discussions with experts on FNPP technology, Chinese strategic planning, the South China Sea issue, and legal experts on civil nuclear energy and nonproliferation, we have identified that the risks posed by these plans have strategic, security, and safety dimensions. Strategically, this allows the PRC to further consolidate their de facto control over a wide area in the contested areas of the South China Sea in a manner that is incompatible with international law. The security risks will at minimum entail the PLA significantly improving its logistical capabilities in the South China Sea, and at maximum, allow the PLA to host energy-intensive weapon systems on artificial islands. Finally, despite Chinese prototypes of FNPPs being theoretically safe and accident-resistant, having FNPPs in contested waters introduces the risks of radiation leaks and intentional targeting, which would have a catastrophic impact on the marine ecosystem and commercial activities in the region.

Several key factors aggravate these concerns, namely the lack of shared awareness and understanding of this issue within ASEAN, the lack of maritime domain awareness among ASEAN, and the absence of international discussions on the regulatory loopholes posed by FNPPs. To address these, this report proposes a phased approach starting from Track 2 dialogues, building on to bilateral meetings and increased capacity-building efforts with ASEAN states, discussions at international organizations on the need to review and revise international legal instruments and standards, and finally addressing this issue at ASEAN/ ASEAN+ summits.

While this is a continuously evolving problem, initiating these recommendations as promptly as possible will help ensure that if/when the PRC decides to deploy FNPPs in the South China Sea, the PRC will be held accountable to proceed in a transparent and responsible manner.

Background Reading

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Appendices

Appendix 1: Phase I Entities

- China
 - China Institutes of Contemporary International Relations
 - China Institute of International Studies
 - Shanghai Institutes for International Studies
- United States
 - Center for Strategic and International Studies
 - Brookings Institution
- Philippines
 - Institute for Strategic and Development Studies
 - Philippine Institute for Development Studies
 - Asian Institute of Management Policy Center
 - Center for International Relations and Strategic Studies
 - Initiatives for International Dialogue
- Vietnam
 - Institute of World Economics and Politics
 - Diplomatic Academy of Vietnam
- Indonesia
 - Centre for Strategic and International Studies
 - Institute of National Capacity Studies
 - Center for Indonesian Policy Studies
- Japan
 - Japan Institute of International Affairs
 - National Institute for Defense Studies
- Malaysia

- Institute of Strategic and International Studies
- Singapore
 - Singapore Institute of International Affairs
 - Institute of Defence and Strategic Studies
 - Institute of Southeast Asian Studies

Appendix 2: Interview List

Interviews/ Meetings (in order of date conducted, includes written correspondence)

1. Ambassador Scot Marciel, Former U.S. Ambassador to Myanmar
2. Dr. Cameron Tracy, Center for International Study and Cooperation (CISAC) Research Scholar
3. Dr. Herb Lin, CISAC Senior Research Scholar
4. Dr. James Timbie, Former Senior Advisor at U.S. State Department
5. Dr. Viet Phuong Nguyen, Nuclear Information Specialist at IAEA
6. Dr. Alvin Chew, Senior Fellow at S. Rajaratnam School of International Studies
7. Dr. Rodney Ewing, Frank Stanton Professor in Nuclear Security at CISAC
8. Sanjana Gogna, Research Associate, Center for Global Security Research
9. Dr. Oriana Mastro, Center Fellow at Freeman Spogli Institute
10. Gita Wirjawan, Former Minister of Trade of Indonesia
11. Col. Raymond Powell, U.S. Air Force (USAF)
12. Andhika Yudha Prawira, Dr. Candidate at Korea Advanced Institute of Science and Technology
13. Dr. Evan Laksmana, Senior Research Fellow with the Centre on Asia and Globalisation at the Lee Kuan Yew School of Public Policy
14. Lt. Col. Faith Posey, USAF Logistics Officer
15. Dr. Joe Felter, Former Deputy Assistant Secretary of Defense for South and Southeast Asia
16. Dr. Chisako Masuo, Associate Professor at the Faculty of Social and Cultural Studies, Kyushu University
17. Liliana Yetta Pandi, Nuclear Energy Regulatory Agency of Indonesia
18. Col. Kazunobu Sakuma, Japan Air Self Defense Force
19. Dr. Peter B. Zinoman, Professor of History and Southeast Asian Studies at University of California, Berkeley
20. Dr. Aki Mouri, Assistant Professor of Humanities and Social Sciences at the University of Tsukuba
21. Dr. Ryo Sahashi, Associate Professor of International Relations, Institute for Advanced Studies on Asia, the University of Tokyo
22. Dr. Ken Jimbo, Professor at the Faculty of Policy Management of Keio University, President of Asia Pacific Initiative
23. Mr. Tomotaka Shoji, National Institute for Defense Studies of Japan
24. Mr. Linh Nguyen, Diplomatic Academy of Vietnam
25. Mr. Tran Chi Tanh, Vietnam Atomic Energy Institute

26. Ms. Ashley Bartlett, Political Military Officer at U.S. Embassy to Vietnam
27. Dr. Pankaj Jha, Professor & Associate Dean, Research and Director of Centre for Security Studies, Jindal School of International Affairs
28. Dr. Mikhail Lysenko, Former Director of International Cooperation Department of the Russian State Atomic Energy Corporation
29. Dr. Ferenc Dalnoki-Veress, Scientist-in-Residence at James Martin Center for Nonproliferation Studies
30. Erik Quam, Deputy Director, Strategic Focus Group, INDOPACOM
31. David Fedor, Hoover Institution
32. Adm. Jim Ellis (Ret.), Hoover Institution
33. Henry Sokolski, Founder and Executive Director, Nonproliferation Policy Education Center

Appendix 3: Conferences

1. 2023 NEREC Regional Workshop in Southeast Asia hosted by KAIST



Center for Global Security Research
Lawrence Livermore National Laboratory
P.O. Box 808, L-189 Livermore, California 94551
<https://CGSR.llnl.gov>

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-MI-852098