

# MP-IDSA

## *Issue Brief*

# China's Nuclear Arsenal: An Assessment

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## **S***ummary*

China is moving away from the minimum deterrence policy. The character of its nuclear arsenal is changing with the diversification of all three legs of the triad. At the operational level, the nuclear forces are on high alert. China is entering into an arms race with the US and Russia.

## Introduction

China is expanding and modernising its nuclear arsenal at an unprecedented speed. China’s development of newer missiles, submarines, strategic bombers and unmanned vehicles is in line with President Xi Jinping’s assertions in 2022 to “elevate our people’s armed forces to world-class standards”.<sup>1</sup> Additionally, China has innovatively integrated emerging technologies into its nuclear force structure. There are debates about China’s nuclear posture changing to a launch-on-warning (LOW) posture.

However, amidst these qualitative and quantitative changes, China has kept its nuclear doctrine unchanged. Beijing still swears by its no-first-use policy. It claims to not engage in the nuclear arms race and maintain nuclear capabilities at the ‘minimum level required for national security’.<sup>2</sup> Against this backdrop, the Brief highlights and assesses some impactful developments *vis-à-vis* the current state of the Chinese nuclear arsenal. It presents probable drivers behind the changing Chinese nuclear profile. Finally, it analyses what these changes mean for India.

## Key Developments

### ***Hypersonic Weapons***

China has become a leading nation to develop and deploy hypersonic weapon systems in its missile arsenal. There are two categories of hypersonic missiles that Beijing is mastering—hypersonic glide vehicle mounted on ballistic missiles and hypersonic cruise missiles. China has been conducting tests of the hypersonic glide vehicle DF-ZF since 2014.<sup>3</sup> According to the testimony of Paul Freisthler, Chief Scientist, Directorate for Analysis, Defence Intelligence Agency,<sup>4</sup> to the US Congress, China has developed “conventional and nuclear-armed hypersonic missile technologies” in the past decade and has developed formidable infrastructure for further technological enhancements. In 2013, China began building the first hypersonic wind tunnel.<sup>5</sup> Further, in 2023, it completed the construction of a JF-22

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<sup>1</sup> [“Full Text of the Report to the 20th National Congress of the Communist Party of China”](#), *Xinhua*, 25 October 2022.

<sup>2</sup> [“Full Text: China’s National Defence in the New Era”](#), The Defence White Paper of China, The State Council, The People’s Republic of China, 24 July 2019.

<sup>3</sup> Franz-Stefan Gady, [“China Tests New Hypersonic Weapon”](#), *The Diplomat*, 26 November 2015.

<sup>4</sup> [“Hypersonic Threat Assessment”](#), Statement of Dr Paul Freisthler, Chief Scientist, Defence Intelligence Agency to the US Congress, 2 March 2023.

<sup>5</sup> Liu Xuanzun, [“China’s New Wind Tunnel Ready to Shape Development of Hypersonic Weapons, Equipment”](#), *Global Times*, 21 November 2021.

hypervelocity wind tunnel at the Institute of Mechanics of the Chinese Academy of Science in Beijing to test airflows up to Mach 30.<sup>6</sup>

China successfully deployed its DF-17 Medium Range Ballistic Missile (MRBM) with a hypersonic glide vehicle as a payload in 2020. According to reports, the DF-17 has a range between 1,800 and 2,500 km.<sup>7</sup> Moreover, DF-17 can carry either conventional or nuclear payload. Furthermore, a leaked intelligence report in April 2023 revealed that China was developing a longer-range hypersonic missile designated as DF-27 that reportedly has a range of 5000–8000km.<sup>8</sup> *Global Times*, in an editorial titled ‘Pentagon leaks show China's efforts to strengthen confidential works are effective’, did not dismiss any of the claims about the DF-27 hypersonic missile in the earlier intelligence leak.<sup>9</sup>

Like DF-17, DF-27 is also likely to carry both conventional and nuclear warheads. Apart from successfully developing hypersonic glide vehicles, China is also successfully testing hypersonic cruise missiles that use scramjet technology. The China Academy of Aerospace Aerodynamics conducted tests of Xingkong-2 (Starry Sky-2) waverider hypersonic flight vehicle in August 2018.<sup>10</sup> The hypersonic cruise missile is believed to have a range of 700–800 km with a maximum speed of Mach 6.<sup>11</sup> Jeffrey McCormick, Senior Intelligence Analyst, National Air and Space Intelligence Centre of the US, testified to the US Congress in February 2024 that China has “flown a Mach 6+ scramjet test bed to research thermal resistant components”, which are useful in further development of its hypersonic weapons programme.<sup>12</sup>

### ***Fractional Orbital Bombardment System (FOBS)***

China tested the FOBS system in August 2021, where a nuclear-capable hypersonic missile was sent into an orbit and deorbited at a chosen time to hit the target.<sup>13</sup> In the process, the distance covered was 40,000 km with a flight time of 100+

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<sup>6</sup> [“Chinese Scientists Finish Development of Hypervelocity Wind Tunnel”](#), *Global Times*, 4 June 2023.

<sup>7</sup> [“Missile Threat”](#), CSIS Missile Defence Project, 23 April 2024.

<sup>8</sup> Josh Rogin, [“The Most Shocking Intel Leak Reveals New Chinese Military Advances”](#), *The Washington Post*, 13 April 2023.

<sup>9</sup> Hu Xijin, [“Pentagon Leaks Show China's Efforts to Strengthen Confidential Works are Effective”](#), *Global Times*, 13 April 2023.

<sup>10</sup> Liu Xuanzun, [“China’s Hypersonic Cruise Missile Sees Technological Breakthrough: Reports”](#), *Global Times*, 8 June 2020.

<sup>11</sup> Paul Bernstein and Dain Hancock, [“China’s Hypersonic Weapons”](#), *Georgetown Journal of International Affairs*, 27 January 2021.

<sup>12</sup> [“2024 Hypersonic Threat Assessment”](#), Statement of Mr Jeffrey McCormick, Senior Intelligence Analyst, National Air and Space Intelligence Centre, to the US Congress, 27 February 2024.

<sup>13</sup> Demetri Sevastopulo and Kathrin Hille, [“China Tests New Space Capability with Hypersonic Missile”](#), *The Financial Times*, 17 October 2021.

minutes.<sup>14</sup> The hypersonic glide vehicle was mounted on a Intercontinental Ballistic Missile (ICBM) to put it in orbit. The FOBS is not a new technology; rather, it was developed during the Cold War by the Soviet Union. As the Outer Space Treaty prohibited the weaponisation of space, the technology was named the FOBS in view of the fact that the nuclear weapons revolving in orbit do not make a full orbit before they hit the target.<sup>15</sup> Although the technology is old, what is new is the fact that China has wedded it with the hypersonic glide vehicle. China is testing these technologies to evade the formidable missile defence system of the US.

### ***Increasing Nuclear Arsenal***

According to the 2024 Stockholm International Peace Research Institute (SIPRI) report, China has a stockpile of around 500 nuclear warheads.<sup>16</sup> The US Department of Defense (DoD) annual report to Congress estimates China will have around 1,000 nuclear warheads by 2030.<sup>17</sup> Although China neither confirms nor rejects these numbers, there is less clarity about what might be the actual picture regarding nuclear warhead count. However, since 2021, China has been building missile silos in the country’s north-western desert areas. The SIPRI data reveals that approximately 350 missile silos are under construction.<sup>18</sup> Additionally, the same report predicts that China has approximately 400 ICBMs in its inventory.

Satellite images reveal that China has made significant construction at its nuclear testing site at Lop Nur.<sup>19</sup> Moreover, China is increasing its production of plutonium through fast breeder reactors.<sup>20</sup> The construction of silos, the rebuilding at Lop Nur, the production of plutonium, and China’s proven multiple independently targetable re-entry vehicle (MIRV)-based ICBMs point to the fact that China is indeed increasing its nuclear arsenal and has already entered into an arms race with the US and Russia.

### ***Nuclear Posture Debate***

The DoD report claims that China is adopting the LOW posture called an ‘early warning counterstrike’, indicating a departure from the past.<sup>21</sup> The adoption of such

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<sup>14</sup> [“Military and Security Developments Involving the People’s Republic of China”](#), A Report to Congress, US Department of Defense, 2023.

<sup>15</sup> Jeffrey Lewis, [“China’s Orbital Bombardment System Is Big, Bad News—But Not a Breakthrough”](#), *Foreign Policy*, 18 October 2021.

<sup>16</sup> [“World Nuclear Forces”](#), *SIPRI Yearbook 2024*, 17 June 2024.

<sup>17</sup> [“Military and Security Developments Involving the People’s Republic of China”](#), no. 14.

<sup>18</sup> [“World Nuclear Forces”](#), no.16.

<sup>19</sup> William J. Broad, Chris Buckley and Jonathan Corum, [“China Quietly Rebuilds Secretive Base for Nuclear Tests”](#), *The New York Times*, 9 January 2024.

<sup>20</sup> Yuki Kobayashi, [“China’s Fast Breeder Reactor Operating? Possibility of Accelerating Nuclear Arms Race”](#), Sasakawa Peace Foundation, 30 November 2023.

<sup>21</sup> [“Military and Security Developments Involving the People’s Republic of China”](#), no. 14.

a posture would enable China to launch a nuclear attack even on suspicion of an incoming missile which may or may not be nuclear-tipped. Also, in such a situation, China will launch a nuclear attack even if the missile has not hit Chinese territory. The DoD report also claims that China has made significant strides in ground and space-based sensor technology, allowing it to implement the LOW posture.<sup>22</sup> Till a few years ago, China would keep its nuclear weapons and delivery systems unmated, thus off-alert. However, the changed nuclear posture indicates a degree of aggression in Chinese nuclear planning.

Even authoritative Chinese sources advocate the adoption of an ‘early warning counterstrike’ posture. The *Science of Military Strategy, 2020*, discusses how the US and Russian nuclear weapons maintain a state of high alert and can carry out nuclear strikes in no time after receiving an order. It further states that China observes a policy of active defence and uses nuclear weapons in a second strike. Thus, the quick nuclear response is a “prerequisite for late development”, and therefore “it is necessary to increase the alertness of the strategic missile force and always maintain a high alert state”.<sup>23</sup>

## Drivers behind Changing Nuclear Profile

### *The US’ Improved Conventional Capabilities*

On 2 August 2019, the US formally withdrew from the Intermediate-Range Nuclear Forces (INF) Treaty, which allowed the Pentagon to develop intermediate-range missiles. The Treaty had banned the US and the then Soviet Union from developing ground-launched ballistic and cruise missiles having a range of 500 to 5500 km. After the exit from the Treaty, the then-US Defense Secretary Mark Esper made clear that the US wanted to deploy conventional intermediate-range missiles in the Indo-Pacific region.<sup>24</sup>

Meanwhile, the Treaty proved a blessing in disguise for Beijing as it developed its arsenal of intermediate-range missiles. However, the US could catch up with China and, in 2023, Gen. Charles Flynn, Commanding General of the United States Army Pacific, declared the US’ intentions to deploy the land-based Tomahawks (2500km) and SM-6s (370km) missiles in the Indo-Pacific.<sup>25</sup> He also sounded the possibility of deployment of the Army’s Precision Strike Missiles, which has a range of upwards of

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<sup>22</sup> Ibid.

<sup>23</sup> “[Science of Military Strategy, 2020](#)”, China Aerospace Studies Institute, January 2022.

<sup>24</sup> “[Secretary of Defence Esper Media Engagement En Route to Sydney, Australia](#)”, US Department of Defense, 2 August 2019.

<sup>25</sup> Patrick Tucker, “[US to Deploy New Land-based Missiles, Army’s Pacific Commander Says](#)”, *Defense One*, 19 November 2023.

499 km.<sup>26</sup> In April 2024, the US military confirmed the deployment of the Mid-Range Capability missile system ‘Typhoon’ in Luzon, the Philippines, as part of joint military exercises called Salaknib 24.<sup>27</sup>

Apart from deploying missiles of intermediate range, the US is also strengthening its Command and Control (C2) capabilities. The DoD is trying to employ the Joint All-Domain Command and Control (JADC2) strategy to ‘identify, organise and deliver improved Joint Force C2 capabilities’.<sup>28</sup> Through the JADC2 strategy, the US is trying to maintain information lead in cyber, space and electromagnetic spectrum by leveraging artificial intelligence and machine learning.<sup>29</sup> Additionally, the US has a robust missile defence system, which it is modernising further. The Chinese security mandarins perceive the superior conventional capabilities of the US as a threat to China’s strategic deterrent.<sup>30</sup>

### ***Tactical Nuclear Weapons***

In addition to strengthening conventional capabilities, there is a talk in the US strategic circles about the development of low-yield tactical nuclear weapons. Elbridge Colby, Deputy Assistant Secretary of Defence for Strategy and Force Development in the Trump administration, argued for the US to develop “low-yield tactical nuclear weapons and associated strategies that could help blunt or defeat a Russian or Chinese attack on U.S. allies without provoking a nuclear apocalypse”.<sup>31</sup> Similarly, Gregory Weaver, former Deputy Director, Joint Chiefs of Staff Directorate for Strategic Plans and Policy (J5), DoD, argued in 2023 that “in order to prevent war and escalation in war, US policymakers and military planners must take the role of nuclear weapons in a Taiwan conflict seriously... The United States should reevaluate its theatre nuclear capability requirements...”.<sup>32</sup>

Although the 2022 Nuclear Posture Review (NPR) does not explicitly mention the development of low-yield weapons, the 2018 edition of the same report suggested that the US should consider the option of developing low-yield nuclear weapons “for the preservation of credible deterrence against regional aggression”.<sup>33</sup> Thus, China

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<sup>26</sup> Ibid.

<sup>27</sup> [“US Army’s Mid-Range Capability Makes Its First Deployment in the Philippines for Salaknib 24”](#), US Indo-Pacific Command, US Department of Defense, 15 April 2024.

<sup>28</sup> [“Summary of the Joint All-Domain Command and Control \(JADC2\) Strategy”](#), US Department of Defense, March 2022.

<sup>29</sup> Ibid.

<sup>30</sup> Henrik Stålhane Hiim, M. Taylor Fravel and Magnus Langset Trøan, [“The Dynamics of an Entangled Security Dilemma: China’s Changing Nuclear Posture”](#), *International Security*, Vol. 47, No. 4, Spring 2023.

<sup>31</sup> Elbridge Colby, [“If You Want Peace, Prepare for Nuclear War”](#), *Foreign Affairs*, 15 October 2018.

<sup>32</sup> Gregory Weaver, [“The Role of Nuclear Weapons in a Taiwan Crisis”](#), Atlantic Council, 22 November 2023.

<sup>33</sup> [“Nuclear Posture Review, 2018”](#), US Department of Defense, February 2018.



has strong grounds to believe that the US is contemplating the development of tactical nuclear weapons, lowering the threshold for nuclear first use. By such means, China can be subjected to nuclear coercion. Therefore, a section of experts in China believes that the employment of low-yield weapons by the US, together with a robust missile defence system, would render the Chinese second strike ineffectual in the war scenario.<sup>34</sup>

### **Taiwan**

Xi Jinping has sworn to annexe Taiwan by force, if necessary. Most recently, he reiterated the proposition of unification of Taiwan during his meeting with former Taiwanese President Ma Ying-jeou in April 2024.<sup>35</sup> In a report to the 20<sup>th</sup> National Congress of the Communist Party of China in October 2022, Xi openly threatened Taiwan, saying that China “will never promise to renounce the use of force, and we reserve the option of taking all measures necessary”<sup>36</sup> to reunify Taiwan. Subsequently, Beijing’s large-scale campaign of political, economic and cognitive warfare and near-daily military intimidation points to Chinese belligerent intentions towards Taiwan. What has prevented China from taking military action against Taiwan so far is the fear of military escalation with the US, which is associated with Taipei through the Taiwan Relations Act of 1979.

One of the clauses of the Act empowers the US president ‘to inform the Congress promptly of threats to the security or the social or economic system of the people on Taiwan, and any danger to the United States interests arising from such threats. [It also] specifies that the President and the Congress shall determine the appropriate action in response to any such danger’.<sup>37</sup> Several Chinese scholars and members of the strategic community worry that a war scenario over Taiwan may escalate, and the US might use nuclear weapons in case of escalation.<sup>38</sup> Thus, by expanding the nuclear arsenal, both quantitatively and qualitatively, China wants to dissuade the US from getting involved in its Taiwan unification bid. By deterring the US from making use of the nuclear option, China is seeking “freedom of action to initiate and escalate military actions, against Taiwan”.<sup>39</sup>

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<sup>34</sup> Henrik Stålhane Hiim, M. Taylor Fravel and Magnus Langset Trøan, [“The Dynamics of an Entangled Security Dilemma: China’s Changing Nuclear Posture”](#), no. 30.

<sup>35</sup> Wang Qi, [“Xi Stresses Shared Culture and History in Meeting with Ma”](#), *Global Times*, 10 April 2024.

<sup>36</sup> [“Key Points from Xi Jinping’s Report to 20th CPC National Congress”](#), International Department, Central Committee of CPC, 17 October 2022.

<sup>37</sup> [“Taiwan Relations Act”](#), US Congress, 1979.

<sup>38</sup> Henrik Stålhane Hiim, M. Taylor Fravel and Magnus Langset Trøan, [“The Dynamics of an Entangled Security Dilemma: China’s Changing Nuclear Posture”](#), no. 30.

<sup>39</sup> David C. Logan and Phillip C. Saunders, [“Discerning the Drivers of China’s Nuclear Force Development: Models, Indicators, and Data”](#), National Defence University Press, 26 July 2023.

### **Great Power Status**

Chinese leadership has historically placed a political premium on the possession of nuclear weapons. Mao Zedong in 1964, felt that China should possess nuclear weapons sooner, which would increase its standing in the world.<sup>40</sup> Similarly, Deng Xiaoping, Jiang Zemin and Hu Jintao correlated possession of nuclear weapons with great power status.<sup>41</sup> In the same vein, Xi referred to the PLA Rocket Force as a force that is a “core force of strategic deterrence, a strategic buttress to the country's position as a major power, and an important building block in upholding national security”<sup>42</sup> during the inauguration ceremony of the PLA Rocket Force in October 2016. Therefore, there is a strong belief at the highest levels in China that the presence of nuclear weapons elevates the country’s global standing.

### **What It Means for India**

China always had more nuclear weapons than India. However, the difference between the two was never as huge as it is today, and the gap will widen further in the coming years. Moreover, India needs to factor in Pakistan as well while thinking about nuclear warhead numbers. Although India need not match the combined numbers of China and Pakistan, India should have enough stockpiles to face the two-front war without being subjected to nuclear coercion by the enemy.

Given India’s no-first-use policy and smaller arsenal than China's, India needs to disperse its nuclear warheads and launchers innovatively throughout the country to survive the first strike. K. Subrahmanyam had recommended that India possess 500 warheads dispersed over vast areas to have a credible deterrent.<sup>43</sup> Further, the country must also have ballistic missile submarines (SSBNs) to make the deterrence look credible and robust.<sup>44</sup>

Given that the US is discussing deploying low-yield nuclear weapons, China is likely to build its own tactical nuclear weapons in the times to come. India needs to be ready to deal with such a scenario. The India–China nuclear dyad has already entered a classic stability–instability paradox. There is less likelihood of nuclear

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<sup>40</sup> Tong Zhao, “[Political Drivers of China’s Changing Nuclear Policy: Implications for U.S.-China Nuclear Relations and International Security](#)”, Carnegie Endowment for International Peace, 17 July 2024.

<sup>41</sup> Ibid.

<sup>42</sup> “[China Inaugurates PLA Rocket Force as Military Reform Deepens](#)”, *People’s Daily Online*, 2 January 2016.

<sup>43</sup> K. Subrahmanyam, “India’s Response” in K. Subrahmanyam (ed.), *India and the Nuclear Challenge*, Lancer International, 1986, p. 276.

<sup>44</sup> Gurmeet Kanwal, “[India’s Nuclear Force Structure 2025](#)”, Carnegie Endowment for International Peace, 30 June 2016.



confrontation. This increases the chances of conventional confrontation. With nuclear stability at a strategic level, India needs to hone its conventional capabilities.

## **An Assessment**

The growth of the Chinese nuclear arsenal is due to threat perceptions from the US. China is moving away from the minimum deterrence policy. Although ‘minimum’ is a subjective term, the sheer number of estimated warheads is huge and is increasing every year. The character of the arsenal is changing with the diversification of all three legs of the triad. There has been a marked improvement in both conventional and nuclear capabilities in terms of precision, mobility and technology.

Technological advances are enabling the PLA to be equipped with hypersonic weapons systems, MIRVs and FOBS. At the operational level, the nuclear forces are on high alert. The decision to retaliate in quick time, based on the warning of incoming missiles by sensors, may lead to miscalculations affecting strategic stability. Further, the risk of accidents increases due to Beijing’s relative inexperience in handling strategic weapons on a hair-trigger alert.

Although the country has not changed the no-first-use principle, the LOW posture and huge number of warheads may enable it to strike first effectively. China is clearly entering into an arms race with the US and Russia, which is contrary to its pledge of not engaging ‘in any nuclear arms race with any other country’, as described in the Defence White Paper of 2019. The Pentagon’s increased conventional and nuclear capabilities have played an important role in changing the nature of China’s nuclear arsenal. Additionally, China fears the US’ intervention in case of forceful unification of Taiwan, where it wants to operate without fear of nuclear blackmail from its adversaries.

The country’s astonishing rise in its nuclear warhead numbers is also connected with the leadership’s desire to be counted as a great power. Apart from increasing numbers, China has made impressive inroads on the technological front. The qualitative and quantitative advances in the Chinese nuclear arsenal is creating a huge gap between Indian and Chinese nuclear numbers, which will make New Delhi susceptible to nuclear blackmail. Therefore, India needs to continuously assess the sufficient numbers required for a credible second strike.

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