

The P5's Nuclear Pursuit and Nuclear Non-Proliferation Treaty(NPT) at Challenge

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Abstract

To what extent are the P5s (the United States, Russia, China, France, and the United Kingdom) to blame for the waning of the nuclear non-proliferation regime? While the P5s' renewed nuclear pursuits are debated to be driving the polarizations between the nuclear haves and have-nots, making the nuclear non-proliferation treaty (NPT: Treaty on the Non-Proliferation of Nuclear Weapons) ever brittle, there are few in-depth analysis on recent changes in P5s' nuclear pursuit or restraint. Against this backdrop, the article aims to evaluate and depict the P5s' changing nuclear policy and capabilities. By proposing an analytic bridge between the NPT literature and growing discussion on the new nuclear arms race (new nuclear multipolarity), this article seeks to gauge P5s' nuclear pursuit and/or restraints along three key variables: 1) nuclear doctrine, 2) nuclear capabilities, and 3) nuclear readiness (posture, nuclear command, and control issues).

Key Words: Nuclear Non-proliferation Treaty(NPT), Nuclear modernization, Nuclear Weapons, P5

Introduction

To what extent are the P5s (the United States, Russia, China, France, and the United Kingdom) to blame for the waning of the nuclear non-proliferation regime? While the P5s' renewed nuclear pursuits are debated to be driving the polarizations between the nuclear haves and have-nots, making the nuclear non-proliferation treaty (NPT: Treaty on the Non-Proliferation of Nuclear Weapons) ever brittle, this study finds that existing literature has not fully explored in evaluating and gauging to what extent the P5s' nuclear pursuit or restraint has changed recently. The purpose of this article is not to dispute the weakening of the nuclear proliferation regimes. Instead, this study aims to provide in-depth analysis and empirical evidence on the P5s' changing nuclear policy and capabilities. By proposing an analytic bridge between the NPT literature and growing discussion on the new nuclear arms race (new nuclear multipolarity), ¹⁾ this article seeks to gauge P5s' nuclear pursuit and/or restraints along three key variables. The first variable is nuclear doctrine. Namely, what is the purpose/role of nuclear weapons? Is nuclear strategy more nuclear expansive/offensive vs. nuclear restraint/defensive? What is the position on a No-First-Use (NFU) policy – declaration to not use nuclear weapons first? Has it changed? The next is nuclear capabilities. What are the qualitative and quantitative changes in nuclear weapons (nuclear warheads and delivery platforms)? The last variable is nuclear readiness (posture, nuclear command, and control issues). How many are operational vs. in storage? How many are ready for launch-on-warning? What is the command and control system/structure of the nuclear arsenal?

Through empirical analysis of the three variables, this study concludes that there is a heightened emphasis on nuclear modernization and (re-)appreciation of nuclear capabilities among all the P5s. On the lookout for changing security environment, China appears to be rapidly building up its nuclear arsenal in both qualitative and quantitative terms. Russia's total number of nuclear weapons has not increased; however, we see a rise in the number of deployed operational warheads. US and France have not increased the number of nuclear warheads (no quantitative increase), but both countries are modernizing their nuclear warheads and delivery platforms (qualitative increase). The UK also does not show signs of increased nuclear warheads. But upgrades of delivery platforms are ongoing in the UK. Most significantly, the UK has decided to increase the cap on nuclear warheads. The P5 states have also remained distant from adopting NFU. Although

1) Ernest J. Moniz & Sam Nunn, "The Return of Doomsday," *Foreign Affairs*, 2019.; Benjamin Zala, "How the Next Nuclear Arms Race Will be Different from the Last One," *Bulletin of the Atomic Scientists*, Vol. 75, No. 1, pp. 36-43.; David A. Cooper, *Arms Control for the Third Nuclear Age: Between Disarmament and Armageddon* (Washington, DC: Georgetown University Press, 2021).

China maintains NFU as its official policy, the exponential growth in investments and build-up of nuclear weapons and silos draw suspicions about its commitment. These changes imply that the aggravating security environment (realists' concerns), weakening of collective commitment and benefits in nonproliferation regimes (institutionalists' interests), and strengthened norm/reappreciation of flexible and modern nuclear arsenal (constructivists) are accumulating into the P5s' recent nuclear pursuits that do not necessarily advance what NPT strives for.

As briefly outlined, this article begins with a review of NPT literature that discusses P5s' nuclear aspirations and their impact on the NPT. While pointing out the lack of empirical analysis on the P5s' nuclear policy, arsenal, and posture, the article proposes an analytic framework to assess changes in nuclear policy, capabilities, and readiness of the arsenals in the P5s. Second, based on the framework, the article analyzes the three variables concerning Russia, the US, and China – the P3 nuclear states in Asia. Third, this study looks into the cases of France and the UK. Finally, this article concludes what these changes mean on the NPT and ways forward.

Debating and Measuring P5s' Nuclear Aspirations and Impact on the NPT

Polarization by the P5s?

NPT has long been described as having a “midlife crisis.”²⁾ One of the major explanations has pointed to the growing polarization between the nuclear and non-nuclear member states. Former assistant director of the US Arms Control and Disarmament Agency, Lewis Dunn, for instance, observed that the “polarization among NPT parties is greater today than it ever has been.”³⁾ While non-nuclear weapon states on one side continue to call for the complete dismantlement of nuclear weapons, the P5s and others are in pursuit for nuclear modernization.⁴⁾ At the foundation of such polarization, many argue that because the NPT could not have been possible without the nuclear weapon states' “concessions” on nuclear disarmament,⁵⁾ the continued failures in taking positive steps toward the disarmament cannot but be deemed insufficient from the perspective of non-nuclear weapon states.

2) Peter Pella, *The Midlife Crisis of the Nuclear Nonproliferation Treaty* (San Rafael, CA: IOP Concise Physics, 2016).

3) L. A. Dunn, “The Strategic Elimination of Nuclear Weapons: An Alternative Global Agenda for Nuclear Disarmament,” *The Nonproliferation Review*, Vol. 24, No. 5-6(2017), p. 408.

4) Manseok Lee & Michael Nacht, “Challenges to the Nuclear Non-Proliferation Treaty,” *Strategic Studies Quarterly*, Vol. 14, No. 3(2020), pp. 111-112.

5) Harald Mueller, “The Nuclear Non-Proliferation Treaty in Jeopardy? Internal Divisions and the Impact of World Politics,” *The International Spectator*, Vol. 52, No. 1(2017), p. 15.

Indeed, when the NPT first entered into force in 1970(signed in 1968), the NPT mandated a Review and Extension Conference after twenty-five years. When the NPT members convened for a review conference in 1995, they agreed to make the NPT permanent on the condition that the members would also come down to an agreement on a comprehensive test ban on nuclear weapons – the Comprehensive Test Ban Treaty (CTBT). As Thomas Graham put it, the CTBT became like an “essential glue that held the NPT together.”⁶⁾ In other words, the belief and anticipation that the nuclear weapon states would make progress in reducing their nuclear arsenal and also stop nuclear testing and production, the non-nuclear weapon states upheld their commitments in NPT. Although the CTBT was signed as scheduled at the United Nations in 1996, nuclear weapon states have not ratified the CTBT. The US, faced with strong opposition at home, failed to ratify the CTBT in 1999 and remains without ratification until now.⁷⁾

Put differently, a growing literature holds the P5s responsible for the sustainability of the NPT. Harald Mueller emphasizes how the increasing great powers’ competition and nationalist policies on nuclear make the NPT ever more brittle.⁸⁾ Jeffrey Knopf also observes that there are “troubling signs of erosion across all aspects of the nuclear order” as the P5s and more states are in concert for more nuclear pursuits than restraints.⁹⁾ As typical examples, many draw attention to how the US, France, and UK’s – the three of the P5 nuclear weapon states – have consistently voted against UN General Assembly’s “Convention on the Prohibition of the Use of Nuclear Weapons,” which stated that “any use of nuclear weapons would be a violation of the UN charter and a crime against humanity.” The P5s’ joint statement against the Treaty on the Prohibition of Nuclear Weapons(TPNW) is another example,¹⁰⁾ which was released after the General Assembly’s approval of the treaty in 2018.

This article does not seek to dispute the view but to provide a more in-depth analysis of what extent the P5s’ nuclear pursuit or restraint has changed recently. More precisely, to analyze the P5s’ impact on the waning of the NPT, a comprehensive review is required that takes into account not only the P5s’ behaviors and decisions within the non-proliferation regimes, but actual changes in their nuclear strategy, capabilities, and operation of the forces.

6) Thomas Graham, “The Nuclear Non-Proliferation Treaty: Delayed Review – Issues Old and New,” *Journal for Peace and Nuclear Disarmament*, Vol. 4, No. 1(2021), pp. 186-195.

7) *Ibid.*, p. 188.

8) Harald Mueller, “The Nuclear Non-Proliferation Treaty in Jeopardy? Internal Divisions and the Impact of World Politics,” *The International Spectator*, Vol. 52, No. 1(2017), pp. 12-27.

9) Jeffrey Knopf, “Not by NPT Alone: The Future of the Global Nuclear Order,” *Contemporary Security Policy*(2021), Online publication, p. 1.

10) Jamie Kwong, “Rescuing a Fraying Nuclear Nonproliferation Regime,” *Carnegie Endowment for International Peace*, Jan. 13, 2022.; CSIS, “Bad Idea: Ignoring the Treaty on the Prohibition of Nuclear Weapons,” Dec. 6, 2018.

Manseok Lee and Michael Nacht, for instance, categorized states' behaviors under the NPT along two axis – NPT membership(Yes or No) versus nonproliferation(Yes or No)<Table 1>.11) If a state is an NPT member and does not proliferate, it is in “Full Compliance.” If a state is an NPT member but proliferates, it is “Cheating.” If a state is not an NPT member but does not proliferate, it pursues a policy of “nonmembership.” Lastly, if a state is not an NPT member and seeks proliferation, it is fully nuclear aspirant(full non-compliance). Yet, the article focuses on explaining ‘why’ a state would choose these policy options. The actual choices and behaviors of the P5s, for instance, are absent as the article concentrates on explaining the rationale, pros and cons of each choice, and how these choices could negatively impact the effectiveness of the NPT. In addition, Lee & Nacht’s ‘Yes or No’ framework excludes mid-way behaviors. A nonproliferating NPT member state, for instance, can be deemed to be in full compliance with the NPT, regardless of its gradual change towards offensive nuclear doctrine.

<Table 1> Lee & Nacht (2020) Framework for State Behaviors under the NPT

Lee & Nacht’s Framework		NPT Membership	
		Yes	No
Nonproliferation	Yes	Full Compliance	Nonmembership/Proliferation
	No	Cheating	Nonmembership/Proliferation

Source: Lee & Nacht’s framework (Table 1) reproduced, p. 101.

Measuring the P5s’ Nuclear Restraints

Against this backdrop, to gauge the P5s’ nuclear pursuit and/or restraints, this article proposes to modify and apply Lee & Nacht’s framework in three ways. First, the NPT membership axis is unnecessary as all P5s are NPT member states and are recognized nuclear weapon states under the NPT.

Second, to better account for mid-way behaviors that are less captured in Lee & Nacht’s framework, I propose to operationalize Lee & Nacht’s nonproliferation-axis into three variables: nuclear doctrine, nuclear capabilities, and nuclear readiness (posture, nuclear command, and control issues), as in the following <Table 2>. Here, I am bridging to the literature on the new nuclear arms race,12) which gauges states’ intentions and actions along these variables:

11) Lee & Nacht, “Challenges to the Nuclear Non-Proliferation Treaty,” p. 101.

12) Paul Bracken, *The Second Nuclear Age: Strategy, Danger, and the New Power Politics* (St. Martin’s Griffin, 2013); Moniz & Nunn, “The Return of Doomsday.”; Zala, “How the Next Nuclear Arms Race Will be Different from the Last One.”; Cooper, *Arms Control for the Third Nuclear Age*

- (1) Nuclear doctrine: What is the purpose/role of nuclear weapons? Is nuclear strategy more nuclear expansive/offensive vs. nuclear restraint/defensive? What is the position on the No-First-Use (NFU) policy – declaration to not use nuclear weapons first, has it changed?¹³⁾
- (2) Nuclear capabilities: What are the qualitative and quantitative changes in nuclear weapons (nuclear warheads and delivery platforms)? Although experts may draw different conclusions, they converge in evaluating the quality and quantity of nuclear forces.¹⁴⁾ The distinction is made whether the increase – in both quantity and quality – is made in nuclear warheads and/or delivery systems of these warheads. Thomas J. Christensen, for instance, in observation of Chinese nuclear modernization, argues that the underlying intentions are found less in China's continued NFU policy but in its efforts to enhance the survivability of the weapons by introducing new delivery platforms and solid-fuel missiles.¹⁵⁾
- (3) Nuclear readiness: What is the nuclear posture or readiness of the weapons system? How many are operational vs. in storage? How many are ready for launch-on-warning? What is the command and control system/structure of the nuclear arsenal? About Chinese nuclear posture, Jeffrey G. Lewis argues that it is important to distinguish how China maintains “the smallest operationally deployed nuclear force of any of the legally recognized nuclear weapon states” and “operates under a no-first-use pledge, and keeps its warheads off alert.”¹⁶⁾

Third, to visualize the extent of decrease and increase in P5s' nuclear pursuit, however arbitrary, I propose to allocate points as the following <Table 2>. Placing nuclear doctrine on one axis and capabilities and readiness on the other axis, a state pursuing offensive nuclear doctrine with an increase in the quantity, quality, and readiness of nuclear warheads and/or delivery platforms will be given a total of four points. A state that pursues defensive nuclear doctrine but shows the same increases as above will accumulate to two points. If a state pursues offensive nuclear doctrine but shows a decrease in the quantity, quality, and readiness of

13) Elbridge Colby, “Russia's Evolving Nuclear Doctrine and its Implications,” *FRS* (2016).; Baohui Zhang, “The Taiwan Strait and the Future of China's No-First-Use Nuclear Policy,” *Comparative Strategy*, Vol. 27, No. 2(2016), pp. 164-182.; David S. Yost, “France's New Nuclear Doctrine,” *International Affairs*, Vol. 82, No. 4(2006), pp. 701-721.

14) Gregory Kulacki, “China's Nuclear Force: Modernizing from Behind,” *Union of Concerned Scientists*, January 2018.

15) Thoma J. Christensen, “The Meaning of the Nuclear Evolution: China's Strategic Modernization and US-China Security Relations,” *Journal of Strategic Studies*, Vol. 35, No. 4(2012), pp. 447-487.

16) Jeffrey G. Lewis, “Chinese Nuclear Posture and Force Modernization,” *The Nonproliferation Review*, Vol. 16, No. 2(2009), p. 197.

nuclear warheads, two points will be given. If a state pursues a defensive nuclear doctrine and shows a decrease or no change in the others, no points will be given. In sum, P5s will be depicted along a scale of zero to four – namely a spectrum of NPT Full Compliance (zero), NPT Constrained (two points), to NPT Challenging (four points).

<Table 2> Gauging P5s' Nuclear Pursuit

P5s' Nuclear Pursuit		Capabilities (Quality and/or Quantity)		Readiness (Quality and/or Quantity)	
		Increase	Decrease	Increase	Decrease
Nuclear Doctrine	Offensive	2	1	2	1
	Defensive	1	0	1	0

P3 in Asia, Nuclear Modernizations under the NPT

Russia: Seeking Qualitative Upgrades and New Delivery Systems

Russia's current nuclear policy traces back to its nuclear doctrinal shift in the early 1990s, when Russia abandoned its earlier NFU pledge of 1982 in the newly announced nuclear doctrine in November 1993. After about twenty-seven years, Russia appears to be taking another offensive turn as evident in the newly signed executive decree in 2020 – ‘The Basic Principles of the Russian Federation’s State Policy in the Domain of Nuclear Deterrence.’¹⁷⁾ In addition to reconfirming that Russia does not rule out its nuclear first-use,¹⁸⁾ the new policy further specified four conditions for nuclear use: (1) the launch of ballistic missiles “attacking the territory of the Russian Federation and/or its allies,” (2) other uses of weapons of mass destruction, (3) “attack by adversary against critical governmental or military sites of the Russian Federation, disruption of which would undermine nuclear forces’ response actions,” as well as (4) “aggression against the Russian Federation with the use of conventional weapons when the very existence of the state is in jeopardy.”¹⁹⁾ Although Russia maintains that nuclear weapons are “exclusive” means for deterrence, Russia’s annexation of Crimea in 2014 with threat of tactical nukes, invasion of Ukraine in 2022, and latest Putin’s declaration

17) V. Isachenkov, “Putin Signs Russia’s Nuclear Deterrent Policy,” *Associated Press*, Jun. 2, 2020.

18) As emphasized in Russia’s military doctrine from 2000, Russia has continued to declare the possibility of nuclear use in response to conventional aggression that is “critical to the national security of Russia.”

19) O. Oliker, “New Document Consolidates Russia’s New Nuclear Policy in One Place,” *Russia Matters*, Jun. 4, 2020.

to suspend the New START treaty on February 21, 2023, suggest that Russia's nuclear doctrine is under change.

Transition in Russia's nuclear doctrine is evident from closer observation of the changes concerning Russia's nuclear arsenal from 2018 to 2022. In numerical terms, while the total number of nuclear warheads decreased, the fall came from dismantling the retired warheads that remained in the inventory. If we look at the number of deployed warheads during 2020 and 2022, the numbers of land-based and submarine-launched ballistic missiles, in fact, increased from 810 to 812 and 560 to 576, respectively. The total operational warheads (excluding retired warheads) showed a slight decrease from 4,350 nuclear warheads in 2018 to 4,310 in 2020, but again increased beyond 2018-level to a total of 4,477 in 2022 <Table 3>. According to Chief of the General Staff Valery Gerasimov, as of December 2021, Russia has allegedly ninety-five percent of Russia's strategic missile forces "continuously ready for combat use."²⁰ In addition, many have anticipated that Russia will substantially increase the number of its deployed nuclear weapons should the New START treaty expire in 2026, which worked to place a cap on both US and Russia's strategic nuclear arsenal.²¹ As Putin suspended the New START in response to Biden's visit to Ukraine, we can expect Russia's increase in the nuclear arsenal (e.g., by deploying more warheads from storage and production of new).

<Table 3> Russia's Nuclear Arsenal: 2018-2022

Year	Operational Total	Deployed			Storage		Retired	Total
		Ballistic Missile	Bomber	Nonstrategic	Strategic	Nonstrategic		
2022	4,477	1,388 (land-based : 812, SLBM: 576)	200		977	1,912	1,500	5,977
2020	4,310	1,370 (land-based : 810, SLBM: 560)	200		870	1,870	2,060	6,370
2018	4,350	1,600			920	1,830	2,500	6,850

Source: Hans M. Kristensen & Matt Korda, "Russian Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, Vol. 74, No. 3(2018), pp. 185-195.; "Russian Nuclear Forces, 2020," *Bulletin of the Atomic Scientists*, Vol. 76, No. 2(2020), pp. 102-117.; "Russian Nuclear Forces, 2022," *Bulletin of the Atomic Scientists*, Vol. 78, No. 2(2022), pp. 98-121.

²⁰ RIA Novosti, "В Генштабе Рассказали О Готовности Установок Для Ядерных Ракет К Пуска," Dec. 9, 2021.

The increases in Russia's nuclear arsenal also become more prominent if we look into Russia's decade-long pursuit for upgrades in its nuclear arsenal. Most notable is Russia's development of new delivery systems. Russia is modernizing its ICBMs, conducting more than twenty-five ICBM tests in the last five years, including at least ten planned in 2022, which is an evident increase in the frequency of the tests.²²⁾ The testings include Russia's development of the new heavy Sarmat ICBM, which once completed will become the heaviest and longest ICBM of all nuclear powers. The ICBM modernizations also accompany the development of new testing sites and the modernization of the facilities. Russia, for instance, announced in 2020 that it was developing a new testing site for Sarmat tests at Severo-Yeniseysky.²³⁾ Russia is also upgrading and hardening the silos and other support facilities by modifying the external fences, roads, and other infrastructure of the silos, including the installation of "Dym-2" perimeter defense system with "automated launchers, small arms fire, and remote-controlled machine gun installations."²⁴⁾

In addition to missiles, Russia has already deployed the Avangard hypersonic glide vehicle, capable of carrying both conventional and nuclear warheads at a speed of Mach 20-27, with the ability to evade missile defense systems. According to Hans M. Kristensen and Matt Korda, Russia has deployed two per year, beginning with the first two on December 27, 2019,²⁵⁾ another two in December 2020,²⁶⁾ and the final two in December 2021, completing a total of six. Further notable is Russia's development of Poseidon, a nuclear-powered long-range underwater drone, previously known as codename Status-6, which enables Russia's use of a "dirty bomb" and "wide radio-active contamination."²⁷⁾ Burevestnik (NATO's designation: SSC-X-9 Skyfall) nuclear-powered and -armed cruise missile is also discussed, although not much progress is revealed. According

21) Lydia Wachs, "The Role of Nuclear Weapons in Russia's Strategic Deterrence, *Stiftung Wissenschaft und Politik*, Nov. 25, 2022.

22) Krasnaya Zvezda, "Ракетные Войска Стратегического Назначения – Основная Составляющая Стратегических Ядерных Сил России," Dec. 17, 2021.

23) Russian Federation, "Expanded Meeting of the Defence Ministry Board," Dec. 21, 2020.

24) Russia Insight, "Breaking! Russia's New Top Secret "Toy" Revealed: "Dym" Small Arms System Protects RS-24 Yars ICBMs," Dec. 21, 2018.

25) Hans M. Kristensen & Matt Korda, "Russian Nuclear Forces, 2022," *Bulletin of the Atomic Scientists*, Vol. 78, No. 2(2022), pp. 98-121.

26) TASS, "The First Avangard Missile Regiment Took up Combat Duty," Dec. 27, 2019.; Russian Federation Defense Ministry, "Chief of the General Staff of the Russian Armed Forces-First Deputy Minister of Defence General of the Army Valery Gerasimov Meets with Representatives of the Military Diplomatic Corps Accredited in Russia," *Press Release*, Dec. 18, 2019.

27) P. Podvig, "Is Russia Working on a Massive Dirty Bomb," *Russian Strategic Nuclear Forces*, Nov. 10, 2015.

to President Putin's end-of-year statement in 2020, Russia has completed 88.3 percent of the modernization of its nuclear triads.²⁸⁾

The readiness of Russia's nuclear arsenal can be assessed by its nuclear command, control, and communication system(NC3). Given President's sole authority in deciding nuclear use – for both strategic and nonstrategic nuclear weapons – according to Russia's nuclear doctrine, it is assumed that the President carries a 'nuclear briefcase,' so-called 'Cheget' at all times, which is the communication system that links the President with his top-ranking aides and to rocket force commanders at the site for a nuclear launch. The "Kazbek" command and control network enables the transmission of top secrets involving nuclear use. According to Russia's Zvezda television, the Cheget is composed of an "array of buttons." In the "command" section, there is allegedly a white 'launch' button and a red 'cancel' button. And the buttons are activated by a special flashcard. Should the President determine that a threat is imminent and decides to use nuclear weapons, the President will send direct launch order to general staff command and reserve command units. The units will then immediately transmit the order to strategic rocket force units, which then would make the final launch of the weapons. The readiness varies along the duration of final decision-making and just a few minutes to transmit the final order down the chain of command and communication.

US: Pacing Change for Nuclear Revival and Modernization

Since the Trump Administration, the US's nuclear doctrine and forces have also shown a pacing change with a renewed emphasis on nuclear modernization. While the Obama Administration began with a pledge to take "concrete steps toward a world without nuclear weapons" at the nuclear security summit in Hague in 2009, Russia's annexation of Crimea with the threat of nuclear use in 2014 quickly revived the US's interest in the role of nuclear weapons. The US also continues not to rule out the first use of nuclear weapons as seen in the 2022 nuclear posture review (NPR), although the Obama Administration in 2016 and the Biden Administration in 2021 have considered adopting the NFU policy.²⁹⁾

A more specific yardstick to gauge changes in the US's nuclear doctrine is the subtle changes in its policy of calculated ambiguity. With the underlying rationale that clarity in nuclear strategy can enable adversarial countries to take advantage, escalate, or cause unwanted entrapments, the US's longtime nuclear policy has rested on not specifying what it will do and will not do. However, if we look at Chapter IV on tailored nuclear deterrence strategies in the latest NPR, changes are

28) Russian Federation, "Expanded Meeting of the Defence Ministry Board," Dec. 21, 2020.

29) The Wall Street Journal, "'No First Use' Nuclear Policy Proposal Assailed by U.S. Cabinet Officials, Allies," Aug. 12, 2016.

quite apparent. Shifting from US's pledge to use "all means necessary, including nuclear weapons, to defend allies in Europe and Asia," despite allies' reiterated requests to specify when, how, and what means will be provided in case of under attack, this time, the NPR specifically listed names of new tactical nuclear weapons to be directed against China and Russia in the chapter. To both China and Russia, the NPR declared that the US would deter attacks and nuclear coercion by adding the SLBMs tipped with new low-yield W76-2 nuclear warheads. Also, as Russia threatens to use its tactical nukes against Ukraine and any Western intervention in the ongoing Russia-Ukraine War, the NPR stated that the US will provide a combination of strategic and non-strategic nuclear forces, including the new B61-12 new nuclear gravity bomb that began its development since Trump administration. The US's declaratory policy manifests heightened appreciation and weight on the role of nuclear weapons in the US's strategy, which is a contrast to how the US aimed to reduce the apparent role of nuclear weapons in the US's strategy since the end of the Cold War.

The US's nuclear doctrine may not be regarded as expansive and/or aggressive, but its declaratory policy is less of the restraint from the previous in relative terms. The change is more palpable when we observe US's nuclear arsenal. Away from emphasis on the pursuit for world free of nuclear weapons, the Trump administration's 2018 NPR reaffirmed the "bedrock truth" that nuclear weapons are critical in "detering nuclear attack and in preventing large-scale conventional warfare between nuclear-armed states for the foreseeable future."³⁰ With emphasis on nuclear modernization and maintenance of robust nuclear triad, the 2018 NPR also announced plan to acquire three new low-yield nuclear weapons: 1) B61-12 nuclear gravity bomb: to modernize tactical nuclear forces stationed in Europe in defense against Russia's growing threats, the US began development of B61-12 nuclear gravity bomb to replace the old B61-3 and B61-4 produced in 1979; 2) W76-2 tipped SLBM: developing a new eight kiloton low-yield warhead(W76-2), to be tipped on the Trident-II SLBMs; 3) new nuclear cruise missile(SLCM-N) by tipping new low-yield warhead on Tomahawks.³¹ While the incumbent Biden administration canceled the SLCM-N, W76-2 are already deployed and operational since December, 2019, and B61-12 are to be completed for production by 2024. While the development of the new arsenal did not involve nuclear tests (subcritical tests) and thus no breach of the NPT, which bans nuclear tests for any military purposes, the US has acquired new and modern types of nuclear weapons that provide more accuracy and smaller yield. What this may also suggest is the increased flexibility and lowered threshold in the use of the weapons, as the surgical nuclear strike has become a new viable option.³²

30) US Department of Defense, "2018 Nuclear Posture Review"(2018), pp. iii.

31) Ibid., pp. xi-xii.

32) Nina Tannenwald, "The Nuclear Taboo: The United States and the Normative Basis of

If we look more precisely at the US's nuclear arsenal in absolute numbers, it is in decline. From 2018 to 2022, the total number of nuclear warheads – deployed, in storage, and retired – decreased all-around, as shown in <Table 4>. However, what must be noted is the increase in the number of strategic nuclear warheads from 2020 to 2022. Although the nonstrategic, tactical nukes deployed in Europe declined from 150 warheads to 100 by 2022, the nuclear warheads on ballistic missiles increased from 1,300 in 2020 to 1,344 in 2022. Of the forty-four newly deployed warheads, twenty-five are the new W76-2 low-yield nuclear warheads that became operational in December 2019. The rest of the nuclear warheads are speculated to be deployed from stockpiles in storage, which suggests enhanced readiness of the weapons system.

<Table 4> US's Nuclear Arsenal: 2018-2022

Year	Operational Total	Deployed			Storage		Retired	Total
		Ballistic Missile	Bomber	Nonstrategic	Strategic	Nonstrategic		
2022	3,708	1,344	300	100	1,964		1,720	5,428
2020	3,800	1,300	300	150	2,050		2,000	5,800
2018	4,000	1,650		150	2,200		2,550	6,550

Source: Hans M. Kristensen & Matt Korda, "United States Nuclear Forces, 2020," *Bulletin of the Atomic Scientists*, Vol. 76, No. 1(2020), pp. 46-60.; "United States Nuclear Forces, 2022," *Bulletin of the Atomic Scientists*, Vol. 78, No. 3, pp. 162-184.; Hans M. Kristensen & Robert S. Norris, "United States Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, Vol. 74, No. 2, pp. 120-131.

The US nuclear bases in Europe are also more alert. According to Hans M. Kristensen of the Federation of American Scientists (FAS), the US has recently increased investment in modernizing facilities, including nuclear storage facilities at Lakenheath Air Base in the UK.³³ Lakenheath Base is known to have deployed approximately 110 B61-3/-4 tactical nuclear bombs in thirty-three underground facilities in the 1990s. Although it is unlikely that the US will permanently deploy the new B61-12 for strategic flexibility, the modernizations are expected to enable the relocation of the US's nuclear weapons in Europe in case of contingencies and complicate adversary's calculation by confusing the exact location of the weapons.

In terms of 'minutes,' the readiness of the US's nuclear arsenal is reported to

Nuclear Non-us," *International Organization*, Vol. 53, No. 3(1999), pp. 433-468.; Paul Nitze, "Is It Time to Junk Our Nukes? The New World Disorder Makes Them Obsolete," *The Washington Quarterly*, Vol. 20, No. 3(1994), pp. 97-101.

33) Hans M. Kristensen, "Lakenheath Air Base Added to Nuclear Weapons Storage Site Upgrades," *Strategic Security, Federation of American Scientists*(2022).; See US's NATO Security Investment Program (NSIP) under the FY2023 Defense Budget, Military Construction Program (April 2022).

be “two minutes” for land-based strategic nuclear arsenal – Minuteman-III ICBMs – and “fifteen minutes” for submarine-launched Trident-II SLBMs, from the final order delivered to the commander at the site to the final launch of the asset.³⁴⁾ The decision-making process may be immediate but more likely to require more time as the President requires deliberation along the chain of command and communication from Secretary of State and Defense, Joint Chiefs of Staff, and other high-ranking officials of the government. Once a decision is made, the President needs to authorize nuclear use via a communication system known as ‘nuclear football’ and transmit an authorization code to activate the weapons for launch.³⁵⁾

China: Gradual Nuclear Expansionist in Asia

China’s nuclear strategy maintains its traditional position that China will not use nuclear weapons first (NFU) and not against non-nuclear countries but maintain them for minimum deterrence and survivable second-strike purposes. While changes may not be evident from China’s official statements, the rapid build-up of China’s nuclear capabilities can be observed qualitatively and quantitatively in the increases in its nuclear warheads and new delivery platforms.

In numerical terms, China’s nuclear warheads almost doubled from a total of 280 in 2018 to 474 in 2022 including the warheads in storage <Table 5>. China is indeed the only P5 country wherein the total number of nuclear warheads – including the ones deployed, stored, and retired – increased. According to the US’s Annual Report to Congress, China is expected to have about “1,000 operational nuclear warheads” by 2030, “most of which will be fielded on systems capable of ranging the continental United States.”³⁶⁾ The report further projected that China may field about 1,500 nuclear warheads by 2035.³⁷⁾

34) CRS, “Defense Primer: Command and Control of Nuclear Forces,” Nov.19, 2021.

35) US Joint Chiefs of Staff, “Joint Publication 3-72: Nuclear Operations,” Jun. 11, 2019.

36) US Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2022*(Office of the Secretary of Defense, 2022), p. 97.

37) *Ibid.*, p. 94, 98.

<Table 5> China's Nuclear Arsenal:2018-2022

Year	Operational Total	Deployed			Storage	Total
		Land-based	Sea-based	Bombers (Gravity bombs)		
2022	410	318	72	20	64	474
2020	272	240	48	20	78	350
2018	254	120-130	48	(~20)	26	280

Source: Hans M. Kristensen & Robert S. Norris, "Chinese Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, Vol. 74, No. 4(2018), pp. 289-295.; Hans M. Kristensen & Matt Korda, "Nuclear Notebook: Chinese Nuclear Forces, 2021," *Bulletin of the Atomic Scientists*, Nov. 15, 2021.; Hans M. Kristensen, Matt Korda, & Eliana Reynolds, "Chinese Nuclear Weapons, 2023," *Bulletin of the Atomic Scientists*, Vol. 79, No. 2(2023), pp. 108-133.

China's recent developments also include the modernization of delivery platforms. From a limited number and mostly fixed, land-based ICBMs, China is now making their ICBMs more road-mobile and also seeking strategic sea- and air-based capabilities. At least at a 'nascent' stage of acquiring a nuclear triad, China is modernizing its Type-094 submarines with longer-range JL-3 SLBMs, developing air-launched ballistic missiles, and reassigning nuclear missions to its bombers. In addition, China is developing short-range and medium-range missiles with hypersonic glide vehicles.³⁸⁾ Meanwhile, China's possession of a tactical nuclear arsenal is unclear. Yet considering China's nuclear tests between 1965 and 1979 involving bombers and display of the nuclear bombs(models), Hans Kristensen and Matt Korda speculate that China is capable of developing bombs for the bombers.³⁹⁾

Another notable change is China's increasing number of silos. From only twenty silo-based ICBMs, China is reported to have recently built more than 250 new long-range missile silos at as many as three major locations in the northwestern region.⁴⁰⁾ Given the absence of China's official explanations, there are also growing speculations that China may be able to use fissile materials from civilian nuclear facilities to increase its nuclear warheads to be tipped on new delivery platforms and missiles.⁴¹⁾ According to the US Department of Defense, the readiness of China's nuclear arsenal may be also increased, possibly seeking

38) Hans M. Kristensen, Matt Korda, & Eliana Reynolds, "Chinese Nuclear Weapons, 2023," *Bulletin of the Atomic Scientists*, Vol. 79, No. 2(2023), pp. 108-133.

39) Hans M. Kristensen & Robert S. Norris, "Chinese Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, Vol. 74, No. 4(2018), p. 290.

40) Arms Control Association, "Pentagon Sees Faster Chinese Nuclear Expansion," 2021.

41) The Washington Post, "China is Building More than 100 New Missile Silos in its Western Desert, Analysts Say," Jun. 30, 2021.

“launch-on-warning... posture” with the enhanced silo-based ICBMs.⁴²⁾ For now, China is more likely to keep nuclear warheads separated from delivery platforms – missiles, launchers, and bombers – which would technically require some time to prepare nuclear weapons for launch.

France and UK, the P2s in Europe: Modernization within Constraints

France and UK are the two European nuclear powers that share many similarities. Most conspicuous is their pursuit of a minimum nuclear deterrent, voluntarily restricting to a small number of nuclear warheads and delivery platforms. Another notable similarity is France and the UK’s strict maintenance of ‘strategic ambiguity’ when it comes to when, how, and at what scale they would use nuclear weapons. Unlike the US’s disclosure of its nuclear strategy, arsenal, and modernization efforts, the two European nuclear powers remain relatively reticent to complicate the calculations of potential aggressors on the basis of a ‘smaller’ nuclear arsenal. Recently, with Russia’s renewed assertiveness in the region since the invasion of Crimea and Ukraine, there appears to be a common pursuit for nuclear modernization and heightened appreciation of nuclear arsenal both in France and the UK.

France: Modernization for Strict Sufficiency

In terms of nuclear doctrine, France proclaims to “limit” the role of nuclear weapons to “extreme circumstances of self-defence.”⁴³⁾ Yet, France also makes it clear that France retains the right to conduct “a unique and one-time-only” nuclear use in case of aggression, in order to demonstrate and deter further aggression by the adversary.⁴⁴⁾ As one of the P5 states to the NPT, France also pledged not to use nuclear weapons against nonnuclear states. France’s nuclear doctrine is also described along its policy of “strict sufficiency,” wherein France seeks possession of the lowest possible level of nuclear weapons compatible with changing strategic environment.⁴⁵⁾ President Macron in February 2020, for instance, emphasized that France has voluntarily “dismantled irreversibly its land-based nuclear component, its nuclear test facilities, its fissile material for weapons production facilities, and

42) US Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China* (2021).

43) Speech of the President of the Republic on the Defense and Deterrence Strategy, February 7, 2020.; Shannon Bugos, “France Offers Nuclear Deterrent to All Europe,” *Arms Control Association*, March 2020.

44) Ibid.

45) Ibid.

having reduced the size of its arsenal, which is currently under 300 nuclear weapons.”⁴⁶⁾ In contrast to US and Russia’s number of nuclear stockpiles and operation of nuclear triads(ICBM-SLBM-Bombers), voluntary restraint on the delivery platforms and the number of the nuclear arsenal are defined as France’s policy of strict sufficiency.

Accordingly, France has fewer than 300 operational nuclear warheads, around eighty percent of which are maritime-based, operated by the Navy’s total fleet of four Triomphant-class SSBNs. Each Triomphant-class SSBN operates up to sixteen M-51 and M-51.2 SLBMs. In total, the Navy maintains a total of forty-eight SLBMs.⁴⁷⁾ Full payload of M-51 is six warheads with variable yields, with a range of 6,000km, and can be extended to 8,000km when carrying a single warhead.⁴⁸⁾ Readiness of the SSBNs is “continuous at sea deterrent (CASD)” posture, operating at least one SSBN at sea, while the other three rotate along maintenance, training, and stand-by at the port. French Navy also operates ten Rafale MF3 aircraft (deployed on France’s Charles de Gaulle aircraft carrier) capable of carrying nuclear-tipped, medium-range(600km) ASMP-A cruise missiles. The rest twenty percent of nuclear warheads are operated by the French Air Force – two squadrons of around forty Rafale MF3 aircraft that are assigned with nuclear roles. The Rafales are also equipped with fifty-four nuclear-armed medium-range(600km) ASMP-A cruise missiles.⁴⁹⁾ France also maintains thirty tons of highly-enriched uranium(HEU) and six tons of plutonium.

Upon strict sufficiency, however, France has been on the lookout for changing security environment in the region. According to the 2017 Strategic Review, France observes how the international system is “giving way to a multipolar environment,” that is “subject to sweeping changes.”⁵⁰⁾ Particularly after Russia invaded Crimea, President Hollande noted how threats of “tactical nuclear arsenals are growing” in the European sphere.⁵¹⁾ Identifying Russia and China, as well as IS, North Korea, and Iran’s nuclear proliferation as threats in 2021 Strategic Update,⁵²⁾ France has reconfirmed the need for “two complementary”(air- and maritime) nuclear deterrent to address the growing challenges.⁵³⁾ There is a heightened appreciation of nuclear arsenal in France.⁵⁴⁾

46) Ibid.

47) Speech by M. Francois Hollande, President of the Republic, Feb. 19, 2015.

48) Bruno Tertrais, “Nuclear policy: France stands alone,” *Bulletin of the Atomic Scientists*, July/August (2004).

49) Claire Mills, “The French Nuclear Deterrent,” *House of Commons Briefing Paper*, No. 4079(2020), pp. 1-24.

50) Government of France, “Defence and National Security Strategic Review 2017”(2017), p. 16.

51) Speech by M. Francois Hollande, President of the Republic, Feb.25, 2015, p. 2.

52) Government of France, “Strategic Update”(2021), pp. 16-17.

53) Government of France, “Defence and National Security Strategic Review 2017”(2017), p. 51.

Against this backdrop, France's nuclear modernization, similar to other P4 nuclear states, has focused on modernizing their delivery platforms. Announcing plans to "renew" existing air- and maritime-based nuclear arsenal in the 2021 Strategic Update,⁵⁵⁾ France also pledged a nuclear modernization plan to invest thirty-seven billion Euros by 2025. In an explanation of the plan, defense minister Florence Parly stated that France aims to "make up for past shortfalls and build a modern, sustainable, protective army."⁵⁶⁾ France has commenced research on possible replacement and upgrades of the Triomphant-class SSBNs, combat aircraft, and new generation of SLBM (M-51.3 SLBM) and air-launched cruise missiles. Namely, France's Triomphant-class SSBNs entered service in 1997. Considering the expected service life of thirty-five years, France has launched third generation SSBN program, designated as 'SNLE 3G.' The first batch is expected to be in service in the early 2030s.⁵⁷⁾

While France reiterates its nuclear restraint for withdrawing ground-based ballistic missile force in 1996, analysts point out that submarines are the most survivable (hard to detect) and advanced delivery platforms, with which air-based delivery systems provide France with both strategic and tactical nuclear capabilities. With airborne capabilities utilized for precision targeting and M-51 SLBM for long-range missions, France retains complementary systems that provide a "range of necessary and sufficient options."⁵⁸⁾

Also, France has been modernizing their nuclear warheads. A new and more robust 'Tête Nucléaire Oceanique (TNO),' which reportedly has a maximum range of 9,000km, is now carried by new M-51.2 SLBMs.⁵⁹⁾ Modernizations of France's ASMP-A cruise missiles involve refurbishing, which began in 2016, and also tipping with new 'Tête Nucléaire AeroPortée(TNA)' – the air-launched version of the new TNO. The specific yield of TNA is unknown. France has also begun research for the fourth generation of missile, designated as the 'ASN4G (air-to-surface nuclear fourth generation).' Advancing the stealth and maneuver of the missile, ASN4G will replace the ASMP-A in 2035.⁶⁰⁾ In short, with new warheads, France pursues a flexible nuclear posture on both air- and sea-based

54) The 2021 Strategic Update, for instance, in confirming how the 2017 evaluations have been "proven," emphasized that France's "nuclear and conventional forces support each other at all times." Government of France, "Strategic Update"(2021), p. 27.

55) Ibid., p.29.

56) EURACTIV, "France to Spend €37 Billion Euros on Upgrading Nuclear Arsenal," Feb. 9, 2018.

57) Naval News, "France Launches Third Generation SSBN Program," Feb. 21, 2021.

58) Speech by M. Francois Hollande, President of the Republic, Feb. 19, 2015.

59) Bruno Tertrais, *French Nuclear Deterrence Policy, Forces, And Future: A Handbook* (Paris: Fondation pour la recherche stratégique, 2020).

60) Claire Mills, "The French Nuclear Deterrent."

delivery platforms.

The readiness of France's nuclear arsenal resembles the US, wherein the President maintains the sole authority for nuclear use. The specific plans and scenarios for nuclear use are prepared by Special Planning Authority and reviewed by Defense Minister. Yet, the President makes the ultimate decision.⁶¹⁾ Similar to the US's PAL system, France's nuclear arsenals are equipped with a control system that requires an authorization code to be activated. For the actual release of the weapons, France adopts the 'two-person rule,' requiring final consent from two commanders at the final chain of the order. For example, SLBM launch from strategic submarines requires consent from both the commander and the deputy commander.⁶²⁾

UK: Continued Modernization of Single Sea-based Deterrent

Minimum deterrence and "deliberate ambiguity" are at the heart of the UK's nuclear policy. Limiting its nuclear use to "only in extreme circumstances of self-defence, including the defense of NATO allies"⁶³⁾ – the UK emphasizes its policy to remain "deliberately ambiguous about precisely when, how and at what scale [UK] would contemplate the use of nuclear weapons."⁶⁴⁾ UK also maintains the position that UK's nuclear arsenal "do not target" any specific state.⁶⁵⁾ Deliberate ambiguity aims to secure deterrence and strategic stability in times of changing security environment.

Despite UK's emphasis on minimum deterrence and deliberate ambiguity, the changing threat environment and perception are also driving UK's push for nuclear modernization. For instance, veering away from 2010's pledge to reduce its nuclear stockpiles by sixty-five percent by 2020 – below 180 nuclear weapons⁶⁶⁾ – the 2021 Integrated Review concluded that the pledge can no longer be fulfilled given the changing security environment. UK's conservative government announced on March 16, 2021, that it would change the '180-threshold' and keep its nuclear arsenal at '260 and/or below.'⁶⁷⁾ As of 2021, the UK possesses 195

61) Bruno Tertrais, *La France et la dissuasion nucléaire: concept, moyens, avenir*. (Paris: Doc Française, 2017), p. 152.

62) Shaun Gregory, "French Nuclear Command and Control," *Defense Analysis*, Vol. 6, No. 1(1990), p. 50.; Bruno Tertrais & Jeffrey Lewis, "The Finger on the Butter: The Authority to Use Nuclear Weapons in Nuclear-armed States," *CNS Occasional Paper*, No. 45(2019), p. 17.; Niklas Granholm & John Rydqvist. *Nuclear Weapons in Europe: British and French Deterrence Forces*(FOI, 2018), pp. 56-57.

63) UK HM Government, *Global Britain in a Competitive Age: The Integrated Review of Security Defence, Development and Foreign Policy*(2021).

64) *Ibid.*, p. 77.

65) *Ibid.*, p. 76.

66) "...this is no longer possible" in *Ibid.*

nuclear warheads, which are developed and produced at the Atomic Weapons Establishment(AWE).⁶⁸⁾ While the exact yield of the warheads remains in a veil, it is anticipated that the UK operates a maximum of 100kt-yield Mk4 nuclear warheads.⁶⁹⁾ In February 2020, UK announced development for next-generation nuclear warheads to replace the Mk4s.

What distinguishes the UK from other P5 states is its operation of a “single deterrent system” – the sea-based delivery platform – the Royal Navy’s Vanguard-class submarines – as the only delivery system for their nuclear warheads.⁷⁰⁾ Keeping CASD posture (also termed as Operation Relentless), similar to France, UK operates four Vanguard-class submarines, wherein at least one nuclear-armed submarine patrols the sea at all times.⁷¹⁾ Each Vanguard-class carries a maximum of sixteen US-produced Trident-II SLBMs, which can be tipped with a maximum of three nuclear warheads (UK operates a total of fifty-eight Trident-II SLBMs).⁷²⁾ In total, each Vanguard-class submarine can operate up to forty-eight nuclear warheads. Normally, each submarine is reported to carry a maximum of forty nuclear warheads, as other SLBMs are equipped with decoys and warheads with smaller yields.⁷³⁾ As the Vanguard-class submarines entered service in the 1990s, nearing the end of service life, the next-generation program for Dreadnought-class submarines have been underway. Four Dreadnought-class submarines will be built and enter service in the early 2030s.

The readiness of the UK’s nuclear arsenal is kept approximately an hour from the Prime Minister’s order of the launch to the firing of the missile. Similar to France, UK’s nuclear arsenal remains independent of its US and European allies. Prime Minister maintains the sole authority to use nuclear weapons even in case of allied responses. Prime Minister’s decision to use nuclear weapons triggers the ‘National Firing Directive,’ which will be transmitted to the Nuclear Operations Targeting Center (NOTC) that is located adjacent to the UK’s Defence Crisis Management Centre (PINDAR) at the Ministry of Defence. The order is also transmitted to the Permanent Joint Headquarters (PJHQ), which will relay the order to the ‘Commander of Task Force 345(CTF-345),’ who will transmit the

67) IPFM, “Countries: United Kingdom,” Aug. 31, 2021.

68) UK Parliament, “Nuclear Weapons at a Glance: United Kingdom,” Mar. 22, 2021.

69) Granholm & Rydqvist, *Nuclear Weapons in Europe*, p. 23.

70) UK Parliament, “Nuclear Weapons at a Glance.”

71) UK Ministry of Defence, “UK’s Nuclear Deterrent(CASD),” Mar. 16, 2021.

72) UK Parliament, “Nuclear Weapons at a Glance.”; Moreover, it is important to note that the Trident-II SLBMs are produced and maintained by the US. While the nuclear warheads and submarines are indigenously manufactured, the operation of the SLBM is administered by the US. For example, every operation includes a port visit to the US for maintenance of the Trident-II SLBMs.

73) Granholm & Rydqvist, *Nuclear Weapons in Europe*, p. 21.

final order to the submarine at sea to launch the SLBM. From Prime Minister, NOTC, CTF-345, to the submarine at sea is reported to take about forty minutes. For the nuclear submarine to confirm the order, authorize, and prepare for final launch would take about fifteen minutes.⁷⁴⁾

Conclusion

All in all, the proposed framework <Table 6> may not fully capture P5s' nuclear pursuits. Debate remains on whether we can still interpret China's nuclear policy as 'defensive' given China's unprecedented build-up of its nuclear arsenal. Questions can be also raised about whether both qualitative and quantitative increases in China's nuclear arsenals can be treated as equivalent to P4's modernization of nuclear warheads and delivery platforms when the actual stockpile of nuclear warheads decreased in these countries. The US's production of new nuclear warheads and France's upgrade of nuclear warheads are contextually different. Nonetheless, based on the framework shown in <Table 6> that assesses the P5's nuclear pursuit along a scale, however arbitrary it may be, this paper concludes that Russia accumulates to four points as an NPT-challenging state and other P4 are given two points as NPT-constrained states. None of the P5 states fully complies with the NPT (zero point).

<Table 6> P5s' Nuclear Pursuit in Spectrum

P5s' Nuclear Pursuit		Capabilities (Quality and/or Quantity)		Readiness (Quality and/or Quantity)		Conclusion
		Increase	Decrease	Increase	Decrease	
Nuclear Doctrine	Offensive	2 (RUS)	1	2 (RUS)	1	NPT Challenging (Total: 4pts) RUS
	Defensive	1 (US, UK, FRA, CHI)	0	1 (US, UK, FRA, CHI)	0	NPT Constrained (Total: 2pts) US, UK, FRA, CHI

While this study recognizes the inherent limitations of the framework, as an attempt to empirically analyze P5s' changing nuclear strategy and policy, I find its results still meaningful. The results manifest how the emphasis on nuclear modernization and (re-)appreciation of nuclear capabilities have been heightened among all the P5s. Given the difficulties to "achieve at the earliest possible date the

74) Granholm & Rydqvist, *Nuclear Weapons in Europe*, p. 18.

cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament” as described in the preamble of the NPT, we have observed Russia’s and China’s rapid build-up of the nuclear arsenal and US and France’s upgrades of the weapons with new warheads and delivery platforms, as well as UK’s announcement of a higher threshold for the nuclear stockpile. The P5 states have also remained distant from adopting NFU. Although China maintains NFU as its official policy, the exponential growth in investments and build-up of nuclear weapons and silos draw suspicions about its commitment.

Then, what are the implications of these changes by P5s? If we go back to the theoretical debates on what held the NPT together, the realist approach has perceived the NPT as an outcome of the power politics of the P5 nuclear weapon states. As the rational, power-driven nuclear powers at the beginning of the Cold War, the P5s feared the emergence of new nuclear states. With materialist interests in mind, to “maintain their nuclear oligopoly and preeminence,”⁷⁵⁾ the P5s “colluded” to the creation of NPT.⁷⁶⁾ The non-nuclear powers would also be interested in joining the NPT as a means for alliances and balancing against their threats. The institutionalist approach interpreted that because NPT enables solutions to the problem of collective action, states are urged to join and uphold their commitments. Sharing realists’ assumptions that states are self-interested and rational actors, the benefits of information sharing, checks and balances, and an overall reduction in transaction costs would enable voluntary cooperation from the states. From the constructivist perspective, the NPT has been upheld thanks to the norms and values of nuclear non-proliferation. As states become more aware of the values of being responsible actors in the international community through the process of international socialization, the NPT incentivizes the states to comply with non-proliferation norms. The immaterial fears of nuclear weapons, justice, and other emotional factors also influence why more states have joined the NPT over the past years.⁷⁷⁾ In this theoretical backdrop, it seems the aggravating security environment (realists’ concerns), weakening of collective commitment and benefits (institutionalists’ interests), and strengthened norms/reappreciation of flexible and modern nuclear arsenal (constructivists) are accumulating to the P5s’ recent behaviors that do not necessarily advance what NPT strives for.

Yet, as we have seen in the case of France and the UK, the self-restraint of the nuclear powers is not all lost. The concerns for maintenance costs and escalations from keeping ‘too many’ nuclear arsenals have induced these countries to modernize their nuclear arsenal within past policy constraints. The major implication here is that polarizations within the NPT may get exacerbated if we exaggerate and do not

75) Lee & Nacht, “Challenges to the Nuclear Non-Proliferation Treaty,” p. 98.

76) A.J. Coe & J. Vaynman, “Collusion and the Nuclear Proliferation Regime,” *Journal of Politics*, Vol. 77, No. 4, pp. 983-997.

77) Mueller, “The Nuclear Non-proliferation Treaty in Jeopardy?” p. 16.

know the extent of the changes made in the P5s' nuclear programs. While the nuclear arms race among the major nuclear states may have already started, the values of restraint and strategic stability remain, based on which we should try to withhold and revive.

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