

**Lightning in a Bottle:  
The Future of the F-35 Program as  
a Tool of American Strategy**

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**Final Policy Report**



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To: Secretary of State, Marco Rubio  
From: Wells Benjamin, Student, University of Georgia, Master of International Policy Program  
Subj: Final Policy Report: F-35 Industrial and Organizational Concerns

### **Executive Summary (ESH)**

The F-35 Lightning II's unmatched qualitative advantage is the linchpin of American security, demanding direct policy action to secure its success across the military and industrial domains (**BLUF**). Ensuring the continued success of the F-35 program in industrial, diplomatic, and military domains is critical to the United States' ability to deter or defeat peer adversaries (**WIFFM**). This policy report will provide context for the F-35 program's history and current state, as well as unique capabilities offered by the platform. Then offer tailored policy solutions for the future of this advanced fighter jet (**Agenda**).

#### **I. History of the F-35 Program: Drafting the Quarterback**

This section examines the history of the F-35 program, tracing the evolution of airpower over the late Cold War. It then examines the nature of F-35 production and major challenges within the program.

##### **a. The Transition to 5th Generation Aircraft**

The United States has maintained a powerful air force as the cornerstone of its military capabilities since the Second World War. After the mixed results of the Vietnam air campaign, the US engaged in a period of airpower soul-searching. The old concept of massive

bombardment for strategic effects was replaced with a focus on using airpower to achieve tactically decisive effects that underpinned greater operational successes (Plessas, 2017). The development of Soviet radar-guided surface-to-air missile (SAM) platforms during the Cold War pushed American aircraft designers towards pursuing stealth technology, learning from the lessons of Vietnam and the Yom Kippur War (Rao & Mahulikar, 2002). While the SR-71 incorporated early stealth characteristics, its primary defensive measures of extreme speed and altitude limited employment to an Intelligence, Surveillance, and Reconnaissance (ISR) role. It was not until the F-117 was deployed in the 1980s that a stealthy strike fighter entered the battlespace. The F-117 provided a decisive operational advantage to the US, and when coupled with newly developed precision-guided weapons, proved revolutionary. During Operation Desert Storm, the F-117 demonstrated a revolutionary capability, comprising 4% of the American air fleet, it undertook 40% of strategic bombing missions during the war, without losing a single aircraft (Rao & Mahulikar, 2002). The capability of stealth aircraft to safely penetrate enemy airspace was a crucial enabler for maneuver-based operations that relied on decisive deep strikes to allow for breakthrough attacks. The F-117 was extremely capable at suppression of enemy air defenses (SEAD) missions and was a technological milestone in the precision strike revolution of the 1990s (Krepinevich, 2023).

### **b. Building on the F-22**

This early stealth revolution marked a historical milestone in military affairs, for the first time in history, airpower could deliver effects with near total impunity (Mahnken, 2014). 1997 marked another milestone of the stealth revolution, with the B-2 bomber becoming the world's first 5th-generation aircraft.

Aircraft Generation	Defining Traits	Examples
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4th (1970s–1990s)	High maneuverability, digital fly-by-wire, advanced radar and avionics, composite materials, multirole design, early stealth features	F-16, Su-27, F-117*, SR-71*
5th (2000s–present)	Full stealth, internal weapons bays, sensor fusion, supercruise, networked situational awareness	F-22*, F-35*, J-20*
6th (2030s–future)	AI onboarding, drone teaming, adaptive cycle engines, full spectrum networking, optionally manned capability	F-47*, F/A-XX*, Tempest*, J-50*

**Fig 1.1** Fighter Aircraft Generations Table: *While aircraft generations represent a loose system of classification, they are useful for a general understanding of technological progression in the space. American aircraft are highlighted in blue, non-American Western aircraft in green, and Soviet Bloc/Chinese aircraft are highlighted in red. Stealth aircraft are marked by an asterisk (IRIA Staff 2024).*

Building on the B-2 and F-117, the F-22 represented a colossal shift. Designed as the ultimate air superiority platform, the F-22 was far stealthier than its predecessors and utilized cutting-edge avionics (Gertler, 2013). Despite its enduring capability, F-22 production was curtailed in the 2000s due to cost overruns and a temporary lack of peer threats (Gertler, 2013). This limitation forced the USAF to confront the difficulty of mass-producing stealth aircraft,

specifically the high production capital, and unique resource constraints associated with exotic materials (Gertler, 2013). The F-35 originated from the Joint Strike Fighter (JSF) program initiated in the early 1990s to develop a multirole stealth fighter characterized by interoperability and multi-decade technological competitiveness (Gertler, 2020). In 2001, Lockheed Martin won the JSF contract, beginning development of the F-35's three distinct variants (Gertler, 2020).

F-35 Variant	Unique Capability	Use Case
A	Primary variant, lightest and least expensive, most exported	Air-to-air combat, strike missions, and multirole operations from standard runways
B	Short Takeoff/Vertical Landing (STOVL), can operate from short runways, amphibious assault ships, or forward bases	Used by US Marine Corps for expeditionary operations, amphibious assaults, and cases where conventional runways are unavailable
C	Carrier Capable, larger wings, longer range, greater fuel capacity	Used by the US Navy for carrier operations, deep strike, and fleet air defense missions

**Fig 1.2** F-35 Variants Table: *Each variant of the F-35 was designed to fill a specific role, representing the design philosophy of interoperability and sustained relevance across branches* (Gertler, 2020).

### c. Design and Production

The F-35 completed its first test flight in 2007 (Gertler, 2020). It stands as the largest procurement project in US history, with a projected lifetime cost exceeding \$2 trillion, and is equally notable as the most international program to date (Gertler, 2009). Eight initial partner nations were brought in to aid in the design and production of the JSF, with the idea that splitting research and manufacturing costs across a distributed network would decrease costs (Gertler, 2009). This marked a sharp turn from the F-22 program that was defined by a total lack of exports or technology sharing, and signaled that the F-35 was meant to be the definitive 5th-generation fighter for the entirety of the American alliance network (Gertler, 2013). Since production scaled up in the 2010s, the program has built 1230 aircraft as of September 2025, making the F-35 the most produced fifth-generation fighter in history. This volume relies on a distributed domestic industrial base. The final assembly plant located in Fort Worth, Texas, works alongside a network of subcontractors across the US (Gertler, 2020). The decentralized network is designed to reduce production bottlenecks through increased shock resilience and spread economic benefits throughout the US. A vast majority of components within an F-35 jet are designed and produced domestically or within a partner nation; however, significant resource challenges remain from particular resource supply chains (GAO, 2025).

#### **d. Challenges**

While the F-35 program has been successful in producing a capable replacement for a majority of American and allied air fleets, it has also run into considerable challenges throughout its lifespan. This section touches on the challenges seen throughout the JSF program, many of which persist into today.

##### *I. Raw Material Acquisition*

The F-35's advanced technology relies on diverse, exotic materials, creating significant bottlenecks that currently impede production rates and force readiness (GAO, 2025). A substantial portion of the rare earth minerals essential for key components is monopolized by an

increasingly hostile China. Current American efforts to catch up in this space are unlikely to yield sufficient results in the near term (Baskaran, 2025). While efforts like the DOW's July 2025 \$400 million investment into a domestic supplier of rare earth magnets are a strong starting point, the situation remains precarious (Baskaran, 2025). More conventional raw materials are also a concern, as demonstrated by the 2023 lawsuit between Lockheed Martin and a titanium supplier over accused price gouging (Brooks, 2023). Global economic shocks like the COVID-19 Pandemic and the Russian invasion of Ukraine have worsened these issues across the defense industrial space (Brooks, 2023). The enormous scale of the JSF program magnifies the inherent risk of material bottlenecks; furthermore, the defense industry's over-reliance on a few critical trade nodes severely heightens vulnerabilities associated with raw material acquisition.

## *II. Technology Transfer*

The F-35 successfully realized its vision as the alliance's common 5th-generation airpower platform. Through procurements, it grants smaller allies otherwise unattainable 5th-generation capabilities. This approach brings inherent risks, given the advanced classified technologies within an F-35. Turkey, a NATO ally and planned F-35 partner, was expelled from the program in 2017 over a planned purchase of Russian SAM systems (Rounds, 2020). Risks extend far beyond just partners, however, and espionage targeting the F-35 has been routine since its inception. A wide-ranging cyber-espionage plot conducted by People's Liberation Army hackers over the course of 6 years stole tens of thousands of files related to classified American aviation technology, and this is one case among many (Kidwell, 2020). These types of attacks have likely contributed to the development of Chinese fifth-generation airframes that represent the greatest challenge to American air dominance, and demonstrate the importance of protecting American intellectual property from industrial espionage (Kidwell, 2020).

## *III. Production Capacity*

Throughout the lifespan of the program, contractors have struggled to meet demand for F-35s. The causes for these issues are varied and range from macroeconomic trends to contractor inefficiencies (GAO, 2025). In the past two years, virtually no aircraft have been delivered at the pace agreed upon in the original order, and this problem is compounded by the continual tech refreshes needed to maintain competitiveness (GAO, 2025). While advanced manufacturing techniques and digital design techniques may reduce the time required to produce a jet in the future, as it stands today, the ability of the American defense industrial base to produce this crucial system is wholly inadequate (GAO, 2025).

#### *IV. Cost Overrun*

The titanic cost of the F-35 program has been widely reported on by mainstream media outlets and has led to considerable public backlash (Zimonjic, 2025). These concerns reflect the growing costs of the program every year, as well as the inability of the Pentagon to properly communicate the details of the program to the American public (GAO, 2025). When inflation is accounted for, the acquisition cost of the JSF program has risen by ~25% from 2001 to 2023, marking an increased real acquisition cost of ~\$200 billion (GAO, 2025). Development and sustainment costs have also risen by ~58% from 2012 to 2023 (GAO, 2025). It is difficult to determine how much of these cost overruns are fair reflections of changing markets and program scope, and how much are due to inefficiency. The actual relationship between increased capability and increased cost remains opaque despite the overall success of the program (GAO, 2025).

#### *V. Peer Adversary Competition*

When the US first flew the F-117 Nighthawk, it was a Sputnik moment in airpower, but the days of an American stealth monopoly are now long gone. While Russia has long attempted to promote itself as a peer in the airpower domain, the Russian Su-57 program has failed to produce more than a dozen flyable aircraft in the past two decades. China, on the other hand, has

had far greater success (Barrie & Thornley, 2024). The People's Liberation Army Air Force (PLAAF) has matured into the most significant competitor to American air dominance in history, with a wide range of modernized aircraft backed by the world's largest industrial base (Barrie & Thornley, 2024). The Chengdu J-20 is marketed as a peer to the F-35, and while any comparison made between the two remains purely speculative, many analysts agree that it may be the nearest peer currently flying in mass (Barrie & Thornley, 2024). Despite advanced capabilities, the J-20 is doctrinally intended to serve as a long range interceptor acting within an A2D2 network, rather than a living battlefield information nexus, negating the qualitative advantage gained by a sensor fused stealth fighter (CSIS, 2021). Chinese aircraft remain a pacing threat and could play a hugely consequential role within any Taiwan scenario.

### **Key Judgement 1: Maintaining the Cutting Edge (KJ1H)**

The F-35 represents the current pinnacle of military aviation, but this status is threatened by industrial and trade concerns (KJ1). If the trade war between the US and China continues to escalate, production bottlenecks may become breaking points. The network of F-35 production as a distributed system may be rendered moot if the raw materials needed for manufacturing are missing. The immense scale of the JSF program has produced an incredible product, but left an Achilles heel in doing so. China represents a persistent threat to the success of the F-35 through the development of competing platforms and rare earth mineral control. Network-wide adjustments may be needed to maintain a competitive edge (E3).

## **II. F-35 Capabilities: We Own the Sky**

This section will examine the role of the F-35 in international alliances, the unique capabilities presented by the aircraft, and operational usage.

### **a. Fighter Diplomacy**

Arms deals have long been used as a means of promoting alliances and pushing soft power alongside hard, and the F-35 represents the pinnacle of this strategy. The history of the

F-35 as a jointly developed and manufactured platform shows that partnerships have always been one of the goals of the program. Beyond the initial cooperation showcased in the program, the F-35 has become widely exported across the globe, and in doing so has reinforced the American sphere of influence substantially (Vucetic & Nossal, 2013). As of November 2025, there are eighteen active operators across three continents.

<b>Country</b>	<b>Variant(s)</b>	<b>Number Ordered</b>
<u>US</u>	A/B/C	~ 2,469
Japan	A/B	147
<u>Italy</u>	A/B	115
<u>Australia</u>	A	72-172
<u>Norway</u>	A	52
<u>Netherlands</u>	A	52
<u>UK</u>	B	74
Israel	I (Israeli variant)	75
South Korea	A	60
<u>Denmark</u>	A	27
<u>Belgium</u>	A	34
<u>Poland</u>	A	32
<u>Finland</u>	A	64

Switzerland	A	36
Germany	A	35
Singapore	B	8-20
<u>Canada</u>	A	88
Romania	A	32-48

**Fig 2.1 F-35 Operators Table:** Over 1250 aircraft have been delivered, with thousands more ordered. Foreign purchases include software upgrades over the fleet lifespan and maintenance assistance. NATO Allies highlighted in Blue, original program partners underlined (GAO, 2020) (Lockheed Martin, 2025) (Vogelaar, 2025).

Through the prolific export of the F-35, the US has managed to interlink partner forces, increasing overall effectiveness through interoperability (Vucetic & Nossal, 2013). The networking built into F-35s builds upon earlier exports of American aircraft like the F-16 and further enhances the plane's qualitative edge (Vucetic & Nossal, 2013). This style of arms export allows for a unique ability to greatly enable power projection that is in the interest of the US, while simultaneously lowering the cost of the American fleet through economies of scale (Vucetic & Nossal, 2013).

### b. Paradigm Shift

While much of this report has focused on historical and political developments related to the F-35, it is critical to briefly highlight the technical abilities that make the F-35. In the words of the highly experienced pilot, Maj. Gen. Gina Sabric, “Hands down, without a doubt, the F-35 is the aircraft to take into combat … it's the quarterback of the entire fight” (Wilson, 2024).

#### I. Stealth

While the popular imagination of air combat remains dominated by notions of dog fighting and flashy maneuverability, actual air warfare in the 21st century is conducted over hundreds of miles (Harmsel, 2023). Beyond visual range (BVR) engagements using long-range air-to-air missiles are the primary means of achieving air superiority in a contested space, and this is the mission the F-35 was designed for (Lockheed Martin, 2024). Through a combination of a radar-absorbing coating, internal weapons storage, geometric design features, and a reduced electromagnetic signature, the F-35 is the stealthiest fighter ever designed (Lockheed Martin, 2024; Harmsel, 2023). In perfect conditions, the F-35 maintains a radar cross section of ~0.005 square meters, making it produce the radar return of a small bird (Harmsel, 2023). These capabilities allow the F-35 to penetrate deep into hostile airspace and engage other aircraft while remaining hidden, enhancing survivability and offensive potential (Harmsel, 2023).

## *II. Networking*

The military advancements of the 21st century have made connectivity the most important objective of any competent force (Osinga, 2017). The F-35 uses cutting-edge sensor fusion and networking to gain a decisive informational advantage in the battlespace and share this advantage throughout friendly forces (Osinga, 2017). When the F-35 is called the “quarterback” of the skies, this is what is implied. Fully networking information throughout forces provides a greatly enhanced OODA loop and a qualitative edge. F-35s can act as an offensive force while simultaneously providing ISR and C2 Capabilities, something no other fighter aircraft can do (McHale, 2009).

## *III. Avionics*

Avionics refers to the onboard electronics in an aircraft and has become vitally important to modern combat. The F-35 maintains an unparalleled amount of computational and electrical power, allowing for highly advanced radar and electronic warfare capabilities (Millet, 2023).

These abilities allow a single aircraft to fill the role of what used to take an entire squadron of 4th-generation fighters.

#### *IV. Adaptability*

The most critical trait held by the F-35 is the platform's adaptability. TThe design philosophy sought to create a truly multirole fighter; a single aircraft capable of serving each branch of the US military (SEO, 2020). The three variants allow for F-35 deployment anywhere from the Suwalki Gap to the middle of the Pacific. Furthermore, the platform was designed to be continuously upgraded over its lifecycle, with regular software updates enhancing effectiveness (Millet, 2023). As new technologies emerge, they are added to the F-35, allowing it to stay relevant for longer than any other fighter (Lockheed Martin, 2024).

##### **c. In the Wild**

Beyond mere speculation, the F-35 has proven itself to be a tremendously capable platform when deployed against hostile forces. Throughout the War on Terror, the F-35 was used as an air-to-ground strike platform and performed exceptionally well in this role (Millet, 2023). During the 2025 Iran-Israel War, F-35s played a crucial SEAD role and were the spearhead of Israeli strikes against the Iranian air defense network (Mesa, 2025). In the ongoing campaign against the Houthis rebels, F-35s have been frequently deployed from US carriers (Mesa, 2025). While protecting the Eastern border of NATO against Russian drones, F-35s have consistently been able to find and strike difficult-to-track loitering munitions (Baker, 2025). While the F-35 has yet to engage another aircraft, it would certainly dominate even the most advanced rival forces.

##### **Key Judgement 2: The Best Today, The Best Tomorrow (KJ2H)**

The F-35 represents a significant paradigm shift in military force that is capable of remaining relevant far into its lifespan (KJ2). A combination of survivability and adaptability allows for the F-35 to dominate air combat at the current moment and continue to do so into the

2040s. Software and hardware updates are an intended part of the F-35's lifecycle, allowing for future relevance. Combat deployments in the Israel-Iran war have showcased the efficacy of the F-35 in penetrating contested airspace protected by advanced Russian SAM batteries, and defensive operations highlight the network-centric nature of the jet's capabilities. Excellence in air-to-air and air-to-ground missions showcases the F-35's keystone role in American and allied forces (E3).

### **III. War as a Network: Connectivity is Everything**

The modern American way of war is not one of mass, but one of precision. The P-38L Lightning, the F-35's namesake, had 10,038 built, in sharp contrast to the less than 1500 F-35s currently flying (NMUSAF, 2025). Modern doctrine emphasizes connectivity and informational advantage as the key force multipliers driving victory, and the F-35 lies in this framework (Khoroshko et al., 2024).

The F-35 marks the shift away from platform-centric aircraft design towards network-centric design. Recent USAF doctrine emphasizes airpower's role as a disruptive force towards enemy kill chains that produces "simultaneous and rapid attacks on key nodes and forces ... a convergence of effects that can overwhelm the enemy's capacity to adapt or recover" (DAF, 2025). The F-35 plays a crucial role in this system as the capability that both conducts and coordinates strikes (Adams, 2021).

In the scenario of a war with China, analysts expect that American air power will play a pivotal role in defending Taiwan (CSIS, 2023). Success or failure will likely depend on the capability of friendly forces to prevent the PLAAF from achieving air superiority and use this contested battle space to attack the logistical and command structures of the enemy (CSIS, 2023). While China holds a considerable quantitative advantage in many fields, the top down command structure of the PLA is vulnerable to deep strike missions (CSIS, 2023). The F-35 is

by far the best tool the US has for this job, and it has the necessary networking capabilities to maintain an informational advantage in extreme chaos. Rapid deployment from C and B variants allows for operational flexibility without risking carriers entering the range of most Chinese anti-ship missiles, and ingrained interoperability will enhance the participation of Japanese and Australian forces.

### **Key Judgement 3: Joint Network Dominance (KJ3H)**

The role of the F-35 in modern warfare is to act as a center of gravity that other forces can operate around (KJ3). Connectivity provided by the platform is a crucial qualitative advantage for friendly forces, and an information advantage gained by the utilization of ISR, C2, and EW capabilities will prove decisive in a potential conflict with the PLA. (E3)

### **Conclusion: Break the Bottle (CH)**

Given The F-35 production base is vulnerable to trade restrictions, particularly if China pursues further trade war escalation. A significant qualitative advantage is provided by the innovative and adaptable design of the F-35, and the crux of this advantage is the ability to leverage connectivity between friendly forces in the air war mission set. The F-35 holds strategic weight through its capabilities, but industrial and organizational concerns serve to bottle the potential of this platform. Breaking the bottle through policy changes should be one of the primary concerns of the current administration. (C)

### **Policy Recommendations: Sharpening the Tip of the Spear (RH)**

#### **I. The United States should accelerate supply chain independence and expand production capacity (PR1)**

The industrial base behind the F-35 is not resilient enough to back the critical role the platform plays in American strategy. Insufficient production capacity and raw material bottlenecks have formed an unstable system that does not meet demand. The US should remedy

this issue by constructing a defensive resilience network within domestic and international domains, reducing dependence on critical economic nodes (Slaughter, 2017).

The Executive branch can use aggressive deregulation and tax incentives to improve domestic manufacturing capacity, focusing on efficiency at the subcontractor level. The USAF can work in tandem with private industry to identify specific bottlenecks and develop tailored policy solutions. A special USAF task force focused on production should work to identify and remedy inefficiency in relevant spheres. Further leveraging the original international network of the program, bilateral negotiations with partner states to spur investment into American manufacturing can be undertaken, with tariff reduction used as an incentive. Already existing efforts to reduce dependence on China for rare earths can be given higher priority. Accelerating supply chain independence and manufacturing capacity will improve resilience and embody the decentralized production ethos of the F-35 program. This networked approach will improve production speed and decrease cost overruns.

A more resilient network focused on distributing risk will keep the lynchpin of American air power in production, all while reducing taxpayer costs and providing economic benefits.

(RE1)

## **II. Leveraging Connectivity: Sharpen the Tip of the Spear**

The F-35's unmatched capabilities provide a strong deterrent, and if necessary, a decisive offensive. The Department of War can further increase capability through increased integration with partner forces and accelerated upgrades for the B and C variants that will be most useful in the Pacific theatre.

Fully integrating Australian and Japanese forces into the INDOPACOM network will greatly enhance the ability of partner forces to collaborate with American air power in peace and war. Solidifying a joint airpower C2 infrastructure with Pacific allies is vital to regional security. Utilizing the F-35's interoperability will increase deterrence against China and allow for better

collaboration if deterrence fails. Increasing vital upgrade packages for forward-deployed units like the USMC VMFA-214 and Pacific Fleet F-35Cs will better prepare US forces for combat. Enabling the F-35's designed adaptability is critical. The greatest advantage of the F-35 is its ability to operate in distributed teams that can work independently from the larger force. Preparing the troops that will first engage the greatest adversary of the US and face peer threats in the air domain is vital to a potential victory. Even outside of a full-scale war with China, these assets are critical to freedom of navigation and surveillance missions. (RE2)

Respectfully,

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## **Collection Plan**

Research Goal: find sources relevant to the research topic from journalistic, academic, and government sources.

Core Questions:

How does the F-35 program relate to the American defense industrial base?

How does the F-35 program differ from previous American exquisite technology programs?

What are issues and challenges within the F-35 program?

How is the F-35 program relevant to a networked defense strategy that integrates partner and ally forces in the Pacific and Europe?

What is the role of the F-35 in current and future near peer conflicts?

How does the multinational structure of the program produce benefits as well as challenges?

Searches:

### A. Journalistic Sources

#### a. Using in-website search tool

Foreign Policy: F-35 -> F-35 AND Pacific -> F-35 AND Europe

## War on the Rocks: F-35 -> F-35 AND Industry

### Breaking Defense: F-35

- b. Using Google Search:
  - i. "F-35 program" AND ("defense industrial base" OR "supply chain" OR "economic impact" OR jobs)
  - ii. "F-35 program" AND ("acquisition strategy" OR "development model") AND "previous programs"
  - iii. "F-35 program" AND (challenges OR issues OR "cost overrun" OR delays OR "Block 4" OR sustainment OR readiness)
  - iv. "F-35 program" AND ("near peer" OR "great power competition" OR China OR Russia) AND role

## B. Academic Sources

- a. Using Google Scholar search tool
  - i. "F-35 program" AND ("defense industrial base" OR "supply chain") AND (affordability OR sustainment)
  - ii. "F-35" AND ("network-centric warfare" OR "interoperability") AND ("near-peer conflict" OR "Great Power Competition")
  - iii. "F-35 Joint Strike Fighter" AND ("partner nations" OR alliance) AND (benefits OR challenges
    - 1. Theoretical Angle:
      - a. "future of airpower" AND "network-centric warfare"
      - b. "F-35" role in Great Power Competition

- c. "Fifth-generation air dominance" vs "sixth-generation concepts" academic review

C. Government, Industry, and Think Tank sources:

- a. Focus on .gov, reputable think tank, and industry (.com) sources
- b. Using Google Search:
  - i. "F-35" AND "Congressional Research Service" AND (modernization OR export OR procurement)
  - ii. "F-35" AND ("Department of Defense" OR DoD) AND ("force posture review")
  - iii. "F-35" AND ("Lockheed Martin" OR "Joint Strike Fighter program office" OR JPO) AND (modernization OR upgrade OR "Block 4")
  - iv. "F-35 export" AND (sales OR "foreign military sales" OR FMS) AND ("Japan" OR "Australia" OR "South Korea")

Utility based search terms: searches made during drafting phase to support a specific point or area

- 1. ("fighter jet generations" OR "air superiority generations") AND ("fifth generation" OR "sixth generation") AND (explanation OR definition OR review) AND (2017 OR 2018 OR 2019 OR 2020 OR 2021 OR 2022 OR 2023 OR 2024 OR 2025)
- 2.

Research Plan: Utilize these search terms to build broad understanding of the topic and formulate an expansive policy report.

## References

- Adams, D. J. (2021). Staying alive: Air power in support of ground operations in the contested environments of 2035 and beyond.
- Baskaran, G. (2025, October 9). China's new rare earth and magnet restrictions threaten U.S. defense supply chains. Center for Strategic and International Studies.  
<https://www.csis.org/analysis/chinas-new-rare-earth-and-magnet-restrictions-threaten-us-defense-supply-chains>
- Brooks, R. (2023, December 7). F-35 suppliers head to court over titanium cost: Lockheed Martin, Howmet. American Machinist.  
<https://www.americanmachinist.com/news/article/21278739/f-35-suppliers-head-to-court-over-titanium-cost-lockheed-martin-howmet>
- CSIS (2023). The first battle of the next war. Washington, DC: Center for Strategic & International Studies.
- CBC News. (2023, March 2). F-35 fighter jets arrive — Canada contractor [News article]. CBC.  
<https://www.cbc.ca/news/politics/f-35-fighter-jets-arrive-can-contractor-1.7556943>
- Department of the Air Force. (2025). Air Force Doctrine Publication 3-0, Operations.
- Epstein, J., & Baker, S. (2025, September 10). The F-35 stealth fighters that shot down Russian drones were just days into new front-line NATO patrols. Business Insider.  
<https://www.businessinsider.com/f-35s-shot-down-russian-drones-days-into-nato-patrol-2025-9>
- Gertler, J. (2009). F-35 joint strike fighter (JSF) program: Background and issues for Congress.
- Gertler, J. (2013). Air force F-22 Fighter program (No. CRSRL31673).
- Gertler, J. (2020). F-35 joint strike fighter (JSF) program.

Government Accountability Office. (2025, July). Defense industrial base: Actions needed to address risks posed by dependence on foreign suppliers (GAO-25-107283).

<https://www.gao.gov/products/gao-25-107283>

Harold, S. W. (2018). Defeat, not merely compete. Land Corporation, 1-73.

IRIA Staff. (2024, June 30). Global race to develop sixth-generation fighter jets. International Relations Insights & Analysis. IRIA Defense Review – Use of advanced technologies and AI in shaping modern warfare. <https://www.ir-ia.com>

John McHale. (2009, Dec 18). F-35 Joint Strike Fighter leverages COTS for avionics systems.

Khoroshko, V., Artemov, V., Brailovskyi, M., & Kozura, V. (2024). Modern network wars.

Scientific and practical cyber security journal.

Kidwell, D. (2020, September 17). Cyber espionage for the Chinese government. US Air Force Office of Special Investigations.

<https://www.osi.af.mil/News/Features/Display/Article/2350807/cyber-espionage-for-the-chinese-government/>

Krepinevich, A. F. (2023). The origins of victory: How disruptive military innovation determines the fates of great powers. Yale University Press.

Lappin, Y. (2021, February 8). The plane that plays a leading role in Israel's shadow war on terror (BESA Center Perspectives Paper No. 1,922). Begin-Sadat Center for Strategic Studies. <https://besacenter.org/f35-war-on-terror/>

Lockheed Martin. (n.d.). F-35 global enterprise [Web page]. Retrieved November 4, 2025, from <https://www.f35.com/f35/global-enterprise.html>

Lockheed Martin. (2024, February 12). Made to Evade: The F-35's Unrivaled Stealth. Retrieved from <https://www.f35.com/f35/news-and-features/the-f35s-unrivaled-stealth.html>

Mahnken, T. G. (2014). Weapons: The growth and spread of the precision-strike regime. In Strategic Studies (pp. 343–354). Routledge.

Mesa, J. (2025, June 17). The F-35, mocked by Elon Musk, finally shows what it can do.

Newsweek.

<https://www.newsweek.com/f-35-mocked-elon-musk-finally-shows-what-it-can-do-2086824>

824

Milet, H. (n.d.). More than a combat aircraft: The Lockheed Martin F-35.

National Museum of the U.S. Air Force. (n.d.). Lockheed P-38L Lightning [Fact sheet].

Retrieved November 4, 2025, from

<https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/196280/lockheed-p-38l-lightning/>

Osinga, F. (2017, July). European Security and the Significance of the F-35. Joint Air Power

Competence Centre.

Plessas, D. (2017, June 1). Transitioning from 4th to 5th generation fighter aircraft: Innovation

and Rationalisation in the new economic environment [PDF]. The Royal Aeronautical

Society.

<https://www.aerosociety.com/media/7520/9-plessas-transitioning-from-4th-to-5th-generation-fighter-aircraft.pdf>

Rao, G. A., & Mahulikar, S. P. (2002). Integrated review of stealth technology and its role in

airpower. *The Aeronautical Journal*, 106(1066), 629–642.

Rounds, R. (2020, February 7). Washington's F-35 embargo against Turkey — success or

failure? *War on the Rocks*.

<https://warontherocks.com/2020/02/washingtons-f-35-embargo-against-turkey-success-or-failure/>

Slaughter, A. M. (2017). *The chessboard and the web: Strategies of connection in a networked*

*world*. Yale University Press.

- ter Harmsel, J. M. (2023). Stealth on aircraft; A literature review. University of Twente.
- Barrie, D., & Thornley, B. (2024). Waiting in the wings: The Asia-Pacific air-to-air challenge (Chapter 6). In The International Institute for Strategic Studies (Ed.), *Asia-Pacific Regional Security Assessment 2024: Key developments and trends* (pp. 1-78). Routledge.  
<https://www.iiss.org/publications/strategic-dossiers/asia-pacific-regional-security-assessment-2024/chapter-6/>
- U.S. Government Accountability Office. (2025, September 3). F-35 Joint Strike Fighter: Actions needed to address late deliveries and improve future development (GAO-25-107632).  
<https://files.gao.gov/reports/GAO-25-107632/index.html>
- Vogelaar, J. (2025, January 3). Lockheed Martin F-35 Lightning II: Current and future operators. Aviation News.  
<https://aviationnews.eu/news/2025/01/lockheed-martin-f-35-lightning-ii-current-and-future-operators/>
- Vucetic, S., & Nossal, K. R. (2013). The international politics of the F-35 Joint Strike Fighter. *International Journal*, 68(1), 3–12.
- Wilson, C. (2024, September 23). F-35 Lightning II leads charge in 5th-generation warfare, strengthens global partnerships. U.S. Air Force Reserve Command.  
<https://www.arpc.afrc.af.mil/News/Article-Display/Article/3915434/f-35-lightning-ii-leads-charge-in-5th-generation-warfare-strengthens-global-par/>