

Modernisation Programmes of the US Armed Forces – Gearing Up for ‘Great Power Competition’

On February 10, 2020 the US President Donald Trump submitted the 2021 defence budget proposal to the Congress in compliance with the constraints imposed by the Bipartisan Budget Act of 2019. The Department of Defense is expected to receive US\$ 705.4 billion out of US\$ 740.5 billion for national security. The major goal of the proposed budget is the implementation of the National Defense Strategy, which is primarily concerned with the ‘great-power competition’ – particularly against China and Russia that possess comparable military capabilities to the United States.

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The FY 2021 DoD budget is presumed to increase by only 0.1 percent (from US\$ 704.6 billion in FY 2020 excluding natural disaster emergency funds), which means that the military spending will decrease in real terms given that the projected inflation rate in 2021 should reach 1.9 percent. The defence budget still requires budget resolutions, which should be submitted by both houses of the Congress, as well as a conference report to reconcile all differences between the two versions of the budget approved by the Senate and the House of Representatives. In the next phase, the Congress drafts appropriation bills, which need to be signed by the president. If all attempts to pass the bills related to defence and other federal administration spending end in failure by the start of a new fiscal year, the US federal government is forced to enter a shutdown.

The primary objectives of the 2021 defence budget are concerned with improving military readiness and implementing military modernisation programmes to maintain the dominance of the US Armed Forces in all domains by prioritising nuclear deterrence, air defence as well as supporting the development of the next-generation technologies. The

military investments – including arms procurement and R&D – are estimated at US\$ 243.4 billion.

Table 1. US Military Modernisation Programmes

Modernisation Programmes	FY 2021 Budget US\$ billion	FY 2022 Budget US\$ billion (Request)
Nuclear Forces		
Ground-Based Strategic Deterrent	0.6	1.5
Long-Range Stand-off Missile	0.7	0.5
Long-Range Strike Bomber B-21	3.0	2.8
Columbia-Class Ballistic Missile Submarine	2.4	4.4
Nuclear Command. Control and Communications	3.5	4.2
Trident II Ballistic Missile Modifications	1.2	1.2
Air Defence		
Ground-based Midcourse Defense and Next Generation Interceptors	2.2	1.7
SM-3 IIA & IB Sea-Based Interceptors		0.6
Aegis Ballistic Missile Defense	1.0	1.1
THAAD Air Defense System	(39 interceptors) 0.7	(41 interceptors) 0.9
PATRIOT Air Defense System/PAC-3	0.7	0.8
US Air Force & Others		

F-35	(98 units) 12.6	(79 units) 11.4
KC-46	(12 units) 2.2	(15 units) 3.0
F-15EX	(8 units) 1.1	(12 units) 1.6
Combat Rescue Helicopter	(12 units) 1.1	(19 units) 1.3
V-22 Osprey	2.1	(9 units) 1.8
C-130J Hercules	(20 units) 2.4	(9 units) 1.3
US Navy & US Marine Corps		
Gerald R. Ford-Class Aircraft Carrier	(1 unit) 2.5	3
Virginia-Class Submarine	(2 units) 8.8	(1 unit) 4.7
FFX Fritgate	(1 unit) 1.3	(1 unit) 1.1
Arleigh Burke-Class Destroyers	(3 units) 6.2	(2 units) 3.5
CVN Refueling Complex Overhaul	0.7	2.1
Landing Platform Dock Ship	0.6	(1 unit) 1.2
F/A-18 E/F Super Hornet	(24 units) 2.0	(24 units) 2.0
P-8A Aircraft	(9 units) 1.8	0.3
2D Advanced Hawkeye	(6 units) 1.4	(4 units) 1.0
CH-53K King Stallion	(6 units) 1.6	(7 units) 1.6
Amphibious Combat Vehicle	0.4	(72 units) 0.5

US Army & Others		
Joint Light Tactical Vehicle	(5,009 units) 1.6	(4,247 units) 1.4
Modernisation of M-1 Abrams Main Battle Tank	(165 units) 2.2	(89 units) 1.5
Paladin M109A7 Howitzer	0.8	0.9
Modernisation of Stryker Infantry Carrier Vehicle	(143 units) 1.2	(154 units) 1.1
AH-64E Attack Helicopter	(49 units) 1.1	(52 units) 1.2
UH-60 Black Hawk	(99 units) 1.7	(60 units) 1.0
AMPV (Armored Multi-Purpose Vehicle)	(121 units) 0.5	(32 units) 0.3
Missiles & Munitions		
JDAM (Joint Direct Attack Munitions)	(28,388 units) 1.1	(20,338 units) 0.5
GMLRS (Guided Multiple Launch Rocket System)	(8,523 units) 1.3	(7,360 units) 1.2
Standard Missile-6	(125 units) 0.7	125 units) 0.8
JASSM (Joint Air-to-Surface Standoff Missile)	(390 units) 0.6	(400 units) 0.6
Long Range Anti-Ship Missile	(17 units) 0.2	(53 units) 0.2
Tomahawk	(90 units) 0.7	(203 units) 0.6
Cyberspace	3.0	3.0
Space-Based Systems		15.4

Source: Department of Defense of the United States

https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/fy2021_Weapons.pdf

Priorities of the Department of Defense

The 2021 defence budget proposal contains 2,586 modernisation-related programmes, projects, and activities, including 88 Major Defense Acquisition Programs (MDAP) which are supervised by the Department of the Army (17 programmes), Navy (30), and the Air Force (38).

Nuclear Deterrence

The National Defense Strategy stipulates that nuclear deterrence is a top priority of the Department of Defense. In response to the findings of the 2018 Nuclear Posture Review regarding elasticity and diversification of the US nuclear arsenal, the Pentagon has implemented a number of nuclear-weapons modernisation programmes that embrace all branches of America’s nuclear triad. By the late 2020s, the US Armed Forces are expected to acquire a new-generation land-based intercontinental ballistic missile – known as Ground Based Strategic Deterrent (GBSD) – to replace the LGM-30 Minuteman III missiles. By the end of 2020, the GBSD is scheduled to obtain the Milestone B approval, which will initiate the Engineering and Manufacturing Development phase of the programme. The Long-Range Stand Off (LRSO) programme is another effort to strengthen the US nuclear deterrence capabilities. The LRSO is a new long-range cruise missile that will replace the AGM-86B whose production began in the early 1980s. The LRSO design should allow the B-52 and future B-21 bombers to operate and launch missiles outside the range of the enemy’s integrated air defence systems and effectively penetrate them. Currently, the programme is in the Technology Maturation and Risk Reduction (TMRR) phase with the Milestone B decision expected in 2022.

The US Air Force is also involved in the F-35A Dual-Capable Aircraft programme aimed at integration of the aircraft with tactical gravity bombs as well as the refurbishment of the B61 nuclear bombs according to the Mod 12 LEP standard. Boeing’s Tail Kit Assembly programme, whose main goal is to increase safety and reliability of the B61 bombs, has obtained the Milestone C approval in 2018, which initiated its Production and Deployment Phase.

The construction of 12 Columbia-class strategic ballistic missile submarines (SSBN) is the most significant nuclear-weapon modernisation programme as far as the US Navy is

concerned. The new-generation SSBNs, whose main purpose is to replace the Ohio-class submarines, are expected to enter service from 2030 onwards. In January 2017, the programme received the Milestone B approval. The construction of the first vessel should begin in FY 2021. Simultaneously, the Trident II (D5) ballistic missiles deployed on 14 Ohio-class submarines are undergoing the Life Extension Programme. The Trident II missiles will also be integrated with the future Columbia-class submarines.

The Nuclear Command, Control, and Communications (NC3) is a common programme for all branches of the US Armed Forces, whose major purpose is to ensure efficient and safe communication between the political authorities and all components of the nuclear triad.

The United States is also involved in the development of hypersonic weapons although this kind of systems will not serve the purpose of nuclear deterrence. The Department of Defense has decided to accelerate the R&D programmes in the field of hypersonic missiles due to China’s and Russia’s recent technological advances. According to the US administration, the DoD intentionally chose to not develop hypersonic weapons to avoid another arms race despite its past technological superiority in this field. Currently, each branch of the US Armed Forces has its own hypersonic-weapon development programme adjusted to its specific needs, for instance, the Long-Range Hypersonic Weapon (LRHW) with a range of over 2,000 km for the US Army and the Navy Conventional Prompt Strike programme for the US Navy. The two missile systems will share the same design based on a Common-Hypersonic Glide Body – whose the last recent test was conducted on 19 March 2020 – and the propulsion system. The main difference is the use of various types of launchers tailored for the requirements of the final user. Hypersonic weapons are also being developed for the Air Force; the AGM-183 (Air-Launched Rapid Response Weapon, ARRW also known as an “arrow”) has an operational range of 1,000 km and can reach a maximum speed of Mach 20. The Defense Advanced Research Projects Agency (DARPA) is also involved in those efforts and is currently working on a number of other projects such as Hypersonic Air-breathing Weapon Concept, Tactical Boost Glide, Operational Fires programmes.

Missile Defence

The top modernisation-related priorities of the United States, as far as the missile defence systems are concerned, were defined in the Missile Defense Review 2019 that underlined the significance of the multi-layered approach to air defence based on the following

principles: a) flexibility and adaptability; b) interoperability and integration of both offensive and defensive capabilities; and c) space-based defence. The air defence-related programmes are conducted by the Missile Defence Agency (MDA) which operates under the auspices of the Department of Defense. Currently, the most complex MDA programme is the development of the new-generation interceptor, a key component of the Ground-based Midcourse Defense intended to protect the territory of the United States against intercontinental ballistic missiles, which are very difficult to detect and intercept due to the speeds that they can reach. It is also worth noting the development and tests of the SM-3 Block IIA missile, a new interceptor of the Aegis Ballistic Missile Defence. The progress of this programme is of particular importance from Polish perspective given that the SM-3 Block IIA missiles will be deployed in the Aegis Ashore site at Redzikowo, Poland. There are also plans to develop a new interceptor for the Terminal High Altitude Area Defense (THAAD) system whose tests are scheduled to begin in FY 2023.

The Department of Defense is also working on the Integrated Air-and-Missile Defense (IAMD) system that will provide air defence capabilities against short, medium, and intermediate-range missiles in a regional domain based on the integration of various American systems, such as THAAD and PATRIOT, with allied air defence sensors and interceptors. The Lower Tier Air and Missile Defense Sensor (LTAMDS) programme conducted by the US Army, is another important contribution to the IAMD given that its primary objective is development of a new radar technology for the PATRIOT systems. In 2019, the US Army selected Raytheon's LTAMDS concept and rejected proposals submitted by Lockheed Martin/ELTA Systems and Northrop Grumman. According to Raytheon, the delivery of the first LTAMDS is expected in 2021. The radar's design is based on gallium nitride (GaN) technology with three radar panels that provide 360-degree detection. The same radar will be applied in the final variant of Poland's PATRIOT air defence system selected in the "Wisła" programme.

To address the growing threat of hypersonic weapons, the MDA has initiated the Hypersonic Defense Regional Glide Phase Weapon System (RGPWS) programme. In early 2020, the MDA released the Draft Request for Prototype Proposal (DRPP) and announced that one or more participants might get the contract for the design, development, and construction of the prototype. Furthermore, five projects submitted by Lockheed Martin, Boeing, and Raytheon compete in the Hypersonic Defense Weapon System programme,

which was launched in 2018. DARPA’s Glide Breaker programme is another effort to develop a defence system against hypersonic missiles.

Programmes of the US Army and joint programmes in the land dimension

As far as the priorities of the US Army are concerned, the modernisation is focused on lethality and survivability of brigade combat teams. Therefore, the US Army is upgrading its M1 Abrams main battle tanks to the M1A2C SEPv3 configuration and is introducing a new generation of Paladin howitzers in the M109A7 variant whose full-rate production commenced in 2019. So far the US Army has ordered 204 out of 689 planned sets of howitzers and M992A3 tracked ammunition carrier vehicles. The US Army also started replacing the M113 vehicles with the Armoured Multi-Purpose Vehicle (AMPV) based on the platform of Bradley Fighting Vehicle. The AMPV programme is conducted within the broader context of the Next-Generation Combat Vehicle programme whose major purpose is to replace a variety of older vehicles used by the US Army.

It is also worth noting that the very Bradley Fighting Vehicle (BFV) is awaiting its replacement. To achieve that goal, the Pentagon launched the Optionally Manned Fighting Vehicle (OMFV) programme which has failed to provide the US Army with satisfactory options. The Pentagon had expected to receive the prototypes of the OMFV by October 2019; however, only the General Dynamics Land Systems managed to submit a proposal, which ruled out any chance of competition in the procurement process. Therefore, the US army has been forced to find another way to procure the replacement system for the BFV. Nevertheless, an attempt to acquire a Joint Light Tactical Vehicle for the US Army and the Marine Corps (as a replacement of the HMMWV vehicles) turned out to be successful. In May 2019, the Oshkosh Defense, the manufacturer of JLTV, initiated the full-rate production of the vehicle.

Furthermore, the US Army continues the modernisation of 154 Stryker vehicles – which involves the integration of 30mm cannons and a modified anti-tank missile system – as well as an upgrade of 50 Apache attack helicopters in the framework of the AH-64E programme. The modification, conducted by Boeing, includes improved flight performance, new open architecture computer systems, as well as an ability to control unmanned aerial vehicles (UAV) and share targeting data through the Link 16 system. The US Army is also modernising its UH-60L fleet to the UH-60V standard and has ordered additional helicopters in both M and V variants. The UH-60 will be replaced by the Future Long-Range

Assault Aircraft (FLRAA). The US Army is expected to select the final type of the aircraft by 2022 depending on the outcome of the competition between Sikorsky-Boeing SB-1 Defiant and Bell Textron V-280 Valor. The FLRAA is a component of the Future Vertical Lift (FVL) programme whose major goal is to replace various types of aircraft that are currently being operated by the US Armed Forces.

The Precision Strike Missile (PrSM), another important programme of the US Army, will be mounted on the High Mobility Artillery Rocket System (HIMARS) and the Multiple Launch Rocket System (MLRS) and will replace the TACMS/ATACMS missiles. The new missile, which is being developed by Lockheed Martin, will be capable of attacking targets in a range of 60-499 km. The Milestone B decision for this programme is expected in FY 2021.

Programmes of the US Navy and the US Marine Corps

According to the National Defense Authorization Act 2018, the surface fleet of the US Navy should increase to 355 vessels of various classes. Besides the aforementioned Columbia-class submarines, the development and construction of the Gerald R. Ford-class – nuclear powered aircraft carriers that will replace the Nimitz-class – is one of the most expensive US Navy programmes. The new aircraft carriers have extended combat capabilities thanks to the Electromagnetic Aircraft Launch System (EMALS), improved working and life conditions for the crew, and require less maintenance than the Nimitz-class. The lead ship of the class USS Gerald R. Ford was formally commissioned in 2017; the second vessel USS John F. Kennedy was launched in 2019 but has not entered service so far; the construction of the third aircraft carrier, USS Enterprise, started in 2017.

The US Navy has also ordered the new version of the Virginia-class Block V nuclear-powered cruise missile fast-attack submarines that also support special operations. Compared to the previous generations, the Block V variant has an additional module that allows the boat to carry more cruise missiles and provides extended capabilities as far as special operations are concerned. The modernisation programme is intended to fill gaps in the US Navy capabilities after the decommissioning of the 4 Ohio-class cruise missile submarines, which will begin being phased out in the late 2020s.

Currently, the US Navy is considering a service life extension (from 35 to 45 years) for the oldest Arleigh Burke-class guided missile destroyers. However, it is very unlikely that the Flight I and Flight II vessels will be included in the programme. Consequently, the US Navy will have to phase out from 2 to 4 ships a year throughout the 2030s. Nevertheless, the

Navy is planning to order additional Flight III variant vessels equipped with the AN/SPY-6(V) radars that have improved capabilities to counter air, sea, and ballistic threats.

Due to the failure of the Littoral Combat Ship (LCS) programme, the Navy has shifted its focus to the development and construction of the new-generation frigates known as FFG(X). The new multi-mission guided-missile frigate is expected to be more cost-efficient when it comes to construction and maintenance than the LCS. It is hoped that the programme will make the goal of 355 surface ships more feasible. The procurement of FFG(X) also shows that the US Navy has changed its priorities due to the growth of China’s anti access/area denial capabilities and will tend to purchase a greater number of cheaper ships rather than fewer large and expensive vessels. The issue of cost-efficiency is also the major reason why the US Navy opted for development of the Unmanned Surface Vessel programme.

Programmes of the US Air force and joint programmes in the air dimension

As far as combat jets are concerned, it is worth mentioning the ongoing F-35 Lightning II programme. All three variants of the 5th generation fighter have achieved the initial operational capability (IOC): F-35B in July 2015, F-35A in August 2016, and F-35C in February 2019. The F-35 aircraft has entered service in the US Air Force (F-35A) as the replacement of F-16 and A-19; the US Marine Corps (F-35B) as the replacement of AV-8B; and the US Navy as the replacement of F/A18A/C/D. The decision regarding the full-rate production of the aircraft is expected in 2020. According to Lockheed Martin, the price of the F-35A Block 3F variant has decreased to USD80 million per unit in Lot 13. Further upgrades of the aircraft, including new weapons, are expected in the Block 4 version. It is expected that the programme will achieve 100 percent rate of on-time deliveries and that the F-35 fleet should hit the 80 percent readiness rate. Nevertheless, the F-35 programme is facing a number of challenges. The DoD Test and Evaluation Office has pointed out issues with the implementation of the Continuous Capability Development and Delivery (C2D2), based on agile software development model, as well as the Autonomic Logistics Information System (ALIS). The C2D2 process allows incremental software updates that can be delivered every six months in order to achieve Block 4 capabilities. On the other hand, the major purpose of ALIS is to support mission planning as well as diagnostics and maintenance; however, the auditors from the Pentagon and the Government Accountability Office (GAO, a government auditing agency that provides investigative services for the Congress) criticised the system

development process for constant delays as well as its instability and unsatisfactory functionality. The US Air Force has also ordered the first batch of F-15EX air superiority fighters as well as Boeing KC-46 Pegasus aerial refuelling transport aircraft, which is based on Boeing 767 and is supposed to replace the KC-135 Stratotanker. According to the Pentagon’s plans, the US Air Force should receive 144 F-15EX and 179 KC-46 in years to come. It is also worth mentioning the development of the B-21 Rider, a long-range bomber able to penetrate the adversary’s air defence systems whose primary task will be conducting both conventional and nuclear strikes. The aircraft is expected to achieve an initial operational capability in the mid 2020s. The US Air Force should receive approximately 100 units that will be deployed in three air force bases (Dyess, Texas; Ellsworth, South Dakota; and Whiteman, Missouri). Northrop Grumman was selected as the main contractor of this programme. Last but not least, an extensive modernisation programme of the ageing B-52 fleet is being conducted, which means that the aircraft will remain the backbone of the US strategic bomber force in the foreseeable future.

Prospects of Success

The United States has launched a number of complex and expensive modernisation programmes whose main objective is either direct procurement or development of new military combat systems. There are two major reasons why the Department of Defense has to deal with them right now. First, the majority of the current military equipment of the US Armed Forces entered service in the last years of the Cold War, during Ronald Reagan’s presidency and there was no need to replace those systems given a lack of major conventional threats for the United States. Second, the United States is facing another arms race with China and – to a certain extent – with Russia. Considering the advances of the two superpowers when it comes to the quantity or even the quality of the military equipment, the United States is forced to invest in new, modern technologies that could balance the adversary’s quantitative advantage over the US military.

However, a great number of modernisation programmes and their costs may force the US administration to cut orders and thus reduce the operational military inventory. Such decisions can lead to the internal disarray (for instance, a political controversy over the future of the A-10 Thunderbolt II, a minimum number of aircraft carriers or the modernisation programme of the Arleigh Burke destroyers) or discontent among the US allies (the aforementioned reductions could undermine the capacity of the US military to

conduct expeditionary operations). The COVID-19 pandemic and its economic implications may even strengthen the pressure to cut the US military budget. According to the International Monetary Fund, the US economy is expected to contract by 6 percent in 2020. Given the aforementioned macroeconomic conditions, the Pentagon could lose even US\$ 70 billion in FY 2020.

Conclusions

1. On February 10, 2020 the US President Donald Trump submitted the 2021 defence budget proposal to the Congress. The primary objectives of the 2021 defence budget are concerned with improving military readiness and implementing military modernisation programmes to maintain the dominance of the US Armed Forces in all domains by prioritising nuclear deterrence, air defence as well as supporting the development of the next-generation technologies.
2. The 2021 defence budget proposal contains 2,586 modernisation-related programmes, projects, and activities, including 88 Major Defense Acquisition Programs (MDAP) which are supervised by the Department of the Army (17 programmes), Navy (30), and the Air Force (38).
3. There are two major reasons why the Department of Defense has to deal with such a great number of modernisation programmes right now. First, the majority of the current military equipment of the US Armed Forces entered service in the last years of the Cold War, during Ronald Reagan’s presidency and there was no need to replace those systems given a lack of major conventional threats for the United States. Second, the United States is facing another arms race with China and – to a certain extent – with Russia.
4. However, a great number of modernisation programmes and their costs may force the US administration to cut orders and thus reduce the operational military inventory. Such decisions can cause internal political controversies or discontent among the US allies. The COVID-19 pandemic and its economic implications may even strengthen the pressure to cut the US military budget.

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