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STRATEGIC LOGISTICS

Includes Contested Logistics and
Contesting Logistics

Co-Authored by

GEN(R) Gus Perna, Cypress International, Subject Matter Expert

SES(R) Guy Beougher, Cypress International, Vice President, Logistics, SCM & Energy



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Preface

The quote "*Amateurs talk tactics. Professionals talk logistics.*" is widely attributed to General Omar Bradley, though some sources also cite General Robert H. Barrow as an early verifiable record of the sentiment. The phrase highlights that while amateurs focus on battlefield maneuvers, professionals understand that the practical execution and supply of any operation depend on strong logistics.

Most US efforts in addressing the contested logistics weaknesses are currently focused on the tactical level by each service. It's a case of what title ten authorities can address within perceived responsibility. This paper will discuss why the FY 26 NDAA language assigns the responsibility for Department of War Contested logistics to US Transcom, the Deputy Secretary of War and the vice CJCS.

Some military pundits will disagree with the provocative thought that logistics is a warfighting domain or weapon system that can create defeat for both the United States and its adversaries. In warfighting, a domain is a distinct physical or conceptual area where military operations take place, characterized by unique operational environments, specialized tactics, equipment and capabilities required to achieve superiority and freedom of action. One could make a case that if there was forethought in the logistics domain, the U.S. would have not created logistically contestable environments in raw materials, pharma and microchip supply chains, currently dominated by US adversaries.

The confluence of capitalism and globalization has created a world where national security risk is abundant for all world competitors. This white paper will draw from previous Cypress White papers on DoD Supply Chain

Challenges, Contested Logistics and Resourcing the National Security Strategy.

This paper postulates to expand **contested logistics** meaning to one that includes **contesting logistics** and naming that task as **strategic logistics**. This paper is intentionally provocative. Parts of this paper will discuss contesting the logistics of US Adversaries. It will identify Russia and Chinese physical locations and capabilities found in open sources that could be contested. It will recount history of both logistic offensive and defensive operations. It will illuminate current history in the Ukraine and Russian Conflict.

Finally, just the writing of this paper serves as a deterrence to US adversaries by identifying their logistical and sustainment weakness while elevating the thought that the US is addressing their own logistical and sustainment challenges. Thirty pages of this white paper highlight from open sources Chinese and Russian dependencies on refiners, pipelines, rail lines and ports.

Bottom Line, Logistics and Logisticians need to become institutionalized as a permanent part of the Joint Targeting Enterprise (JTE).

Why is this paper important? Logistics is the underpinning of War, more importantly it can be the deterrence of War. Contested logistics is in the eye of the beholder and is often defined differently by DoW Organizations and one's place in the supply chain. It might be time to calibrate the way DoW discusses logistics and sustainment.

Definitions

ChatGPT defines Contested logistics as a military concept describing the ability to sustain and supply forces when an adversary is actively trying to disrupt, deny, degrade, or destroy logistics capabilities across all domains (land, air, sea, space, and cyber). In simple terms: It's logistics under attack—when, Tactical, Operational, and Strategic supply lines, transportation networks, fuel, munitions, information systems, or sustainment hubs cannot be assumed to be safe, and forces must operate despite adversary interference.

Key elements often included in definitions of contested logistics: Adversary actions such as kinetic strikes, cyberattacks, electronic warfare, space-based disruptions, or interdiction of transport. Denied or degraded environments: Limited access to bases, ports, or airfields due to threats. Resilient sustainment: Emphasis on dispersion, deception, redundancy, prepositioning, autonomous systems, and rapid repair.

Joint and coalition operations: Ensuring supply continuity with partners despite contested conditions. The US Department of Defense/War, individual services, and civilian

periodicals all tend to define contested logistics slightly differently but with common core similarities. All focus on the targeting of logistics operations regardless of domain, air/land/sea/cyber at the tactical, operational, and strategic levels. The differences tend to emerge at echelon and focus on the “act of planning for” vs the environment of operating within and are somewhat inconsequential to this paper.

The U.S. Department of Defense increasingly identifies **contested logistics** as a defining characteristic of future conflict, particularly in theaters such as the Indo-Pacific, where

Organization / Source	Concept Focus	Core Definition / Framing	Key Commonalities	Distinctive Differences / Emphases
U.S. Department of Defense (General Framing)	Contested Logistics	A defining challenge in future conflict where sustainment is disrupted by distance, limited basing, and capable adversaries.	Adversary threat; disruption to sustainment; multi-domain challenge.	Emphasizes <i>future conflict context</i> (e.g., Indo-Pacific) and <i>geographic scale</i> rather than formal doctrinal language.
Title 10, U.S. Code §2926	Contested Logistics	An environment where adversaries challenge all domains and directly target logistics operations, facilities, and activities in the U.S., abroad, or in transit.	Multi-domain threat; direct targeting of logistics; global scope.	Legal/authoritative framing; focuses on <i>environment</i> rather than logistics actions or processes.
Army Contested Logistics CFT / Joint Concept for Contested Logistics (JCL)	Contested Logistics	The act of planning, executing, and enabling force movement and support across all domains in a contested environment.	Multi-domain operations; adversary interference; logistics as decisive.	Action-oriented definition—focuses on <i>planning and execution</i> , not just conditions.
U.S. Air Force – Airman Magazine	Contested Logistics	An environment where an adversary challenges all domains and targets logistics, operations, facilities, and activities globally.	Mirrors Title 10 language; adversary targeting; global reach.	Service-level narrative; less emphasis on execution mechanics than Army/JCL.
Joint Publication (JP) 4-0 – Joint Logistics	Strategic Logistics	Logistics at the strategic level links national resources to military power and determines global mobilization and sustainment capability.	National resource linkage; mobilization; sustainment of global operations.	Does not always label the term “strategic logistics”; embedded within levels-of-war framework.
U.S. Army Doctrine (ADP 4-0 / FM 4-0 Sustainment)	Strategic Logistics / Sustainment	Use of national resources, industrial base, strategic mobility, and global sustainment networks to support theater commanders.	Defense industrial base; strategic mobility; global networks.	Emphasizes sustainment as a <i>warfighting function</i> enabling freedom of action and endurance.

long distances, limited basing, and capable adversaries place sustainment at heightened risk. Across U.S. law, joint concepts, and Service doctrine, contested logistics is consistently framed as an environment in which adversaries deliberately target logistics operations, facilities, and activities across all domains—land, maritime, air, space, cyber, and the electromagnetic spectrum.

Title 10, U.S. Code, Section 2926 establishes the foundational characterization of contested logistics as an operational environment in which logistics is directly targeted in the United States, abroad, and during transit. The Joint Concept for Contested Logistics, as adopted by the Army's Contested Logistics Cross-Functional Team, expands this framing by emphasizing the actions required to plan, execute, and enable force movement and sustainment across domains under adversarial pressure. U.S. Air Force publications reinforce this definition, underscoring the global and multi-domain nature of the threat while highlighting logistics as a primary target rather than a protected rear-area function.

In contrast, **strategic logistics** is not defined as an environment but as a level and function of logistics activity that links national resources to military power. Joint Publication 4-0 situates strategic logistics at the strategic level of war, where decisions regarding mobilization, deployment, sustainment, and global distribution determine the nation's ability to project and sustain combat power worldwide. Army doctrine further refines this concept by defining strategic logistics as the employment of national resources—including the defense industrial base, strategic mobility assets, and global sustainment networks—to support theater commanders and enable

freedom of action, extended operational reach, and prolonged endurance.

Across doctrinal sources—including the National Defense University, the Defense Acquisition University, and the Center for Joint and Strategic Logistics—strategic logistics is consistently characterized by its national and theater-level scope, integration across the Joint Logistics Enterprise, and coordination among Services, combatant commands, combat support agencies, industry, and international partners. Strategic logistics encompasses force generation, long-term sustainment, global mobility, prepositioning, infrastructure development, and resilience under disruption.

Synthesized doctrinally, **contested logistics defines the problem**, while **strategic logistics provides the solution space**.

Strategic logistics ensures that forces can be generated, deployed, sustained, and reconstituted in alignment with national objectives, despite adversary efforts to disrupt sustainment. By integrating industrial capacity, transportation networks, allied support, and policy mechanisms, strategic logistics enables operational commanders to execute campaigns without being constrained by shortages of materiel, movement capacity, or sustainment depth at the strategic level.

For purposes of this white paper, we define **Strategic logistics** as the highest level of military logistics—focused on the national, theater, and global scale—where resources, industrial capacity, and sustainment networks are organized, mobilized, and managed to generate and maintain military power over time.

Whereas tactical logistics supports units in immediate operations and operational logistics bridges campaigns or theaters, strategic logistics ensures that the entire force can be raised, equipped, transported, and sustained to meet national defense objectives.

Key Characteristics of Strategic Logistics

- **National-level scope:** Integration of the defense industrial base, transportation networks, and global supply chains.
- **Force generation:** Raising, training, equipping, and deploying forces.
- **Sustainment over time:** Long-term stockpiling, prepositioning, and resupply to maintain campaigns or deter adversaries.
- **Global mobility:** Planning and execution of large-scale movements (airlift, sealift, rail, etc.) across inter-theater distances.
- **Allied/partner integration:** Coordination with coalition supply chains, host nation support, and access agreements.
- **Resilience and adaptation:** Ensuring continuity under disruption (cyber, kinetic, economic, or political).

Definition Reflections

These definitions are focused on friendly forces. They define strategic logistics and contested logistics in a defensive manner. Supply Chains are not neat linear lines of communication from the forward line of troops to the Industrial base and strategic raw material that support it. They are a complicated web of relationships that often cross boundaries between friend and foe. The recent discussions of tariffs have illuminated that in just the vehicle industries

components travel back and forth several times across national boundaries before reaching the final assembly location. Like COVID, the act of raising tariffs illuminated supply chain dependencies for both raw materials and industrial production. This will be highlighted later in this paper describing the complexity of the supply chains of US Adversaries. Specifically, the T80V Russian Tank. Logistics and Sustainment is more than infrastructure, roads, ports, APODs, SPODs and G/ALOCs it also includes the commercial dependencies that globalization has driven that are which most of the time is not well known by design and treated as intellectual property by industry. DoW and services create legacy sustainment strategies that are over reliant on contractor support and are no longer applicable in a peer competition environment.

Contested Logistics Framework Conundrum

The Contested Logistic Framework previously discussed in the Cypress White Paper on Contested Logistics provides an overview of Contested Logistics being in the eye of the beholder, or Title Ten Authority, Command, Agency or Industry.

The premise of this Contested Logistics Framework is that someone oversees every part of the organizational diversity in this framework, including public, private, and international partners.

The real question may be, who oversees synchronizing all the organizational diversity identified in the framework to mitigate a contested environment or has the authority to act?

Within the context of globally integrated operations, the tension between increasingly demanding logistics requirements and constrained/degraded logistics resources

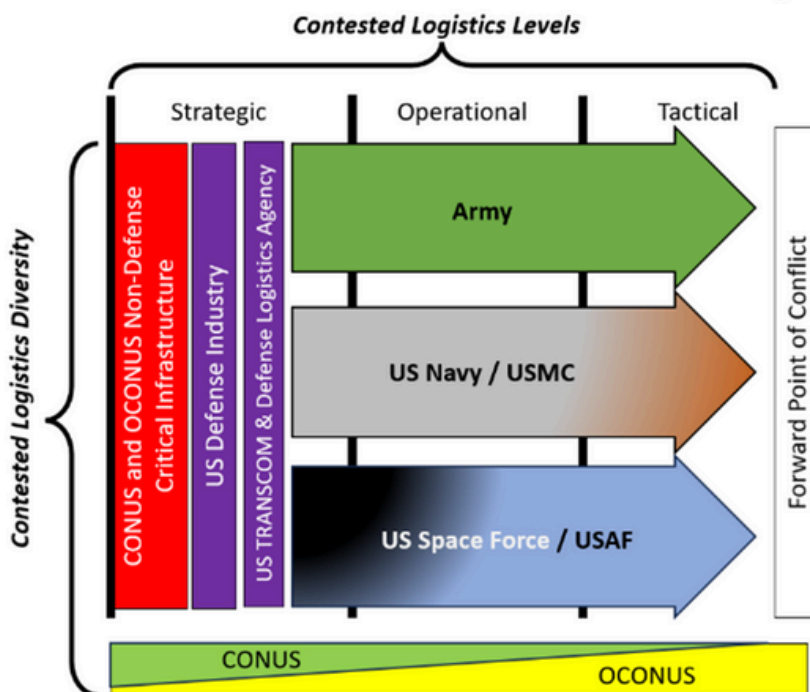
creates a dilemma that will be the essential challenge joint logistics will have to overcome for the foreseeable future. These trends have the potential to create a situation in which the disparity between logistics demand and logistics resources—the Logistics Gap—will demand a new conceptual approach to logistics.

Unlike the regional conflicts like Iraq and Afghanistan, peer conflict includes much different challenges like speed, lethality, rapid technological evolution, rapid decision making, and the need to invest in sustainment capabilities at all echelons to include allies and partners to increase resilience.

As described in the Cypress White Paper on Contested Logistics, separate from the common threats of the battlefield environment, below are the threats that

Contested Logistics Framework Conundrum

"Who's in Charge?"



Threats Causing Contested Logistics

- Cyber
- Kinetic
- Tyranny of Distance – Point of Need
- Dependence on Non-DoD Critical Infrastructure
- US Interagency, State and Local Government awareness of DoD Requirements
- Affordability – Tooth to Tail realities
- Years of Sustainment Underinvestment to Pay Other Bills
- Acknowledgement that Power Projection and Sustainment are Competitive Advantage over Peer and Near-Peer Competition
- Disparate Resourcing Authorities in Separate Lines of Effort
- Unity of Effort, Service, Joint, Industry, Interagency, State, Local and Host Countries
- Federal Acquisition Hurdles, Slowing Speed of Need for Unknown or Un-forecasted Requirements
- Commercial & Civilian Security Clearances
- Allies and Partners sustainment diversity

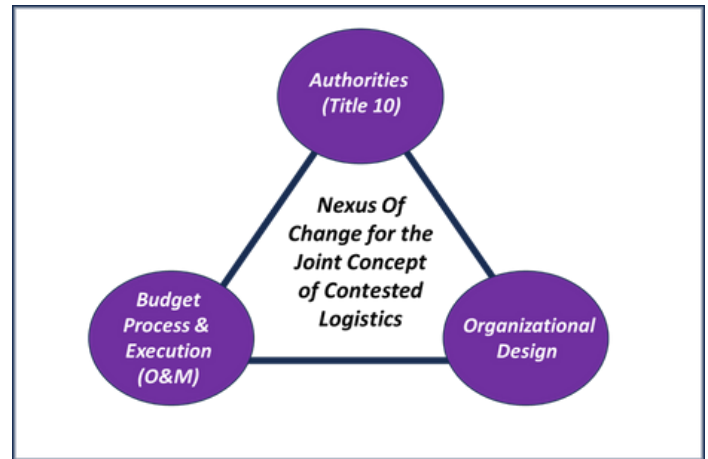
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logistics will face in the contested space:

- Cyber
- Kinetic
- Tyranny of Distance – Point of Need
- Dependence on Non-DoD critical infrastructure
- U.S. Interagency, State, and Local Government awareness of DoD requirements
- Affordability – Tooth to Tail realities
- Years of sustainment underinvestment to pay other bills
- Acknowledgement that power projection and sustainment are competitive advantage over Peer and Near-Peer Competition
- Disparate resourcing authorities in separate Lines of Effort
- Unity of Effort, Service, Joint, Industry, Interagency, State, Local, and Host Countries
- Federal acquisition hurdles, slowing speed of need for unknown or unforecasted requirements
- Commercial & Civilian security clearances
- Allies and partners sustainment diversity

Although not a threat, Contested Logistics is often seen as a result of the challenges the department faces with legacy system sustainment strategies that no longer meet the challenges of the current national security environment.

Contested Logistics means many things to many stakeholders. Modern technologies such as Artificial Intelligence, Machine Learning, Augmented Reality, Autonomous Operations, and the new domain of Space offer many solutions to many problems and are being applied where Title 10 authorities have prioritized. There are both Joint and



DoD instruction materials that coalesce a community of the willing across the services. The gaps between DoD, Interagency, State, and Local are recorded by the Defense Science Board with recommendations surrounding illumination of the blind spots where some faulty assumptions may be occurring.

U.S. Peer and Near Peer competition is measured as occurring sooner versus later. Any notable change cannot be achieved before the next fight. One could argue that the magnitude of change to improve DoD Logistics would take a decade to achieve. The three principles, or levers, to improve the Joint Concept of Contested Logistic are authorities, budget process and execution, and organizational design.

The FY26 NDAA language has attempted to address authorities by assigning overall DoW Contested Logistics responsibility to the Deputy Secretary of War, Vice Chairman of the Joint Chiefs of Staff and Commander of US Transportation Command. The language also emphasized that Life Cycle Sustainment remains a focus of the Product Support Team aligned with each weapon system. This may influence the budget process. The recent organizational changes in the Acquisition Organizations across the

Kaleidoscope of Sustainment Support Required for US National Security					
Environment	Characteristics	CCMD	Title 10 & 32 Order of Battle	Sustainment Pacing Items	Previous Major Conflicts with US Involvement
Pacific	* Expansive Area of Operations with 52% of the earth's surface, 36 countries, with 16 time zones.	INDOPACOM	US Navy, US Air Force, US Marine Corps, US Army, US Space Force	Power Projection Platforms DIB/OIB Fuel Munitions SLOCs / ALOCs / GLOCs Forward Positioning	WW II, Korean War, Vietnam
	* Predominately Sea and Ocean				
	* Mostly Bi-lateral Allies				
	* Highest OCONUS Presence				
EUROPE	* Area of Operations covers 21,000,000 square miles (54,000,000 KMs) and 51 countries and territories in 5 time zones.	EUCOM	US Army, US Air Force, US Marine Corps, US Navy, US Space Force	Power Projection Platforms DIB/OIB Fuel Munitions GLOCs / ALOCs / SLOCs Forward Positioning	WW I, WW II, Bosnia, Kosovo Ukraine
	* Predominately Land Base				
	* Well developed Alliances with NATO & EU				
	* 2nd Highest OCONUS Presence				
Middle East	* Area of Operations spans more than 4 million square miles with more than 560 million people, 21 Nations, 25 ethnic groups, speaking 20 languages and 4 time zones.	CENTCOM	US Army, US Air Force, US Marine Corps, US Navy, US Space Force	Power Projection Platforms DIB/OIB Fuel Munitions GLOCs / ALOCs / SLOCs	Desert Storm OEF OIF New Dawn Syrian Response
	* Predominately Land Base				
	* Well developed Alliances with NATO & EU				
	* 3rd Highest OCONUS Presence				
US National Disasters	* Continental United States and its territories	NORTHCOM	DHS / FEMA / USCG, National Guard Forces DoD Forces / DSCA	Food / Water Fuel GLOCs / ALOCs	Hurricane Forrest Fires Earthquakes Civil Disturbance
	* Predominately Land Base				
	* National Guard, FEMA & DHS Partners				
	* State and Region Centric				
Worldwide Disaster Response	* Multiple AORs Around the World	Multiple	State Dept / USAID DoD Forces and Agencies	Food / Water Commodities Fuel Services	Hurricane Tsunami Earthquakes Ebola Spt Refugee Spt
	* Predominately Land Base				
	* Treaties and Declarations				
	* International Influence				
** Does not include requirements in AFRICOM, SOUTHCOM & NORAD					

services should benefit the trade space between procurement and sustainment by removing excess stakeholders that often place life cycle sustainment at the bottom of the list.

The U.S. NDS will name adversaries and prioritized Areas of Responsibility (AOR). The matrix above describes the characteristics, Combatant Command Responsibilities, Service's level of effort, the sustaining pacing items, and the previous conflicts in those Areas of Responsibility. It describes a very different conflict depending on the environment found in that location on the globe. One could debate the Title 10 lead in each AOR, but each service has an obligation to fight for dollars in the budget. The adversarial game changer will be if U.S.

adversaries conspire together like they did during World War II. Neither the NDS nor budget account for all simultaneous operations with every U.S. Adversary that exist.

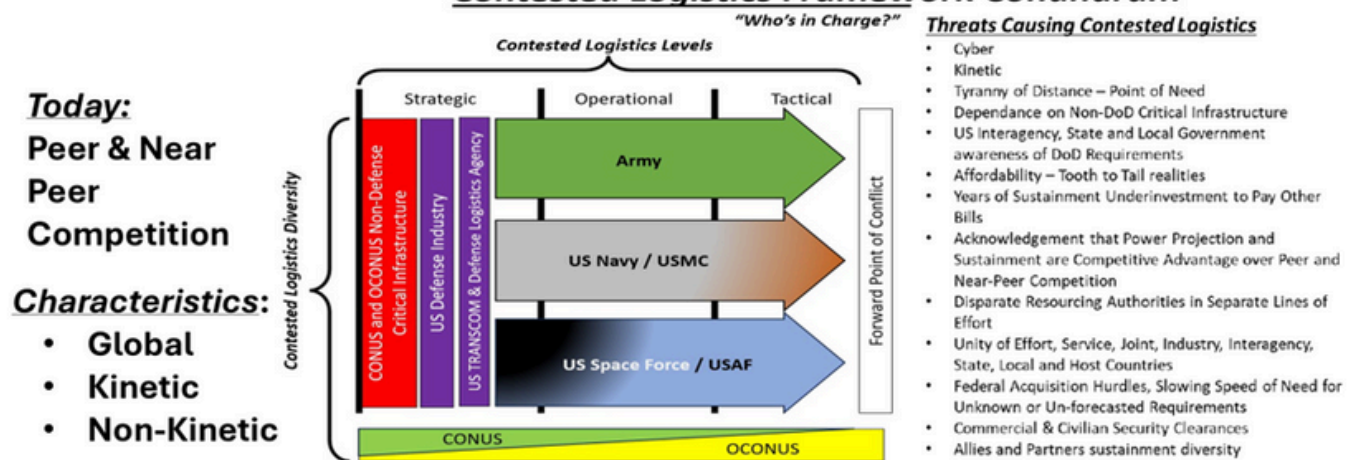
Outsourcing and offshoring US supply chains has caused vulnerabilities and contestation opportunities by US Adversaries. If that wasn't enough, most of the Combat Service Support (CSS) Forces that conduct theater level supply and distribution have been placed in the Army Reserves. This has made contract logistics support (CLS) the preferred method to prosecute and support conflict over the last three decades. It started with the cold war dividend, which was deemed successful in the Balkan conflicts in Bosnia and Kosovo.

Evolution of Multinational and Contract Logistics Support – Where we are and how we got here

Composition Evolution of U.S. Logistics Forces



Contested Logistics Framework Conundrum



Source: <https://www.linkedin.com/feed/update/urn:li:activity:7160747101436432384/>

When force manning levels (FML), once referred to as boots on the ground (BOG) became limiting factors for Warfighters, CLS became the solution to allow more trigger pullers in the FML numbers. US Forces deploying to Iraq and Afghanistan became Task Force organized by taking CSS capability out of the formations and replaced by CLS on the ground. Often the contractors that supported US Forces in Iraq and Afghanistan had more time on the ground making these contractors a form of continuity for rotating forces deploying in and out of theater. Does putting CSS capability in the hands of contractors or COMPO 2&3 Units make sense in addressing the version of contested logistics that has been described thus far? The reasoning that

found the use of contract logistics in historic regional conflicts is not applicable to peer competition in high intensity conflict.

Contested Logistics Is In the Eye of the Beholder

The term, "Contested Logistics" has become a generic term for logistics and sustainment of US Forces from raw material to end user. It means different things to different organizations, levels, communities and stakeholders. Some OEMs have stood up Directorates that have the name Contested Logistics in its title. The above Venn diagram is an attempt to identify and group three definitions that are consistently discussed when someone talks about contested logistics.

Environmental contestation of logistics are those challenges that exist all the time without an advisory necessarily getting involved. It includes the economy, vendors and industrial base, obsolescence, natural disasters, policy, regulations, and criminality. This is the everyday fight to procure, distribute, project and posture. An example is DLA's vendor base shrank from

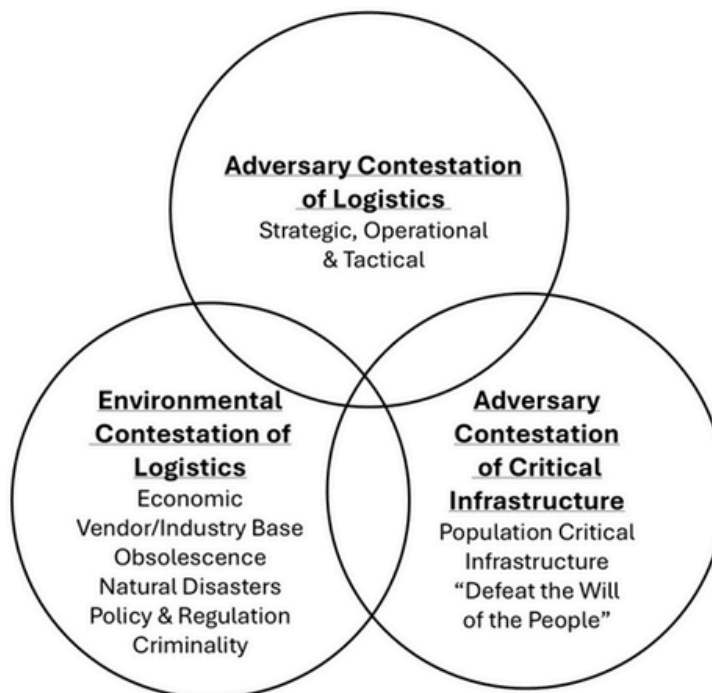
approximately 15000 to 9000 vendors from 2015 to 2025. This has contributed to approximately 18,000 no bid solicitations as of July 2025.

Adversarial contestation of civilian infrastructure is directed at a civilian population to diminish the will of the people to fight an adversary. The best example of this is the current war between Russia and Ukraine. Drone, rocket and artillery strikes in the capital cities of Moscow and Kiev have a varying impact on the Russian and Ukraine civilian populations.

Adversarial contestation of Military logistics at the strategic, operational and tactical levels is the more typical application of the term contested logistics. There are hundreds of examples in history from Napoleon's march on Moscow to the present-day war in Ukraine. In phase zero or in the competition

DoD Contested Logistics is often defined by the eyes of the beholder

The Venn Diagram of Contested Logistics Definitions



phase contested logistics becomes a chess match of deterrence. Frederick the Great stated, "He who defends all defends nothing" Logistics presents far more targets than can be serviced. The chess match includes both what to defend and what to target.

The most effective adversarial attack on logistics is one that could be associated with all three definitions in the Ven diagram. The attack on the Colonial Pipeline is the best example. That attack could address all three definitions. Was it a ransomware attack by a criminal entity in Russia focused on economic exploitation? Did it affect the US population in the south and east of the United States? Did it impede the delivery of fuel to the Atlantic Fleet on the east coast?

The answer to all three questions is yes, it was and did. It was a trifecta of contested logistics that caused pause in how to defend and respond. Sometime the virtues of capitalism cause contestation. The pipeline industry in the US treats the location and type of fuel in their pipelines as intellectual property. Only 8% of the total fuel in US pipelines was commonly known to the government or available commercially.

The defense community might be better served by one definition that is commonly known for the term Contested Logistics. The fact that the SASC language for 2026's NDAA includes direction that US Transportation Command will become responsible on behalf of the entire Department of Defense/War for Contested Logistics. They will have 90 days after the NDAA is signed to report on the current gaps in the world of contested logistics. There will now be a Combatant Commander responsible for global contested logistics posture.

U.S. Contested Logistics Current Shortcomings

Since the Joint Warfighting Experiment yielded the term “Contested Logistics”, Services have focused on what was under their direct control and title ten authorities. This has resulted in a focus on the operation and tactical levels. This in turn has resulted in vulnerabilities at the strategic and operational levels which have not been serviced. US adversaries desire to never have a fight at the tactical and operational levels. US adversaries will and are attacking at the strategic and operational levels today and tomorrow. Left unchecked they will achieve their objective to never fight at the tactical level while defeating the US and their National Security Interests.

Congress has seen this soft underbelly of US National Security and has taken action in the newly released FY26 National Defense Authorization Act (NDAA).

Contested Logistics in the FY26 National Defense Authorization Act (the start of fixing focus)

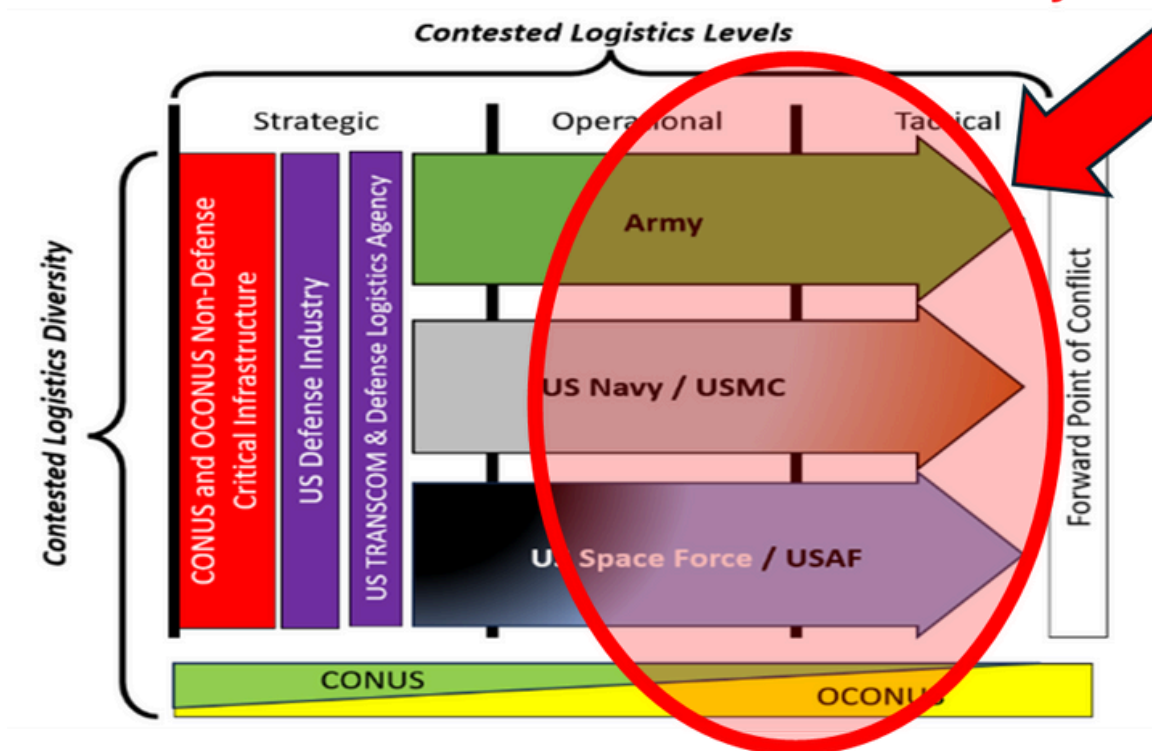
Summary of Statutory Changes and Strategic Implications

Signed into law 8 December 2025

Overview

The FY26 National Defense Authorization Act (NDAA) elevates contested logistics from a conceptual operational risk to a statutory requirement governing governance, posture, acquisition, and multinational operations. Through new Title 10 authorities, mandated senior-level oversight, multinational exercises, and acquisition-related provisions, Congress signals that logistics must be designed, managed, and exercised under persistent adversary pressure, rather than assumed permissive access.

Current Focus by the Services



Strategic Governance and Global Posture Management

Section 334 of the FY26 NDAA establishes a new 10 U.S.C. §2229b, formally assigning responsibility for global contested logistics posture management to the Deputy Secretary of Defense, the Vice Chairman of the Joint Chiefs of Staff, and the Commander of U.S. Transportation Command (USTRANSCOM). These leaders are jointly responsible for integrating contested logistics posture across the Department of Defense.

Their statutory duties include identifying vulnerabilities and risks across core logistics capabilities—supply, maintenance operations, prepositioned stocks, deployment and distribution, health services support, engineering, logistics services, and operational service contracts—and developing strategies to mitigate those risks. The statute further directs integration and deconfliction of global posture investments across the Military Departments, including overseas stock positioning, intra-theater air and sea lift capacity, and Service resourcing decisions tied to operational plans and contingencies.

To institutionalize contested logistics management, the Act requires at least two Deputy Management Action Group (DMAG) meetings annually, co-chaired by the Deputy Secretary and Vice Chairman, focused specifically on contested logistics posture and investment.

Multinational Co-Sustainment and Contested Logistics Exercises

The FY26 NDAA mandates multinational depot-level co-sustainment and emergency tabletop exercises explicitly conducted in contested logistics environments. The Air

Force is directed to deepen depot-level maintenance integration with designated partner nations and stress-test these relationships through realistic scenarios involving denied access and degraded logistics conditions.

Following the first exercise, the Secretary of the Air Force must submit a lessons-learned report to Congress addressing candidate systems for co-sustainment, depot workload sharing, public-private partnership opportunities, logistical challenges, IP and ITAR impediments, partner industrial base gaps, and recommended legislative or policy changes.

Acquisition and Life-Cycle Sustainment Implications

Within Title VIII, Sections 871 and 872 introduce an acquisition-side focus on demonstration, prototyping, and exercise requirements tailored to contested logistics environments. These provisions reinforce that acquisition programs must consider sustainment survivability, integrate resilience early in system design, and align sustainment planning with readiness and affordability constraints.

Strategic Implications and Bottom Line

Collectively, the FY26 NDAA establishes a coherent contested logistics architecture encompassing senior-level governance, global posture integration, realistic multinational exercises, and acquisition alignment. Contested logistics is now a statutory requirement, a global posture mandate, an acquisition design consideration, and a multinational coordination imperative. The United States no longer assumes access—it plans to fight to sustain it.

This NDAA language should result in aggressive investment and focus on weaponizing Logistics and Sustainment.

Two immediate weaponizations to address are how to leverage Artificial Intelligence and how to make the US Industrial Base responsive in both volume in distribution for a war fight with a peer competitor.

Artificial intelligence can make the Department of War's supply chains much more effective by improving speed, resilience, cost efficiency, and decision advantage—especially in “contested logistics” conditions where disruption is expected. Ten specific examples include:

1) Predict demand before the battlefield “asks for it”

- Problem today: supply systems react late—by the time demand shows up, it's already a shortage.
- AI enables:
 - **Predictive demand forecasting** at the part/NSN level using:
 - usage history + OPTEMPO
 - failure rates and maintenance cycles
 - deployment schedules + terrain/climate effects
 - unit readiness data
 - **Pre-positioning recommendations** for the right mix of inventory by theater
- Impact: fewer stockouts, fewer emergency shipments, higher readiness.

2) Predict failure and shift from reactive maintenance to readiness maintenance

- Problem today: many parts are ordered after failure, driving downtime.
- AI enables:
 - **Predictive maintenance** using sensor data, maintenance records, and environmental conditions

- **Remaining useful life** predictions (RUL) for high-impact systems (aircraft engines, vehicle drivetrains, power systems)
- Impact: better mission capable (MC) rates, more stable demand, reduced cannibalization.

3) Optimize inventory so you stock what matters—not what's easy

- Problem today: supply chains often optimize for “availability” and end up with excess low-value items while critical parts are constrained.
- AI enables:
 - **Multi-echelon inventory optimization**
 - **Readiness-based sparing models** (optimize for availability of key weapon systems)
 - “Risk-aware reorder points” tied to:
 - supplier fragility
 - lead-time variability
 - transit disruption probability
- Impact: higher readiness per dollar, reduced backorders, better working capital.

4) Make transportation and routing adaptive in contested logistics

- Problem today: traditional routing assumes permissive conditions—AI can help plan for degraded nodes, interdiction, and infrastructure loss.
- AI enables:
 - Dynamic routing with:
 - threat overlays (air/missile/cyber)
 - port/airfield capacity + damage estimates
 - weather impacts
 - convoy risk models
 - **Mode shifting** recommendations:
 - air → sea → ground / rail
 - additive manufacturing as a “virtual supply node”

- “What-if” planning: losing a port, losing a key supplier, denied air corridors, etc.
- Impact: faster OODA loop in theater logistics, less predictable supply patterns to adversaries.

5) Identify risk early: supplier, geopolitical, cyber, and quality

- Problem today: risk detection is fragmented across contracting, intelligence, and logistics.
- AI enables:
 - Supplier risk scoring using:
 - financial indicators
 - quality history
 - country-of-origin exposure
 - single-point-of-failure mapping
 - Natural language processing to scan:
 - tech data packages
 - contracts
 - supplier communications
 - quality deficiency reports
 - Early warning (e.g., “this supplier is trending toward failure in 90 days”)
- Impact: fewer “surprise” readiness events, more time for alternatives.

6) Automate contracting & procurement workflows (where time is lost)

- Problem today: acquisition lead time is a logistics killer—even when supply exists.
- AI enables:
 - Automated market research
 - Suggesting clauses and building contract packages faster
 - Flagging:
 - abnormal pricing
 - noncompetitive patterns
 - suspicious substitutions
 - Matching requirements to:
 - existing IDIQ catalogs
 - allied sourcing
 - alternate NSNs

- Impact: faster procurement, reduced admin burden, fewer errors.

7) Use AI to fix data quality—the #1 bottleneck in DoD logistics

- Problem today: systems don’t share clean data (GCSS-Army, DPAS, DLA systems, GFM-DI, OEM data, etc.).
- AI enables:
 - Automated data cleansing and entity resolution:
 - duplicate part records
 - inconsistent manufacturer identifiers
 - incorrect unit usage mapping
 - Crosswalks between:
 - NSN ↔ OEM part number
 - maintenance codes ↔ failure drivers
 - tech manual references ↔ parts ordering
- Impact: better planning, fewer manual reconciliations, fewer wrong parts shipped.

8) Improve warehouse & depot operations with computer vision

- Problem today: large depots and storage sites still rely heavily on manual inspection and inventory management.
- AI enables:
 - Vision-based:
 - inventory counting
 - damage detection
 - pallet/box identification
 - hazardous labeling compliance
 - Faster receiving, stowing, and picking
- Impact: fewer errors, faster throughput, higher accountability.

9) Strengthen counterfeit-part detection and quality assurance

- Problem today: counterfeit or poor-quality parts degrade readiness & safety

- AI enables:
 - Pattern detection in:
 - failure rates
 - supplier anomalies
 - certificate irregularities
 - Vision inspection and anomaly spotting at acceptance testing
- Impact: reduced safety risk, fewer grounding events, better supplier accountability.

10) Create a truly predictive supply chain “COP” (common operating picture)

- Problem today: many dashboards show yesterday. Commanders need tomorrow.
- AI enables:
 - Predictive logistics COP:
 - projected stockouts
 - lead-time shifts
 - transportation chokepoints
 - readiness impacts by unit and weapon system
 - Decision support: “top 10 actions that increase readiness this week”
- Impact: logistics becomes a warfighting advantage, not an administrative system.

Creating a strategy to address US Industrial Base responsiveness in both volume and distribution to enable operations for a war fight with a peer competitor falls into four categories or pillars:

Pillar A — Surge Capacity

Warm lines + DPA Title III + second sources

Pillar B — Surge Inputs

Production reserve + critical minerals + energetics

Pillar C — Regional Sustainment (Distribution Reduction)

RSF + forward MRO + repair over replace

Pillar D — Resilient Distribution

Alternate routes, ports, packaging, dynamic routine

These Pillars yield the following 12 concepts:

1) Build “Surge-Ready Capacity” as a standing requirement (not a crisis action)

- Concept: pay industry to maintain warm production capacity—extra shifts, idle tooling, trained labor pipelines—so you can surge in weeks, not years.
- Mechanisms:
 - Capacity contracts with availability payments
 - Pre-negotiated “surge options” with ceiling rates and lead times
 - DoD investments using Defense Production Act Title III to expand/restore critical manufacturing capacity
- Why it matters: “surge” is a capability that must be bought like readiness.

2) Create a Defense “Production Reserve” (analogous to prepositioned stocks)

- Concept: maintain rotating reserve inventory of the hardest-to-produce inputs:
 - rocket motors / propellant ingredients
 - castings/forgings
 - microelectronics
 - rare earth magnets, critical minerals
 - high grade bearings, seals, fibers
- DLA and DoD have been emphasizing that just-in-time does not work in contested logistics.
- Outcome: production lines don’t go idle waiting for long-lead sub-tier materials.

3) Expand “Regional Sustainment + MRO” as a distribution multiplier

- This is a big one: every repair forward is one less replacement shipped from CONUS.
- Concept: scale the Regional Sustainment Framework (RSF) globally:

- distributed MRO nodes
- partnered repair with allies/partners
- regionally aligned depots and commercial sustainment providers
- Effect: reduces distribution demand while increasing readiness.

4) Design weapons for wartime production, not peacetime optimization

- Concept: “Surge Manufacturing Design Rules” for new programs:
 - modularity
 - fewer unique parts
 - open systems
 - substitute materials approvals baked in
 - simplified tolerances where possible
 - digital tech data packages that enable multiple manufacturers
- Goal: cut the time to add second/third sources.

5) Certify “Second Source in Peacetime” for all critical items

- Concept: you don’t surge if you have single points of failure.
- Approach:
 - require 2+ qualified producers for:
 - energetics
 - castings/forgings
 - guidance electronics
 - batteries/power systems
- qualify alternates early (not during war)
- Outcome: more resilient production and price stability.

6) Treat distribution as a warfighting system (not trucking)

- In peer war, production without movement is wasted.
- Concept: build a “Resilient Distribution Network” with:
 - alternative ports/airfields
 - mobile port opening kits

- modular packaging standards
- containerization optimized for rapid transload
- “degraded network routing”

CSIS and DLA emphasize logistics and distribution networks will be contested and require resilience.

7) “Commercial Surge Conversion”: pre-plan what industry can convert

- This is a major peer-conflict lever.
- Concept: pre-negotiate which commercial lines can convert quickly:
 - automotive / heavy equipment → military vehicles, trailers, generators
 - electronics manufacturing services → boards, harnesses, radios components
 - chemical plants → specific defense precursors (energetics)
- Deliverable: a conversion playbook with:
 - tooling lists
 - labor requirements
 - regulatory waivers
 - DPA prioritization triggers

8) Build “National Logistics Surge Brigades” (a workforce concept)

- Problem: capacity exists but labor doesn’t surge fast.
- Concept: a reserve-like system for skilled manufacturing + logistics labor, including:
 - welders, machinists, QA inspectors
 - hazmat handlers
 - forklift + port operators
 - rail specialists

This is the workforce analog of the National Guard.

9) Establish a Joint “Surge Allocation Authority” for scarce items

- Peer war means allies compete for the same things (fuel, munitions, spares).

- Concept: an allocation authority that can:
 - prioritize by operational effect
 - deconflict Services and allies
 - set theater distribution precedence

This reduces the strain on exquisite, long-cycle production and supports scale.

Army writings on contested logistics highlight the complexity of competing demands.

10) Build a “Manufacturing & Distribution Digital Twin”

- Concept: an AI-enabled model of:
 - tier-1 through tier-4 suppliers
 - capacity and constraints
 - workforce bottlenecks
 - transportation routes
 - port throughput and choke points
- Then you run daily:
 - “What breaks if Taiwan contingency starts tomorrow?”
 - “Where do we surge first to increase munitions output by 20% in 90 days?”

NDIA/industry groups have explicitly advocated industrial base surge campaigns tied to warfighting needs.

11) Put the Defense Production Act on rails (automatic triggers)

- Use DPA priority ratings and Title III pre-planned, not improvised.
- Concept:
 - predefined DPA triggers by scenario
 - rapid award templates
 - standing “surge IDIQs”

GAO emphasizes DPA authorities are key tools for industrial investments and availability of needed goods.

12) Shift to attritable systems + repairable subsystems

If you want volume fast:

- attritable platforms
- repairable components
- common propulsion + batteries + datalinks

Contesting Logistics of U.S. Adversaries

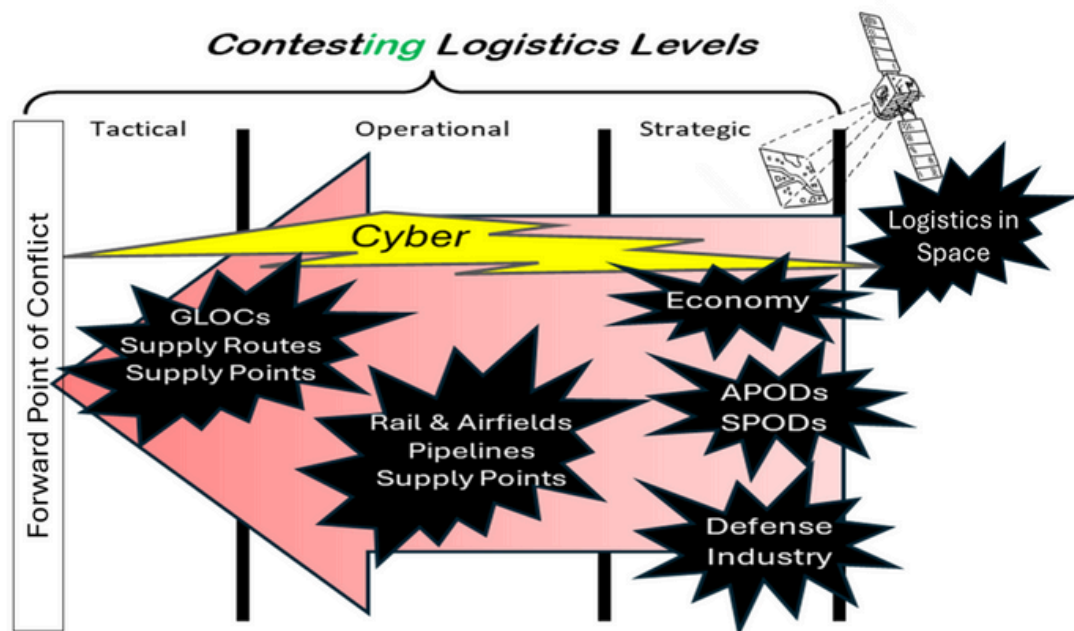
The United States Department of War has long recognized that the ability to contest and disrupt an adversary's logistics is one of the most decisive factors in modern warfare. Logistics—the movement of fuel, food, ammunition, and materiel to sustain forces in combat—serves as the lifeline of any military operation. By targeting and degrading these supply chains, the U.S. can weaken an opponent's operational tempo, limit their ability to maneuver, and reduce their endurance in protracted conflict. Contesting logistics is not only about physically destroying supply lines but also about creating uncertainty, delay, and inefficiency within an adversary's sustainment system.

Historically, the United States has used a variety of methods to contest enemy logistics, ranging from strategic bombing

campaigns against fuel refineries and rail networks in World War II to interdiction of supply routes during the Vietnam War. In more recent conflicts, the focus has expanded to include cyber operations, space-enabled disruption of communications and navigation, and precision strikes on critical infrastructure nodes. This reflects a shift toward multidomain operations, where the U.S. seeks to apply pressure on adversary logistics networks in the air, sea, land, cyber, and space domains simultaneously.

In contemporary planning, the Department of Defense views contested logistics as a core element of deterrence and warfighting strategy, especially in potential conflicts with near-peer competitors like China or Russia. Both nations rely heavily on long, vulnerable supply chains, critical port infrastructure,

Contesting Logistic of US Adversaries



Knowledge of our strategy is a deterrence !
Defending Logistics has a cost associated with it that can bankrupt an adversary

and energy distribution systems to sustain operations. U.S. doctrine emphasizes that denying or disrupting these flows—through kinetic strikes, blockades, sanctions, or digital attacks—can limit an adversary's ability to project power beyond their borders. By contesting logistics, the United States not only seeks to constrain adversary options in wartime but also to impose strategic costs in peacetime by forcing them to over-invest in redundancy, protection, and stockpiling.

Most of this paper is focused on contesting the logistics of US Adversaries. It underpins the thought that logisticians need to part of the Joint Targeting Enterprise. Contested Logistics needs to be a term and problem US Adversaries fear, creating a deterrence before, during and after a conflict with the United States.

History of the U.S. Attacking the Logistics of Adversaries

During the finalization of this paper, the US attack on Venezuela to capture Maduro is the most recent example of the US contesting the logistics of an adversary before executing kinetic action. Attacking logistics vulnerabilities involves exploiting weaknesses in supply chains, such as poor vendor security, unsecured software, and phishing campaigns, to gain indirect access to a target company for data theft or operational disruption. Common attack vectors include compromising third-party software or services, malware injection into updates, and credential harvesting through phishing emails disguised as shipping documents. Defenders must implement multifactor authentication, conduct

thorough vendor retaining employees on cybersecurity, and use email filtering to protect against these threats.

The **Anaconda Plan** was a Civil War Union strategy devised by General Winfield Scott at the start of the American Civil War to defeat the Confederacy by a naval blockade of Southern ports and a land and naval advance down the Mississippi River to cut the South in two. Named for the snake that slowly suffocates its prey, the plan aimed to economically and politically "strangle" the South by cutting off its supplies and markets. While initially scoffed at, elements of the plan were adopted and proved crucial to the Union victory, especially after the

The History of US Attacking the Logistics of Adversaries

Conflict	Method of Logistics Attack	Outcome	Lesson Learned	Relevant Plan/Operation Name
Civil War (1861-65)	Union blockade, destruction of railroads, Sherman's March targeting food & supplies	Confederacy starved of resources, morale collapsed	Cutting off supply and infrastructure can be decisive; logistics = warfighting capability	" Anaconda Plan " (Union blockade strategy); Sherman's March to the Sea (1864)
WWII – Germany (1942-45)	Strategic bombing of factories, oil, rail hubs	German war machine crippled, mobility degraded	Attacking key logistical nodes (oil, transport) can collapse industrial powers	Operation Pointblank (Combined Bomber Offensive, 1943); Transportation Plan (pre-D-Day, 1944); Operation Crossbow (targeting V-weapons, tied to logistics)
WWII – Japan (1942-45)	U.S. submarine campaign against merchant shipping	Japan starved of oil, food, raw materials; military isolated	Maritime interdiction can strangle an island nation dependent on imports	No single OPLAN name, but the submarine war was part of " Unrestricted Submarine Warfare " policy (approved Dec 1941); logistics targets also fell under Operation Starvation (mining Japanese shipping lanes, 1945)
Korean War (1950-53)	Air interdiction of convoys, bridges, supply depots	High losses inflicted, but Chinese sustained ops via manpower & carts	Air/logistics attacks less effective if enemy can resupply with low-tech, dispersed means	Operation Strangle (1951 interdiction campaign); Operation Saturate (later intensified air interdiction)
Vietnam War (1960s-70s)	Bombing Ho Chi Minh Trail, supply caches	Supplies still flowed; U.S. unable to cut the trail	Decentralized, redundant networks are highly resilient to interdiction	Operation Rolling Thunder (1965-68); Operation Commando Hunt (1968-72, bombing the Ho Chi Minh Trail); Operation Igloo White (sensor-based interdiction campaign)
Desert Storm (1991)	Precision airstrikes on supply dumps, bridges, comms nodes	Iraqi Army immobilized, rapid collapse in Kuwait	Modern mechanized armies collapse quickly without fuel/logistics; precision = decisive	Operation Desert Storm (Jan-Feb 1991) — with " Instant Thunder " air campaign concept targeting C2 and logistics
Afghanistan/Iraq (2001-present)	Targeting insurgent finance, smuggling, supply caches	Insurgents adapted with local, small-scale logistics	Against irregular forces, focus must be on finance, networks, and cross-border sanctuaries	No single "OPLAN" just for logistics interdiction, but within Operation Enduring Freedom (Afghanistan, 2001-2014) and Operation Iraqi Freedom (2003-2011), logistics targeting included programs like Task Force 2010 (targeting insurgent financing) and Counter-IED Task Force (attacking bomb supply chains)

Union gained control of the Mississippi River.

Key Components of the Plan

- **Naval Blockade:** A key part of the plan was a Union naval blockade to prevent the Confederacy from importing manufactured goods and exporting cotton, which was vital for its economy.
- **Control of the Mississippi River:** The plan called for a strong military push down the Mississippi River, which would split the Confederacy in two. This would sever communication and transportation between the Confederate states and isolate them from supplies and troops.
- **Land and Naval Attacks:** In addition to the blockade and river control, the plan envisioned land and naval forces working in tandem to squeeze the Confederacy and force its surrender.

Operation Pointblank was the World War II Anglo-American air campaign aimed at destroying the German Air Force (Luftwaffe) and German aircraft production. Conducted primarily from mid-1943 to early 1944, it was part of the larger Combined Bomber Offensive that prepared the way for the 1944 Normandy invasion (Operation Overlord) by securing Allied air superiority.

Operation Starvation WWII

Over the course of the war, mine laying sank or damaged over 2 million tons of enemy shipping, a volume representing nearly one quarter of the prewar strength of the Japanese merchant marine. Prior to Operation STARVATION, a widespread mining campaign was conducted in the enemy's Outer Zone. Submarines, surface vessels and aircraft laid nearly 13,000 mines

in harbors and shipping lanes. No submarine or surface vessel was lost while minelaying and out of 3,231 aircraft mining sorties, only 40 aircraft failed to return. Approximately 770,000 tons of shipping was sunk or damaged.

Operation Strangle (Korean War)

A sustained interdiction attack on North Korea's supplies and communications by the United Nations forces during the Korean War. Beginning in August 1951, the campaign's 87,552 interdiction sorties were credited with destroying 276 locomotives, 3,820 railroad cars, 19,000 rail cuts, and 34,211 other vehicles. The North Koreans countered the campaign by moving anti-aircraft (AA) guns and crews towards the front line and placing them in higher concentration around important targets, causing heavy casualties in the UN forces. Despite high losses, Operation Strangle destroyed 900 AA gun positions and damaged 443.

Operation Rolling Thunder (Vietnam War)

1965 Operation Rolling Thunder was a frequently interrupted bombing campaign that began on 24 February 1965 and lasted until the end of October 1968. During this period U.S. Air Force and Navy aircraft engaged in a bombing campaign designed to force Ho Chi Minh to abandon his ambition to take over South Vietnam. The operation began primarily as a diplomatic signal to impress Hanoi with America's determination, essentially a warning that the violence would escalate until Ho Chi Minh "blinked," and secondly it was intended to bolster the sagging morale of the South Vietnamese.

Operation Instant Thunder Desert Storm

The preliminary air campaign plan for the 1991 Gulf War, devised by Colonel John A. Warden III to systematically degrade the Iraqi military's leadership, command, infrastructure, and forces through a series of air strikes. Though Warden's strategic plan was influential, the final Operation Desert Storm air campaign also incorporated significant attacks on Iraqi ground forces, ultimately contributing to the swift coalition victory.

Task Force 2010

In 2010, the U.S. military formed Task Force 2010 to combat corruption in Afghanistan by overseeing military contracting and stopping U.S. funds from being diverted to insurgents and corrupt officials. The task force's creation followed a congressional investigation that revealed the U.S. supply chain in Afghanistan was corrupted by a protection racket, effectively funneling U.S. funds to the Taliban and other criminal networks.

Operation Midnight Hammer

Joint United States and Israeli military operations in June 2025 significantly damaged key Iranian nuclear sites, including the Fordow, Natanz, and Isfahan facilities. The attacks, codenamed "Operation Midnight Hammer" for the U.S. portion, followed a week of Israeli strikes and led to an immediate crisis that included an Iranian retaliatory attack on a U.S. base and subsequent ceasefire.

Simply put, the US has focused on attacking the logistics, sustainment, finances and infrastructure of their adversaries since the revolutionary war.

China's and Russia's Logistics Dependencies

Both China and Russia rely heavily on logistics to prosecute a war, but their dependencies and vulnerabilities differ due to geography, industrial base, military doctrine, and access to global supply chains.

Here's a structured breakdown:

China's Logistics Dependencies:

Maritime Dependence

- Sea Lines of Communication (SLOCs): China relies on shipping lanes (Indian Ocean, South China Sea, Strait of Malacca) for energy imports, food, and critical raw materials. Disruption of these SLOCs would directly impair its war-sustainment capacity.
- Maritime Logistics: PLAN (People's Liberation Army Navy) lacks a large fleet of replenishment ships compared to U.S. standards, limiting sustained operations far from Chinese shores.

Energy Requirements

- Oil and Gas Imports: Roughly 70–80% of China's imported oil flows through the Strait of Malacca. In wartime, China would depend on secure routes or overland pipelines from Russia and Central Asia.
- Coal & Domestic Energy: While China is self-sufficient in coal, oil and natural gas remain critical vulnerabilities.

Industrial Base and High-Tech Inputs

- Defense Manufacturing: China has a vast domestic defense industry, but still relies on imports of advanced machine tools, semiconductors, and certain aerospace materials.
- Technology Bottlenecks: Access to advanced chips and microelectronics is a critical dependency—these power AI,

precision weapons, and C4ISR systems.

Overseas Basing & Access

- Limited Global Presence: Djibouti is China's only overseas military base. Its global logistics network is underdeveloped compared to the U.S., meaning China depends heavily on friendly ports or civilian commercial infrastructure in war.

Russia's Logistics Dependencies

Rail and Ground-Based Logistics

- Rail Network: Russia depends overwhelmingly on rail to move heavy equipment, fuel, and ammunition across its vast territory. In Ukraine, supply lines had to stay close to railheads, creating predictable chokepoints.
- Truck Shortages: Russia's military has fewer modern tactical trucks and suffers from poor maintenance/logistics planning, reducing flexibility once rail access ends.

Energy and Fuel

- Abundant Resources: Russia is largely self-sufficient in oil, natural gas, and coal, which supports domestic sustainment.
- Distribution Challenge: Delivering fuel to forward units in contested areas has been a recurring weakness (seen in Ukraine with abandoned vehicles due to fuel starvation).

Industrial and Ammunition Base

- Stockpile Dependency: Russia relies on massive Soviet-era stockpiles of artillery ammunition, armored vehicles, and spare parts. Sustainment depends on these reserves being available and functional.
- Foreign Components: Despite a strong .

- domestic arms industry, Russia still depends on Western and Asian microelectronics for precision-guided munitions, communications, and drones

Geographic Constraints

- Land-Locked Vulnerabilities: Unlike China, Russia's logistics lines are continental. While this reduces dependence on maritime choke points, it creates long supply distances and exposure to interdiction.
- Sanctions: Russia is increasingly dependent on imports from China, Iran, and North Korea for drones, artillery shells, and electronics—highlighting an external dependency for sustained war.

China's war prosecution depends most on secure maritime energy and trade routes, and access to high-tech components.

Russia's war prosecution depends most on maintaining long-distance ground supply lines, access to rail, and foreign tech imports for modern weapons.

In Appendix 1 of this White paper, you will find rich open-source details of PRC and Russia dependance on infrastructure. You will see how vulnerable these dependencies are and how the Ukraine has already penetrated and attack Russian Infrastructure. Appendix 1 must read material for this White Paper.

Conclusions

The term, “Contested Logistics” has become a phrase that means something different to many stakeholders. Many stakeholders assume that their understanding of contested logistics is universal. It’s only a naming convention that should generate a series of questions to better understand what is in the eye of the beholder.

This has caused the DoW Services to focus on what they could directly control in the Contested Logistics conundrum. This resulted in only meeting operational and tactical levels. The FY26 NDAA addresses focus on the entire Contested Logistics stratosphere; strategic to tactical, raw material to vender, lines of communications from raw material, vendor, depot and port to foxhole, vessel and flight line. This should result in attention to two principal concepts: weaponizing the use of AI to solve strategic logistics problems and a focus on weaponizing the US Industrial Base to meet war time needs in both volume and distribution against peer competitors.

The term, “Contested Logistica” is defensive in nature. It really is just the start of understanding weaknesses inherent in logistics and sustainment dependencies. Many of these dependencies were created unknowingly by the confluence of capitalization and globalization. The term, “Strategic Logistics” is more complete taking into consideration of contested logistics and contesting logistics. It applies and reflects that the lens of US logistics dependencies can be used to see the logistics dependencies of adversaries. This becomes a deterrence and an economic burden to US adversaries that would wage war.

Finally, US Logisticians in uniform and civilians in federal service along with Industry, both in the US and in the countries of our allies and partners need to be a part of the planning process during the competition and conflict phases of future conflicts. They should be a permanent partner at the tactical, operational and strategic of the Joint Targeting Enterprise.

APPENDIX I

Details of key refineries, rail lines, pipelines and ports in China and Russia

China – Key Logistics Infrastructure for War Refineries

China is the world's largest crude importer and has massive refining capacity (>18 mb/d). Critical refineries for military sustainment include:

Dalian Refinery (Liaoning) – Northeast hub, supports Northern Theater



PetroChina, China's largest oil and gas producer, has officially approved a massive \$9.6 billion investment to upgrade its Dalian refinery complex. This strategic decision represents one of the company's most significant capital expenditures in recent years, highlighting the continued importance of refining infrastructure in China's energy landscape despite global energy transition pressures.

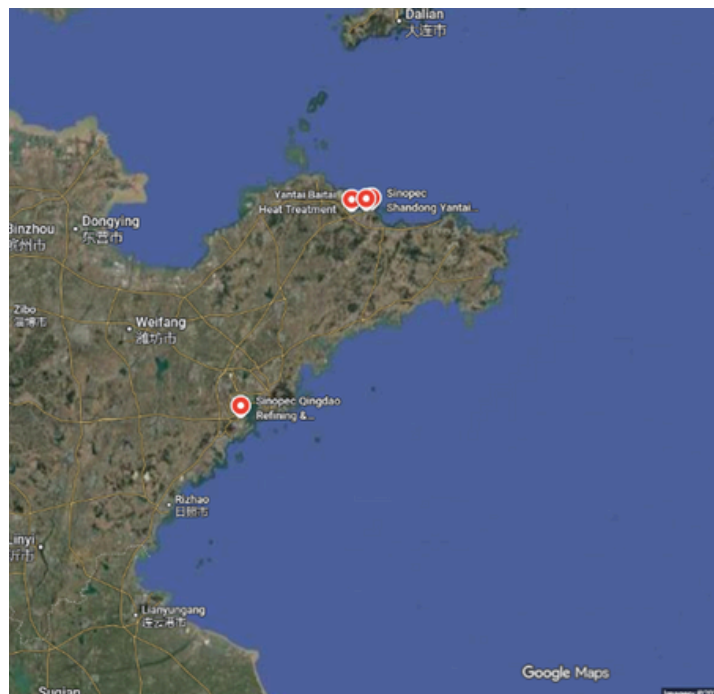
Located in northeastern China's Liaoning province, the Dalian facility has long served as a critical energy hub. The comprehensive overhaul aims to transform the aging complex into a world-class integrated refining and petrochemical operation capable of meeting growing domestic demand while enhancing China's competitive position in global markets.

Qingdao / Yantai Refineries (Shandong cluster) – Huge independent refiners (“teapots”), critical for jet fuel and diesel.

China's Shandong Yulong Petrochemical plans to invest \$117.86 billion yuan (\$16.42 billion) to produce chemicals at its refinery complex in Yantai, according to a government notice detailing



the provisional plan. The expanded refining complex would process petrochemical feedstocks produced at Yulong's existing operations, including ethylene and propylene, into materials such as super absorbent polymers and biodegradable plastics, according to a notice by the natural resources ministry published on June 18, 2025, and reported by local media Jiemian News on Wednesday.



Crude pipelines shared by independent refineries in Shandong



One of China's newest refiners, the company is 51% owned by private aluminum smelter Nanshan Group while provincial government-backed Shandong Energy Group has a 46.1% stake. The remainder is held by two local firms.

Shanghai Petrochemical / Zhenhai (Ningbo, Zhejiang) – Supplies East Theater forces

Sinopec Shanghai Petrochemical Company

Location: The company's main operations are in the Jinshan District of Shanghai.

Size and products: It is one of China's largest integrated refining and chemical enterprises, producing a range of petrochemical products.

History and ownership: It grew out of the Shanghai Petrochemical Complex, founded in 1972, and was one of the first Chinese companies to be listed on stock exchanges in Shanghai, Hong Kong, and New York. It is a subsidiary of China Petrochemical Corporation (Sinopec).

Sinopec Zhenhai Refining & Chemical Company (ZRCC)

Location: ZRCC is situated in Ningbo, in the Zhenhai District of Zhejiang province.

Size and products: It is also a major integrated refining and chemical company and is home to China's largest petrochemical industrial base. Its products include diesel, jet fuel, and ethylene.

Environmental practices: The Zhenhai facility has been recognized for its efforts in sustainable practices, including zero emissions and recycling wastewater.

History and ownership: Founded in 1975, ZRCC is a subsidiary of Sinopec and has been listed on the Hong Kong Stock Exchange since 1994.



Guangdong (Huizhou and Zhanjiang) – Supports South Theater and PLA Navy (PLAN) bases.

Huizhou - CNOOC Huizhou Petrochemical: This is a large-scale oil refining and chemical complex operated by China National Offshore Oil Corporation (CNOOC).

Huizhou I: This refinery was commissioned in 2009 and specializes in processing high-acidity heavy crude oil.

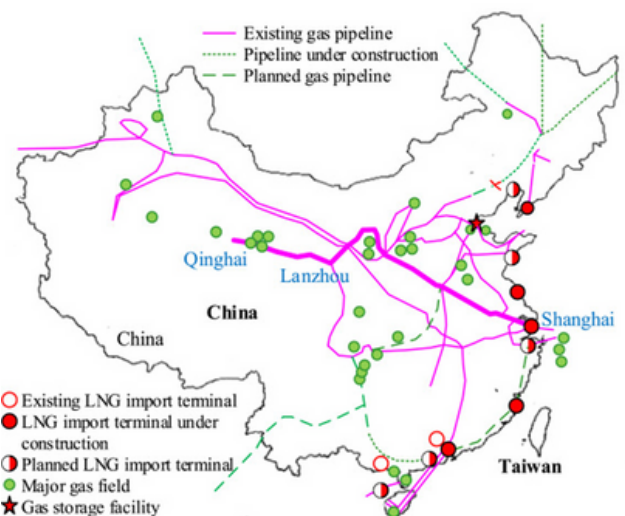
Huizhou Phase II: An expansion project that started up in 2017, it added 10 million tons per year of oil processing capacity and an ethylene plant. The integrated petrochemical complex was a joint venture with Shell.

Location: Daya Bay Petrochemical Industrial Park.

Zhanjiang - Sinopec Zhanjiang (Zhongke) Integrated Refinery and Petrochemical Complex:

This facility was started up by Sinopec in 2020 on Donghai Island.

Initial Capacity: The refinery began with a crude oil processing capacity of 200,000 barrels per



per day (300,000 tons per year) and an 800,000-ton-per-year ethylene facility.

Location: Donghai Island, Zhanjiang, which was chosen after an original site in Guangzhou was deemed ecologically unfit.

Sinopec Zhanjiang Dongxing Petrochemical: A second, separate Sinopec refinery in Zhanjiang that processes crude oil.

Capacity: 5 million tons per year.

Operations: In 2020, this refinery was merged with the newer Zhanjiang (Zhongke) plant to form a new refining hub.

Lanzhou & Urumqi (Xinjiang). – Linked to Central Asian pipelines (Kazakhstan oil, Russian gas).
Lanzhou Petrochemical

The Lanzhou refinery was one of the first major refining bases built in western China.

Ownership: Operated by PetroChina Lanzhou Petrochemical Company, a subsidiary of CNPC.

Capacity: As of 2021, the refinery's crude distillation unit had a processing capacity of approximately 213,000 barrels per day. Its total annual crude processing capacity is 10.5 million tons.

Products: The complex produces over 400 grades of products, including gasoline, kerosene, diesel fuel, and various petrochemicals like ethylene, synthetic resins, and fertilizers.

Input: It is connected to the Urumqi-Lanzhou pipeline and processes crude oil from Xinjiang and Kazakhstan.



Urumqi Petrochemical

The Urumqi complex is a significant hub for oil refining and petrochemicals within the Xinjiang region.

Ownership: The main oil and petrochemical operations are controlled by PetroChina, with the Urumqi Petrochemical Company as a subsidiary.

Products: The complex produces fuels and a range of petrochemical products, including urea, xylenes, and polypropylene.

Green hydrogen project: In 2024,

PetroChina began constructing a 20,000-ton-per-annum green hydrogen plant at the Urumqi complex. The green hydrogen is intended to replace conventionally produced "grey hydrogen" and lower the facility's carbon emissions.

Input: The refinery is supplied with crude oil from local fields in Xinjiang as well as imported oil via the Kazakhstan–China pipeline.

Strategic importance

The Lanzhou and Urumqi refineries are linked by an oil pipeline and are both integral to China's energy strategy in the northwest. They enable China to:

- Process crude oil from inland fields in Xinjiang.
- Refine imported crude oil from Central Asia, delivered via cross-border pipelines.
- Supply petroleum products and petrochemicals to both domestic and international markets.

Rail Lines (Strategic Mobility)

China's military depends on China Railway's dual-use infrastructure:

Beijing–Guangzhou (North–South trunk) – Moves equipment between capital region and southern ports.

The Beijing–Guangzhou railway is a major trunk railway that connects Beijing in the north with Guangzhou in the south. This double-track electrified line has a total length of 2,324 kilometers (1,444 miles) and spans five provinces through north, central and south China. The line passes through the capitals of each of them: Shijiazhuang (Hebei), Zhengzhou (Henan), Wuhan (Hubei), Changsha (Hunan) and Guangzhou (Guangdong). The line's two terminals are the Beijing West railway station and the Guangzhou railway station. Due to abundance of large and medium-sized cities on its route, this railway is widely recognized as the most important conventional railway line in China.

Baotou–Lanzhou–Xinjiang Line – Connects industrial heartland to western frontier (critical vs. India or Central Asia)

The Baotou–Lanzhou railway also known as the Baolan line is a 995 kilometers (618 mi) railway line that connects the cities of Baotou in Inner Mongolia to Lanzhou in Gansu Province. It began operating on 1 August 1958, making it the first Chinese railway through desert.

The Baotou–Huinong section is under the





jurisdiction of the Hohhot Railway Bureau, while the Huinong-Lanzhou section is under the jurisdiction of the Lanzhou Railway Bureau. In December 1997, electrification of the Gantang-Lanzhou East section was put into operation, and the Shizuishan-Zhongwei section was electrified in November 1998.[2] In 2009, the Baotou-Huinong section was electrified, completing the electrification of the whole line.

The Lanzhou-Xinjiang railway or Lanxin railway is the longest railway in Northwestern China. It runs

1904 kilometers (1,183 miles) from Lanzhou, Gansu, through the Hexi Corridor, to Ürumqi, in Xinjiang. It was Xinjiang's only rail link with the rest of China until the opening of the Lanzhou-Xinjiang high-speed railway in December 2014. The railway follows the path of the ancient Silk Road.

Strategic importance

Economic development: The combined Baolan and Lanxin railways have been critical for connecting northern and northwestern China, promoting economic growth, and strengthening ties within the region.

Eurasian land bridge: The Lanxin line, particularly its extension to the Kazakh border, serves as a crucial component of the Eurasian Continental Bridge corridor. This modern "steel silk road" connects China's coast to Europe.

Geopolitical control: Historically, the development of these railways helped the People's Republic of China to consolidate control over the remote and geographically complex northwestern provinces.

Harbin-Dalian-Shenyang Lines – Critical for rapid movement toward Korea/Japan theaters

The "Harbin-Dalian-Shenyang Lines" refer to the Harbin-Dalian high-speed railway (Hada HSR), a high-speed rail line in China that connects the cities of Harbin, Dalian, and Shenyang. It serves as the high-speed rail corridor for Northeast China, running from Harbin to Dalian via Shenyang and Changchun. Opened in December 2012, it is notable as the world's first high-speed railway

designed to operate in extreme cold and snowy conditions.

Cities Connected: Harbin, Dalian, and Shenyang.

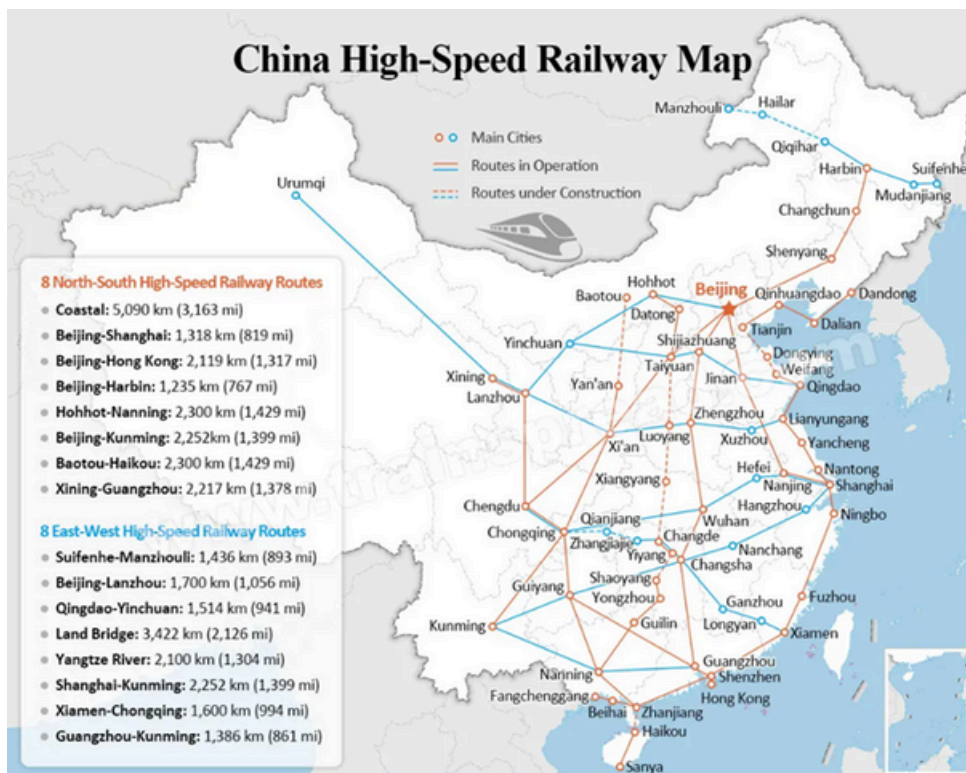
Route: The line extends from Harbin, passes through Changchun and Shenyang, and continues to Dalian.

Purpose: It forms a crucial high-speed rail corridor in Northeast China.

Key Feature: It was the first alpine high-speed railway in the world, designed to operate in sub-zero temperatures and snowy conditions.

Operation: The line is owned by China Railway and operated by CR Harbin and CR Shenyang.
Technical Design: The line incorporates de-icing technology for its tracks and has a robust safety system for managing extreme cold.

High-Speed Rail (HSR): PLA logistics doctrine considers limited use of HSR for personnel and some light cargo in emergencies.



Pipelines

West-East Gas Pipeline (WEPP I-III) – From Xinjiang to Shanghai and Guangzhou; ensures stable gas supply for industry during war.

The West-East Gas Pipeline (WEPP I-III) is a series of interconnected natural gas pipelines built by China to transport gas from the Xinjiang region to major economic centers, including Shanghai and the Pearl River Delta (including Guangzhou). The project aims to deliver clean energy

to eastern and southern China, supporting economic growth and replacing coal, with WEPP I, II, and III completed in 2004, 2011, and 2015, respectively. The pipeline crosses significant topographical challenges, including major rivers and mountains, and has brought economic and social benefits to areas along its route.

Energy Security: The pipelines enhance China's energy security by providing a reliable domestic supply of clean natural gas.

Economic Growth: The project facilitates economic development in western China and fuels the energy-intensive coastal cities by increasing local income and employment.

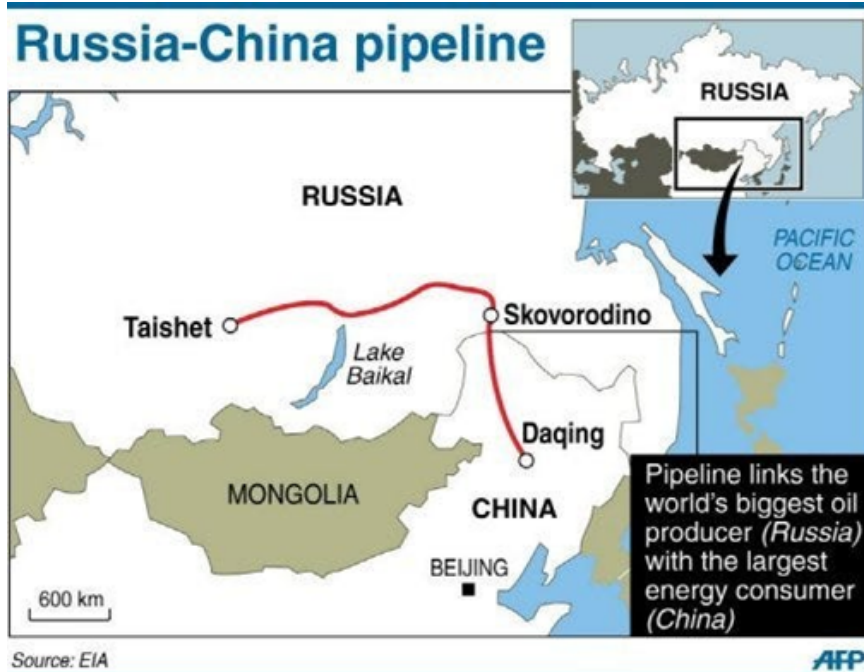
Infrastructure Development: The WEPP is a landmark energy infrastructure project that spurred growth in related industries, including construction materials, iron, and steel.

Origin: The WEPP starts at Horgos in the Xinjiang Uygur Autonomous Region.

Destinations: It delivers gas to key economic hubs, including the Yangtze River Delta (Shanghai) and the Pearl River Delta (Guangzhou).

Technical Challenges: The project involved overcoming significant engineering challenges, including crossing China's three major rivers (Yellow, Yangtze, Huai) and tunneling through mountains.

Network: The WEPP forms a trunk line network for China's natural gas sector, connecting to other domestic pipelines and the Central Asia-China Gas Pipeline.



Sino-Russia Oil Pipeline (ESPO spur to Daqing) – Strategic crude from Russia's East Siberia

The ESPO spur to Daqing is a China-Russia crude oil pipeline system, built as a branch of the larger East Siberia-Pacific Ocean (ESPO) pipeline system, which transports Russian oil to China. A second parallel pipeline was completed and began commercial operations in 2017, increasing the total combined annual capacity to 30 million metric tons (about

600,000 barrels per day). This project, involving CNPC (PetroChina) and Rosneft, was launched in 2013 to meet China's growing energy demand and to boost Russia's energy market share in China.

Energy Insecurity: The pipeline was built to help address the decline in crude oil production in China's northeast and to secure China's oil supply.

Strategic Shift: The project is part of Russia's strategic shift to strengthen ties with China and the Asian market, especially as demand for energy in Europe has fluctuated and, more recently, declined.

Economic Partnership: The venture was cemented by agreements between PetroChina and Rosneft, with CNPC making large prepayments for future oil deliveries.

Capacity: The two pipelines have a combined annual capacity to transport 30 million metric tons of crude oil (approximately 600,000 barrels per day).

Key Players: China National Petroleum Corporation (CNPC, PetroChina) is the primary buyer, and Rosneft is the supplier, with the pipeline built by CNPC.

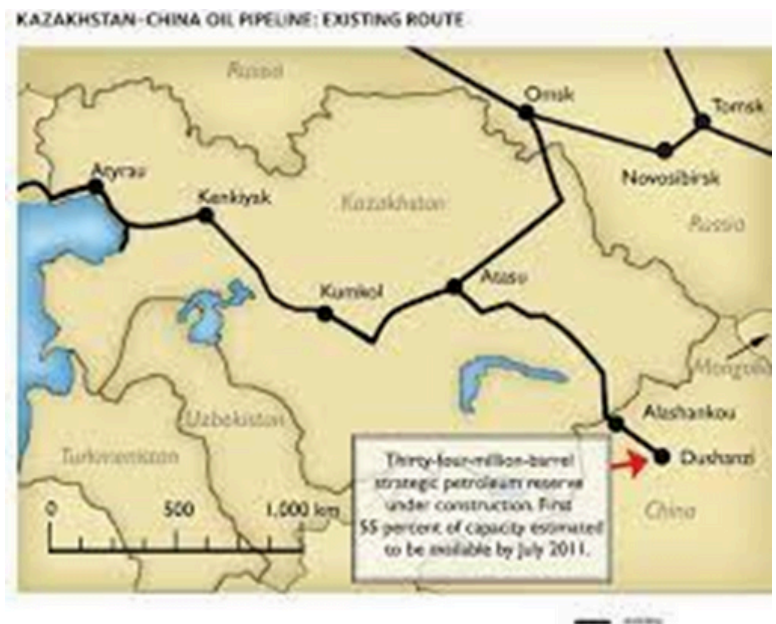
Boosts China's Energy Security: The pipeline enhances the reliability and integration of China's crude oil supply.

Strengthens Sino-Russian Ties: The project deepened energy cooperation between Russia and China.

China-Kazakhstan Oil Pipeline (Atasu-Alashankou) – Diversifies crude supply away from Malacca Strait

The Kazakhstan-China oil pipeline is China's first direct oil import pipeline allowing oil import from Central Asia. It runs from Kazakhstan's Caspian shore to Xinjiang in China. The pipeline is owned by the China National Petroleum Corporation and the Kazakh state-owned oil company KazMunayGas.

The 2,228 kilometers (1,384 mi) long pipeline runs from Atyrau in Kazakhstan to Alashankou in China's Xinjiang. The



Kenkiyak-Atyrau section of the pipeline is 449 kilometers (279 mi) long and has a capacity of 120 thousand barrels per day. Capacity of the pipeline maybe upgraded to 180 thousand barrels per day in the future. The pipeline was built and is operated by MunaiTas a joint venture between the China National Petroleum Corporation and KazMunayGas.

The Zhanaarka-Alashankou section of the pipeline cost US\$700 million. It is 987 kilometers (613 mi) long and has a capacity of 200 thousand barrels per day. Capacity of this section might be upgraded to 400 thousand barrels per day by 2011. The pipeline includes an oil metering station at Alataw Pass. The pipeline was built and is operated by a joint venture between CNODC and KazTrans Oil JSC. The first oil through this pipeline reached the refinery in August 2006.

The Kenkiyak-Kumkol section is 792 kilometres (492 mi) long. It has initial transportation capacity of 10 million tons per year. This section reached its full capacity in 2011.



Myanmar-China Pipeline (Kyaukpyu to Kunming) – Oil/gas bypassing Malacca (though vulnerable to interdiction)

The Myanmar-China pipeline is a set of two pipelines—one for crude oil and one for natural gas—that link Kyaukphyu Port, Myanmar, to Kunming,

China. Construction began in 2009, with the gas pipeline completed in 2013 and the oil pipeline in 2014. The project serves to provide an alternative energy route for China, bypassing the vulnerable Strait of Malacca, and to develop China's southwestern regions, aligning with the Belt and Road Initiative.

Purpose: To diversify China's energy supply routes, particularly for oil imports from the Middle East and Africa, and to provide a new access point to the Indian Ocean.

Route: The pipelines start at the deep-water port of Kyaukphyu on Myanmar's Bay of Bengal coast and travel across Myanmar to Kunming, the capital of China's Yunnan Province. Crude Oil Pipeline: Designed to carry crude oil, allowing China to move it overland and bypassing the Strait of Malacca.

Natural Gas Pipeline: Also transports natural gas from Myanmar to China.

Strategic Importance: The project provides China with strategic access to the Indian Ocean and supports the economic development of China's less-developed southwestern provinces.

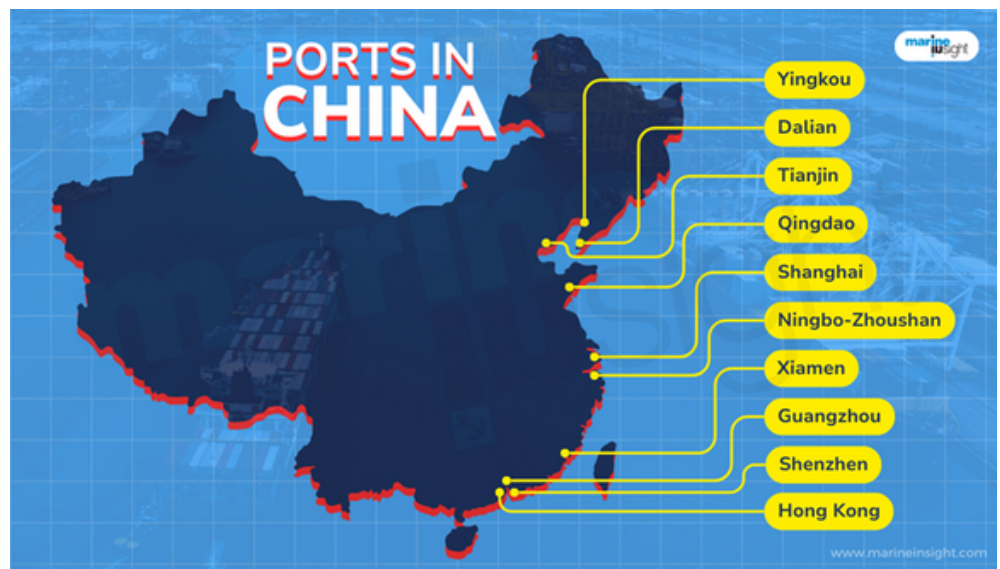
Energy Security: The pipelines enhance China's energy security by providing alternative, overland routes for energy imports, reducing reliance on sea lanes through the Strait of Malacca.

Belt and Road Initiative: The project is a key component of China's Belt and Road Initiative (BRI), specifically the China-Myanmar Economic Corridor (CMEC), designed to build infrastructure connecting China to the Indian Ocean.

Ports (Maritime Lifelines)

Shanghai – Largest port in the world, central to East Theater.

The Port of Shanghai is in the vicinity of Shanghai, comprises a deep-sea port and a river port. The main port enterprise in Shanghai, the Shanghai International Port Group (SIPG), was established during the reconstitution of the Shanghai Port Authority. In 2010, Shanghai port overtook the Port of Singapore to become the world's busiest container port. Shanghai's port handled 29.05 million TEU, whereas Singapore's was a half million TEU behind. Shanghai handled 43.3 million TEU in 2019.

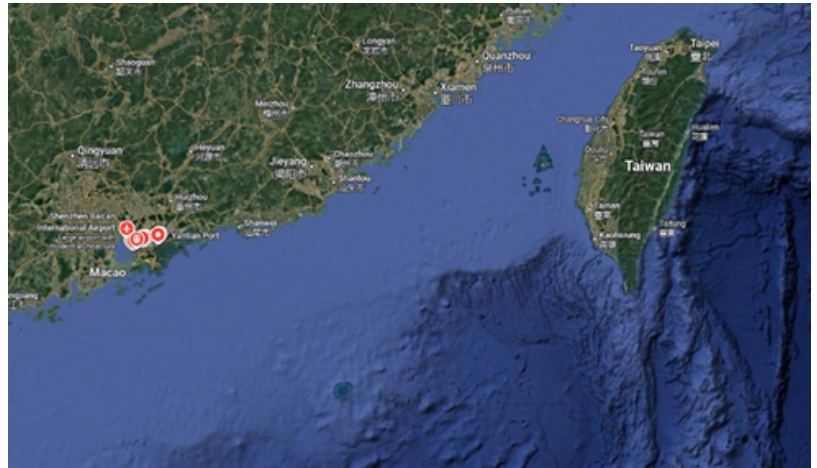


Shanghai is one of only four port-cities in the world to be categorized as a large-port Megacity, due to its high volumes of port traffic and large urban population. The Port of Shanghai faces the East China Sea to the east and Hangzhou Bay to the south. It includes the confluences of the Yangtze River, Huangpu River (which enters the Yangtze River) and Qiantang River.

Shenzhen (Yantian, Shekou) – Container hub for South Theater logistics

The Port of Shenzhen is a major port system located in China's Guangdong Province,

comprising key terminals like Yantian, Chiwan, Shekou, and Dachan Bay, serving as a global shipping hub. It is the third-largest port in China and one of the busiest container ports globally, handling millions of containers annually and facilitating worldwide trade connectivity. The port is a vital component of the Pearl River Delta's economy and the Maritime Silk Road initiative, with ongoing investments in its infrastructure and technology.



Strategic Location: Situated in the Pearl River Delta, it offers excellent connectivity to South China Sea markets and global trade routes.

Major Terminals: Features key facilities like Yantian Port (specializing in container transport), Chiwan, and Shekou, along with others such as Nanshan and Dachan Bay.

Global Significance: Ranked among the world's busiest ports, it plays a crucial role in international trade and the global supply chain.

Economic Driver: The port is a significant contributor to the economic development of Guangdong Province, attracting foreign investment and creating jobs.

Advanced Infrastructure: Undergoing continuous upgrades to its technology and facilities to enhance efficiency.

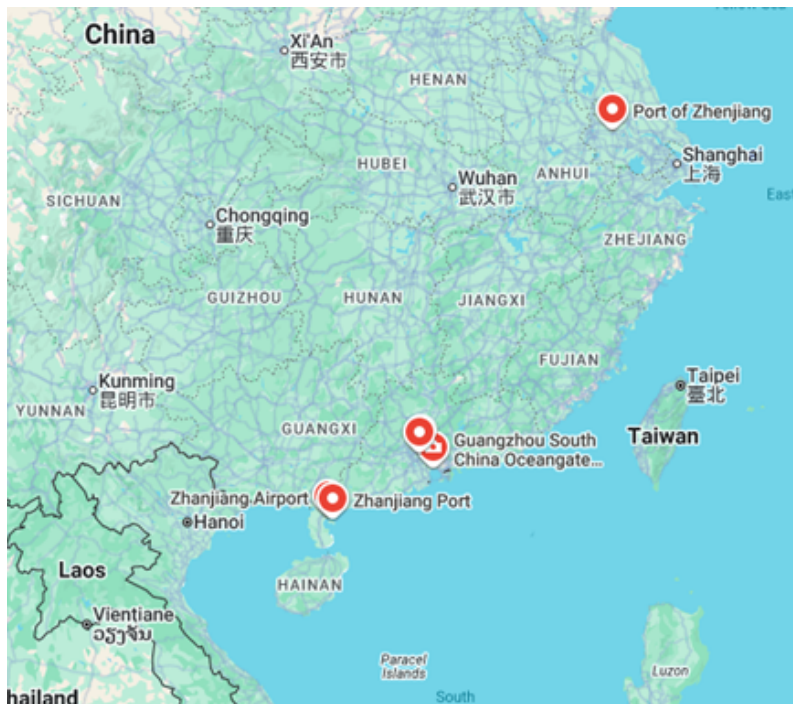
Container Shipping: The main focus, with extensive container handling capacity and numerous berths for container ships.

Passenger Services: Includes a border crossing and passenger terminal at the Shenzhen Bay Port, linking mainland China with Hong Kong.

Global Connectivity: Connects major markets in Asia, North America, and Europe through extensive shipping routes.

Guangzhou / Zhanjiang – PLAN South Sea Fleet bases and logistics support.

The Guangzhou and Zhanjiang ports are two significant but distinct deepwater seaports in China's Guangdong Province, both playing crucial roles in international trade and regional



logistics. Guangzhou Port is the largest comprehensive and foreign trade port in South China, serving as an ancient starting point for the Maritime Silk Road with a long history and extensive facilities for various cargo types. Zhanjiang Port, located on the southwestern tip of Guangdong, was China's first self-designed modern deepwater port, specializing in handling bulk commodities like oil and iron ore, while also developing into a key multimodal transit hub.

Guangzhou Port (CNGZG)

Cargo Focus: It is a large, comprehensive port that handles a wide variety of cargo, including general cargo, containers, and various bulk commodities.

Zhanjiang Port (CNZHA)

Modern Development: China's first self-designed modern deep-water harbor, established in the 1950s to handle large volumes of cargo and vessels.

Strategic Location: Located at the southwestern tip of Guangdong, it offers a direct and short route to major international shipping routes in Southeast Asia, the Middle East, Africa, and Oceania.

Specialized Cargo: Known for handling bulk cargo, especially oil, petroleum, and chemicals, and has terminals for iron ore, grains, and other bulk commodities.

Multimodal Hub: It serves as a multimodal transit hub, integrating with the province's road and rail networks to facilitate efficient logistics.

Strategic Importance: Plays a key role in the Belt and Road Initiative, supporting regional economic development and China's trade strategies.

Qingdao – Northern theater naval and industrial hub.

The Port of Qingdao is a seaport on the Yellow Sea in the vicinity of Qingdao (Tsingtao), Shandong Province, People's Republic of China. It is one of the ten busiest ports in the world (7th in 2019, considering total cargo volume).

Qingdao Port consists of four areas, which are often themselves referred to as ports due to their size: Dagang port area, Qianwan port area, Huangdong oil port area (for oil tankers), and Dongjiakou port area, the latter being located 40 kilometres south of Qingdao city.

Including the Qingdao Qianwan Container Terminal and the Qingdao Cosport International Container Terminal, which are in different areas, Qingdao also has a large terminal for handling iron ore. Qingdao enjoys strong industrial connections to Northeast Asia and increasingly the Arctic. While the city may not have an instantly recognizable name, it's located just across the sea from Seoul, South Korea and is close to Fukuoka, Japan and Shanghai, too. The Chinese metropolis' commercially critical location has helped push its port into the ranks of the world's top ten in terms of cargo volume. It is a major transshipment port and ranks sixth in terms of metal ore throughput. In fact, Qingdao port authorities are planning to turn its iron ore handling terminal into the world's largest. Iron is a key input for steel manufacturing, and in May 2017, it was reported that the country had enough iron ore stockpiled to build 13,000 Eiffel Towers.



Fujian Ports (Xiamen, Fuzhou) – Forward staging vs. Taiwan



Fujian province has multiple major ports, with the Port of Xiamen and the Port of Fuzhou being prominent examples, both ranked among the world's top ports for cargo and container throughput in 2022. These ports are crucial for international trade, connecting Fujian's manufacturing hubs to global markets and serving as key hubs for sea-rail intermodal services.

Port of Xiamen

Location: A well-developed, first-class port with a significant coastline and deep water.

Infrastructure: Features nine container terminals and multiple berths capable of handling large vessels.

Port of Fuzhou

Location: A natural seaport situated at the estuary of the Minjiang River, facing the Taiwan Strait.

Infrastructure: Composed of both river and deep-water seaport areas, including the Jiangyin

and Sanduao port districts.

Global Trade: Both ports are vital for Fujian's international trade, facilitating the import and export of goods from the region's factories and industries.

Maritime Silk Road: Xiamen is recognized as a starting point of the Maritime Silk Road initiative, highlighting its historical and strategic importance for trade.

Intermodal Connectivity: Fujian Port Group is actively developing intermodal sea-rail services, connecting the ports to inland regions to expand trade networks.

Gwadar (Pakistan) & Djibouti – Overseas ports to extend logistics reach, though still limited.

Gwadar Port in Pakistan and Djibouti Port in the Horn of Africa are both strategically important port developments within China's Belt and Road Initiative, though they differ significantly in their operational capacity and success. Gwadar has faced significant delays and struggles to attract major commercial traffic, whereas Djibouti is a major, high-performing regional trade hub and hosts China's only overseas military base.

Gwadar Port, Pakistan

Gwadar is a deep-sea port located on the Arabian Sea in Pakistan's Balochistan province, developed as a centerpiece of the China-Pakistan Economic Corridor (CPEC).

Commercial challenges: The port has not met commercial expectations and largely serves local fishing and artisanal trade, despite officially becoming fully operational in 2021.

Infrastructure deficiencies: Progress is hampered by limited road and rail links connecting the port to major economic



centers in Pakistan and onward to China. Recent issues include persistent power outages that affect port operations.

Expansion efforts: Expansion plans are in place, including an adjacent Special Economic Zone (SEZ) and a new international airport that opened in 2024. The long-term goal is to handle 400 million tons of cargo annually by 2045.

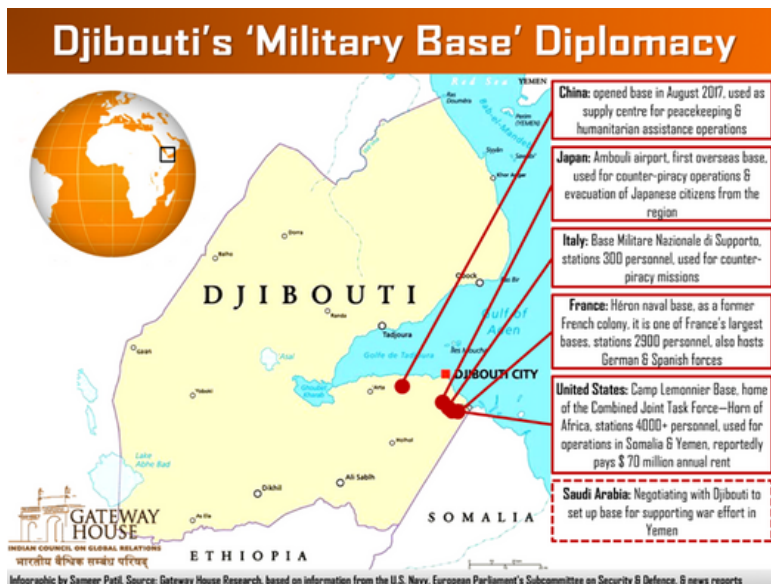
Security risks: Attacks by separatist groups, such as the Baloch Liberation Army, have repeatedly targeted Chinese projects and personnel in the region, creating a significant security concern.

Recent activity (2025): Pakistan plans to boost transshipment operations between Gwadar and the Gulf region and is actively engaging shipping companies. However, the port has not yet become the major international hub envisioned.

Djibouti Port, Djibouti

Djibouti's port complex is located at a critical chokepoint connecting the Red Sea and the Gulf of Aden, giving it a key role in trade between Europe, the Middle East, and Asia.

Operational performance: Djibouti is a highly active and important trade and logistics hub for the Horn of Africa and for international shipping. In 2024, it showed a 46% increase in container throughput, a record gain that underscores its commercial success.



Advanced infrastructure: A diversified port system includes a modern container terminal (Doraleh) capable of handling the world's largest vessels, a bulk port, and a free trade zone. It is also connected to landlocked Ethiopia via a modern, Chinese-built railway.

Chinese involvement: China is Djibouti's largest investor and has provided extensive financing for infrastructure. Three Chinese companies hold stakes in the Djibouti International Free Trade Zone, and Chinese firms have also been

involved in communications projects.

Strategic military presence: China established its first overseas military base in Djibouti in 2017 to support its naval operations, leveraging its port investments for broader strategic influence.

Geopolitical context: Djibouti's strategic importance has made it a focal point for geopolitical competition. The country unilaterally canceled a contract with DP World in 2018 and has since deepened its relationship with China.

Russia – Key Logistics Infrastructure for War Refineries

Russia is energy self-sufficient but needs refining close to warzones:



Omsk Refinery (Siberia) – Largest refinery; supplies western Russia via pipelines

The Omsk Refinery is one of the largest and most important oil refineries in Russia, located in the Siberian city of Omsk, approximately 1,700 miles (2,700 km) east of Moscow. Operated by Gazprom Neft, the facility has a current crude oil processing capacity of 19.5 million tons per year and produces a wide range of petroleum products, including high-octane gasoline, diesel

fuel, and marine fuel. The refinery, which began operations in 1955, is a major industrial enterprise and a significant supplier of products for both domestic and military use.

Location: Omsk, Siberia, Russia.

Ownership: Gazprom Neft.

Capacity: 19.5 million tons of crude oil per year.

Products and Operations

Product Range: Produces various petroleum products, including high-octane gasoline, diesel fuel, marine fuel, and aviation kerosene.

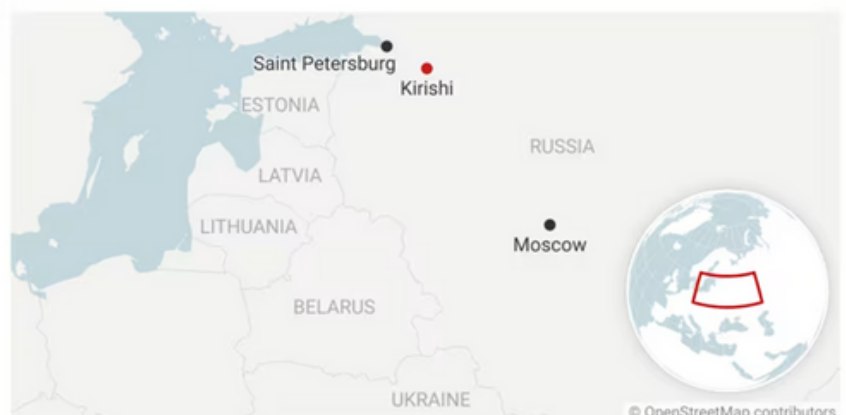
Significance: It is one of Russia's largest oil processing facilities and a key supplier to the Russian military.

Recent Events: Fire and Explosion (2024): A fire and explosion occurred at one of the refinery's primary distillation units (CDU-11) in August 2024, injuring several people and causing significant damage.

Kirishi Refinery (near St. Petersburg) – Fuels Northwestern Military District

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– Fuels Northwestern Military District

The Kirishi oil refinery, also known as Kirishinefteorgsintez (KINEF), is a large-scale Russian refinery located in Kirishi, Leningrad Oblast, about 100 kilometers southeast of St. Petersburg. It is owned by the Russian company Surgutneftegaz



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and is the only refinery in Northwestern Russia.

Capacity: With an annual processing capacity of about 17.7–20 million metric tons (355,000–400,000 barrels per day), it is one of Russia's largest refineries.

Significance: The facility is a major supplier of petroleum products, including gasoline, diesel, and aviation fuel, for St. Petersburg and the surrounding regions.

Operations: KINEF produces a wide range of petroleum and petrochemical products and has regularly updated its facilities to improve product quality and safety. A specialized "Kirishi-2" residual oil high conversion refinery was added in 2017 to produce a high yield of light oil and high-quality motor fuels.

Ukrainian drone attacks

The refinery has been a target of Ukrainian drone attacks during the Russo-Ukrainian War: March 2024: A drone attack reportedly hit the refinery, causing damage that impacted half of the facility's production until repairs were made.

September 2025: On September 14, 2025, a Ukrainian drone strike caused a fire at the refinery. Industry sources told Reuters that the attack forced a shutdown of a key processing unit, which accounted for almost 40% of the plant's total processing capacity.

Aftermath of September 2025 attack: Ukrainian military intelligence claimed responsibility for the strike. Russian officials stated that falling debris caused a fire that was extinguished without casualties. The strike occurred just days after a separate attack on the nearby Primorsk oil terminal.



Ryazan Refinery (near Moscow) – Critical central hub

The Ryazan Refinery is an oil refinery located in the city of Ryazan, Russia, approximately 120 miles (200 kilometers) southeast of Moscow. The facility is owned and operated by the Russian state-owned oil giant Rosneft.

It is one of the largest oil refineries in Russia, with a processing capacity of around 17 million tons of crude oil per year.

The refinery produces a significant amount of Russia's refined fuels, including gasoline, diesel, and jet fuel.

Due to its importance in Russia's energy sector and military-industrial complex, it has been repeatedly targeted by Ukrainian drone attacks during the war.

Ukrainian strikes have hit the refinery in May, August, and September 2025, as well as in early 2025, causing significant damage and disrupting its operations.

Tuapse Refinery (Black Sea coast) – Supports Black Sea Fleet and southern operations

The Tuapse oil refinery is a Russian facility on the Black Sea coast that has been a frequent target of Ukrainian drone attacks during the war. Owned and operated by Russian state-owned oil giant Rosneft, the refinery is one of the oldest in Russia and holds strategic importance for Russian military logistics.



Location: The refinery is located in Tuapse, a port city in Russia's southern Krasnodar Krai, and is the only major Russian refinery on the Black Sea.

Capacity: It has a processing capacity of 12 million metric tons of oil per year (about 240,000 barrels per day).

Production: The plant produces naphtha, fuel oil, and diesel, which are exported via the adjacent marine terminal to countries like Turkey, China, and Malaysia.

Military importance: In addition to its civilian export role, the refinery is considered strategically important as it supplies fuel to Russia's Black Sea Fleet and military infrastructure.

Throughout 2024 and 2025, Ukrainian drones have repeatedly struck the Tuapse refinery, causing fires and damage. These attacks are part of a broader Ukrainian strategy to disrupt Russia's energy infrastructure and limit its capacity to fund its war effort.

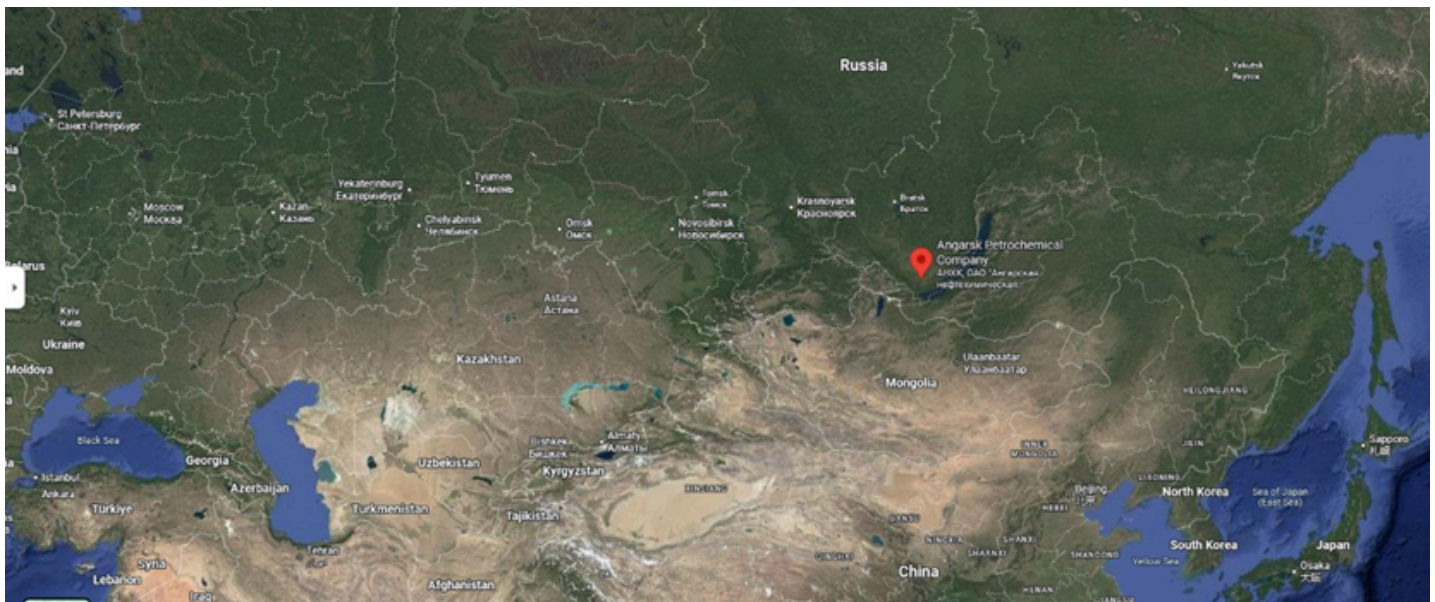
Recent significant attacks include:

- March 2025: A drone or missile attack caused a fire to break out in a gasoline tank, which took three days to extinguish. The blaze reportedly covered more than 1,000 square meters.
- February 2025: A swarm of Ukrainian drones targeted the refinery, with local residents reporting numerous explosions.
- July 2024: A drone strike started a fire that was later put out. Authorities indicated no casualties.
- May 2024: Another attack led to a fire, resulting in a temporary shutdown of the plant.
- January 2024: A fire caused by a drone attack forced the refinery to cease operations for several months.

The frequent strikes on the Tuapse and other Russian refineries have had several impacts: Operational disruptions: The refinery has been forced to halt operations multiple times, disrupting Russia's fuel output and export capacity.

Refining capacity reduction: By November 2024, industry reports suggested that the repeated strikes had placed the outdated Tuapse refinery at risk of permanent closure, along with other affected facilities.

Domestic fuel issues: The attacks contributed to domestic fuel shortages and price concerns within Russia, leading the government to impose temporary bans on gasoline exports in 2024.



Angarsk Refinery (Irkutsk, East Siberia) – Links to China pipeline exports but also fuels Far East military units

The Angarsk Refinery is a major oil refining and petrochemical complex in Angarsk, Irkutsk Oblast, East Siberia, Russia. Operated by the state-owned oil company Rosneft, it is one of the largest refineries in the country and a crucial supplier of petroleum products for the Siberia and

Far East regions.

Owner: The facility is operated by the Angarsk Petrochemical Company (APCC), which was acquired by Rosneft in 2007.

Capacity: The refinery has a crude distillation capacity of around 13.4 million tons (or 98 million barrels) per year.

Feedstock and production: The refinery processes crude oil from West Siberian oil fields, which is delivered through the Russian pipeline system. It produces over 200 different products, including:

- Gasoline (including Euro-5 compliant fuel)
- Diesel and jet fuel
- Oils, bitumen, and coke
- Chemical products like methanol and sulfuric acid

Petrochemical integration: The Angarsk complex includes petrochemical capacities that produce products like methanol, butanols, and amines. It also supplies feedstock to the nearby Angarsk Polymer Plant, also owned by Rosneft, to produce petrochemicals like ethylene and propylene.

Strategic importance: Angarsk's large output and location on the Trans-Siberian Railroad make it a key supplier of refined products to the eastern regions of Russia.

Modernization: Rosneft has invested heavily in modernizing the complex to increase its refining depth and produce higher-quality, environmentally compliant fuels. Upgrades have included new units for catalytic cracking, hydrotreatment, and blending, allowing the refinery to produce Euro-5 standard fuels.

In December 2022, an explosion and fire occurred at the refinery, killing two workers and injuring several others. An investigation and a criminal case were initiated following the incident



Rail Lines

Rail is Russia's single most important logistics artery:

Trans-Siberian Railway – Strategic east-west spine, connects Moscow to Vladivostok.

The Trans-Siberian Railway is the world's longest railway system, connecting European

Russia to the Russian Far East, with its main line from Moscow to Vladivostok spanning 9,289 kilometers. It also includes branch lines, like the Trans-Mongolian, that extend to Beijing through Mongolia, and the Trans-Manchurian, which passes through China's Manchuria.

Construction began in 1891 under Tsar Alexander III and was completed in 1916, facilitating population, resource transport, and the unification of the Russian Empire.

Length: At over 9,289 kilometers (5,753 miles), it is the longest railway in the world.

Route: The main line runs from Moscow to Vladivostok on the Pacific coast, passing through cities like Yekaterinburg, Novosibirsk, and Irkutsk before reaching the Russian Far East.

Branch Lines: The Trans-Mongolian and Trans-Manchurian routes extend the network to Beijing, China.

Construction: The railway was built in harsh conditions between 1891 and 1916 to connect the vast Russian territories and stimulate population growth and resource development in Siberia.

Economic Development: The railway was crucial for supplying Siberia with goods and materials, delivering raw materials to industry, and uniting European Russia with its eastern regions.

Unification: It served to connect the vast, disparate parts of the Russian Empire and facilitated migration to the sparsely populated Siberian regions.

A National Symbol: The railway is a symbol of Russian ambition and engineering prowess, and it remains a vital part of Russia's transportation network and national identity.



Moscow-Bryansk-Belgorod Line – Primary resupply into Ukraine.

The Moscow-Bryansk-Belgorod railway corridor is a historically significant route now operating under the Moscow Railway's administration, with the Moscow-Kursk-Belgorod section being the key line for connections to the city of Belgorod and beyond to Ukraine. The Moscow-Bryansk segment was historically part of the Moscow-Kyiv-Voronezh Railway, while the Moscow-Kursk-Belgorod route provides connection to Kharkiv, Ukraine. In recent years, these lines have been a target of sabotage attacks, leading to service disruptions and temporary closures.

Operational Authority: The Moscow Railway manages services on this corridor, including suburban and long-distance trains.

Route Configuration: The corridor comprises two main lines: the

Moscow–Bryansk line and the Moscow–Kursk–Belgorod line, which continues south towards Kharkiv, Ukraine.

Electrification: The railway lines are electrified, facilitating efficient passenger and cargo transport.

Infrastructure: The Moscow–Odintsovo section has four tracks, reducing to two tracks west of Odintsovo.

The Moscow–Bryansk section was constructed between 1895 and 1899 as part of the Moscow–Kyiv–Voronezh Railway.

The Moscow–Kursk–Belgorod line provides a direct connection from Moscow to the major city of Belgorod and further south.

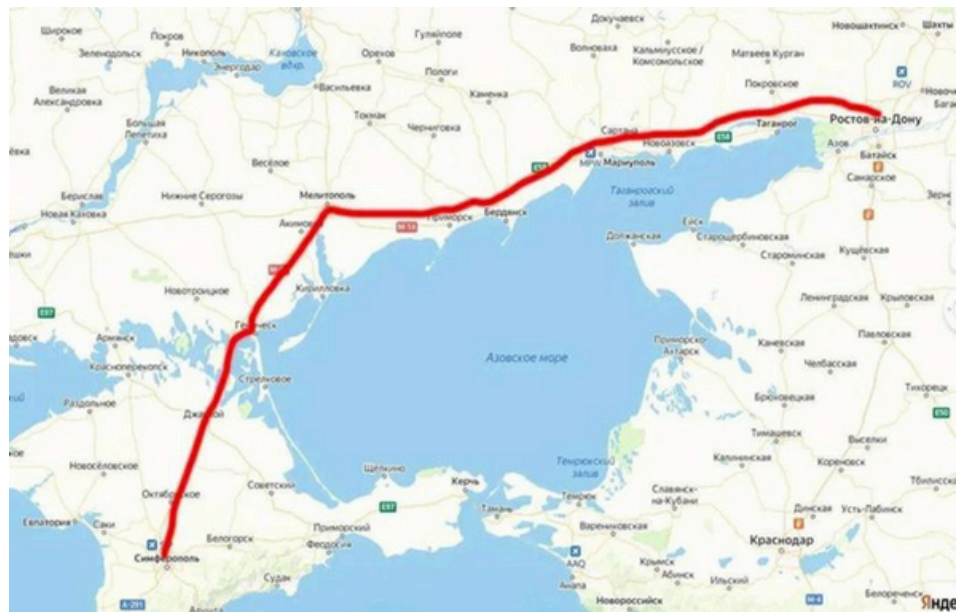
The Moscow–Bryansk–Belgorod lines have experienced multiple incidents of sabotage, including explosions and bridge collapses, which have temporarily halted train traffic. These incidents have been classified as terrorist attacks by Russian authorities, with Ukraine being accused of involvement.

The disruptions have affected train schedules and highlighted the strategic importance of these routes for logistical operations.

Rostov–Krasnodar–Crimea Line – Supports operations in southern Ukraine and Black Sea.

Line – Supports operations in southern Ukraine and Black Sea.

The Rostov–Krasnodar–Crimea Line refers to Russia's ongoing effort to build a new land-based railway system connecting Rostov-on-Don and Krasnodar with the Russian-occupied Crimean Peninsula. This project aims to create an alternative logistical route to the Kerch Bridge, which has been targeted by Ukraine, and to consolidate Russian control over occupied territories in the Sea of Azov region. This new line, also known as Tavrida-2, runs through occupied Ukrainian territories like Melitopol and



Berdiansk in the Zaporizhzhia Oblast, and is a critical strategic target for Ukraine's military to disrupt Russian supply chains.

Alternative Supply Route: The line serves as a land-based backup to the Kerch Bridge, which serves as a key supply route for Russian forces in Ukraine but has been damaged and targeted by Ukrainian strikes.

Logistical Consolidation: The new railway aims to improve logistical efficiency for military supplies and industrial freight, and to reinforce Russia's integration of the occupied territories.

Strategic Target: For Ukraine, this new railway line represents a significant military threat, making it a priority target for sabotage to degrade Russian military capabilities and logistics.

Key Locations:

Rostov-on-Don: A major city in Russia and a starting point for the new rail line.

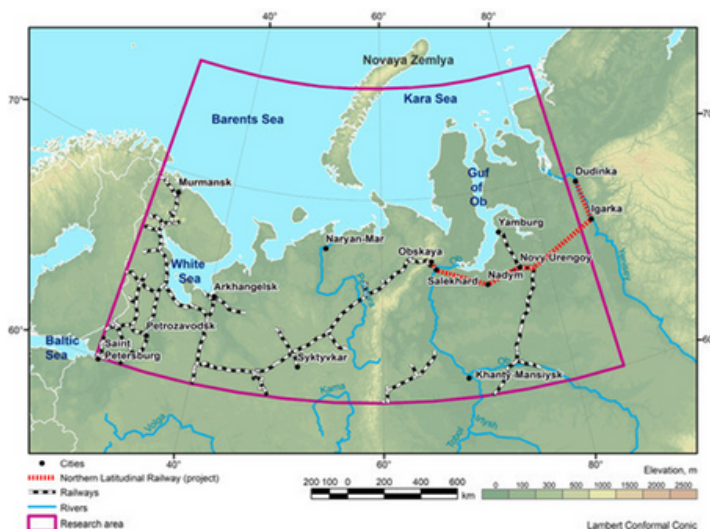
Krasnodar: The capital of Krasnodar Krai, a region in southern Russia bordering the Sea of Azov and the Kerch Strait.

Occupied Ukrainian Territories: The route includes stops in occupied cities like Melitopol and Berdiansk, which are now part of the Russian-controlled supply network.

Ongoing Construction: Russia is building this new line in phases, integrating existing and new rail infrastructure to connect the mainland with Crimea and the occupied Sea of Azov region.

Ukrainian Attacks: Ukraine has repeatedly targeted infrastructure in the Rostov and Krasnodar regions, including railway substations, to disrupt

Crimea: The destination of the new line, consolidating Russia's illegal annexation of the peninsula.



Russian supply chains and logistics related to this new line.

Murmansk & Arkhangelsk Lines – Supply Arctic bases and Northern Fleet.

The primary Murmansk and Arkhangelsk rail lines are distinct routes connected by a strategically important World War II-era line between Obozerskaya and Belomorsk. The main lines run south from their respective

Arctic ports to join Russia's broader rail network.

Murmansk Rail Line

Original Name: Originally named the Murman Railway when constructed between 1915 and 1917 to provide a year-round, ice-free port for Russia during World War I.

Current Status: Now known as the Kirov Railway, it is operated by the Russian Railways' subsidiary, the October Railway.

Route: The line runs south from the port of Murmansk on the Kola Peninsula. It connects with St. Petersburg, with the section between Petrozavodsk and Kola being particularly significant. Historical Significance: During both World Wars, the line was a vital supply link to central Russia via Murmansk, which remains ice-free due to the Gulf Stream.

Arkhangelsk Rail Line

Route: This line runs south from the port of Arkhangelsk on the White Sea. It connects to Russia's rail network near Moscow via Vologda.

Infrastructure: The main railroad that connects Moscow and Arkhangelsk is served by the Obozerskaya railway station, which is part of the Northern Railway.

Historical Context: Unlike Murmansk, the port of Arkhangelsk freezes in winter, which has historically limited its use as a northern supply line.

Belomorsk–Obozerskaya rail link

Purpose and Construction: This crucial connecting line was constructed during World War II between 1939 and 1941. It links Belomorsk (on the Murmansk line) with Obozerskaya (on the Arkhangelsk line).

Strategic Importance: The line was built to create an alternative transport route for supplies to the Murmansk port. This proved invaluable after Finnish forces cut the main Murmansk rail line in 1941, making the Belomorsk–Obozerskaya link the only rail access to Murmansk for three years.

Baikal–Amur Mainline (BAM) – Alternative to Trans-Siberian for Far East supply.

The Baikal-Amur Mainline (BAM) is a 4,324 km-long railway in Russia that runs parallel to the Trans-Siberian Railway through Eastern Siberia and the Russian Far East. Constructed through some of the world's most remote and challenging terrain, its history is marked by both forced labor during the Stalinist era and later Soviet propaganda celebrating it as a "hero project".

Route and Geography

The BAM originates at Tayshet, west of Lake Baikal, where it splits from the Trans-Siberian Railway.

From there, it crosses three time zones and several federal subjects, including the Irkutsk, Chita, and Amur regions, before ending at the Pacific Ocean port of Sovetskaya Gavan.

The railway traverses six regions of Russia and required the construction of over 2,200 bridges and the nearly 16 km-long Severomuysky Tunnel to overcome the challenging terrain and permafrost.

Strategic importance and purpose

Military alternative: The BAM was built as a strategic alternative to the Trans-Siberian Railway, which runs closer to the Chinese border and was considered vulnerable to a potential Chinese incursion.



Economic development: A key objective was to open up and extract the vast natural resources of Siberia, including coal, timber, and various minerals.

Modernization: The project was part of a Soviet strategy to industrialize and modernize the remote regions of the north.

Transit corridor: Today, alongside the Trans-Siberian Railway, the BAM is seen as a vital transit corridor for trade with Asia-Pacific markets.

Pipelines

Druzhba ("Friendship") Oil Pipeline – Supplies western Russia & exports to Europe (less relevant under sanctions)

The Druzhba, or "Friendship," Oil Pipeline is one of the world's longest oil pipeline networks, built during the Cold War to transport crude oil from Russia to Eastern and Central Europe. It has become a significant geopolitical tool, with recent Ukrainian attacks highlighting Europe's ongoing reliance on Russian energy.

Eastern Siberia–Pacific Ocean (ESPO) Pipeline – Lifeline for Asian exports (China spur to Daqing also sustains China).



The system has a total capacity of approximately 1.2 to 1.4 million barrels per day (bpd). While the Russian section is operated by Transneft, other portions of the pipeline are operated by state-owned companies in their respective countries, including Belarus, Ukraine, Poland, Slovakia, and the Czech Republic.

[Russian invasion of Ukraine \(2022–present\):](#)

Northern branch shutdown: In 2023, Germany and Poland stopped importing Russian oil via the northern route, though Kazakhstan now sends oil to Germany through this branch.

Southern branch targets: The southern branch, which remains a lifeline for Hungary and Slovakia due to exemptions from EU sanctions, has been targeted multiple times by Ukrainian drone strikes in 2025.

Diplomatic fallout: The attacks have created tension between Ukraine and Hungary, which relies heavily on Druzhba for its oil supply.

Yamal-Europe Gas Pipeline – Exports cut, but domestic branches still vital for internal war economy.

The Yamal-Europe Gas Pipeline is a major, now-idle, natural gas pipeline that historically

transported Russian natural gas through Belarus and Poland to Germany. While



transported Russian natural gas through Belarus and Poland to Germany. While construction started in 1994, it was fully commissioned in 2006 and has a maximum annual capacity of 33 billion cubic meters. Samara–Tuapse Pipeline – Feeds Black Sea ports.

The pipeline spans approximately 4,107 kilometers and is made up of several

sections, each with different ownership.

Russia: The main pipeline originates at the Torzhok hub in Russia. This section is owned and operated by Gazprom.

Belarus: The pipeline runs 575 kilometers across Belarus, with this section owned by Gazprom and operated by Gazprom Transgaz Belarus.

Poland: The Polish section is 683 kilometers long. It was originally owned by EuRoPol Gaz, a joint venture between Polish company PGNiG and Gazprom. In 2023, following sanctions, Poland's state oil concern Orlen took over Gazprom's 48% stake, making it the 100% owner of this section.

Germany: The pipeline terminates at the Mallnow compressor station near Frankfurt (Oder), where it connects with the Western European gas grid. The German section is owned by WINGAS, a joint venture between Gazprom and Wintershall Dea.

Ports

Murmansk – Year-round Arctic port, supports Northern Fleet and global naval operations.

The Murmansk Commercial Seaport is a major, year-round ice-free port in northwest Russia, located on the Kola Bay, an inlet of the Barents Sea. Situated north of the Arctic Circle, it serves as a critical economic and strategic hub for Russia's Arctic region.

Key characteristics and features:

Year-round operation: Unlike many other Arctic ports, Murmansk remains ice-free all year due to the warming effect of the North Atlantic Drift, an ocean current from the Gulf Stream.

Strategic location: The port is the western terminus of the Northern Sea Route (NSR), an increasingly viable commercial shipping lane due to Arctic ice melt. It links the North Atlantic, Asia, and European Russia.

Extensive facilities: The port includes commercial, fishery, oil, and passenger terminals. It features 13 berths and modern equipment, including gantry cranes and forklift trucks.

Deepwater access: The port's fairways are between 20 and 60 meters deep, accommodating large vessels of up to 130,000 deadweight tons (DWT).

Major cargo handler: The port has historically been a significant transit point for goods, particularly coal, though cargo volumes have fluctuated. More recently, authorities have sought to diversify cargo to include fertilizers and iron ore.

Home of the nuclear icebreaker fleet: Murmansk is home to Russia's nuclear-powered icebreaker fleet, which is essential for maintaining shipping routes in the Arctic Ocean.

Cold War Development

Throughout the Cold War, the port was heavily developed and served as a major naval base for the Soviet fleet.



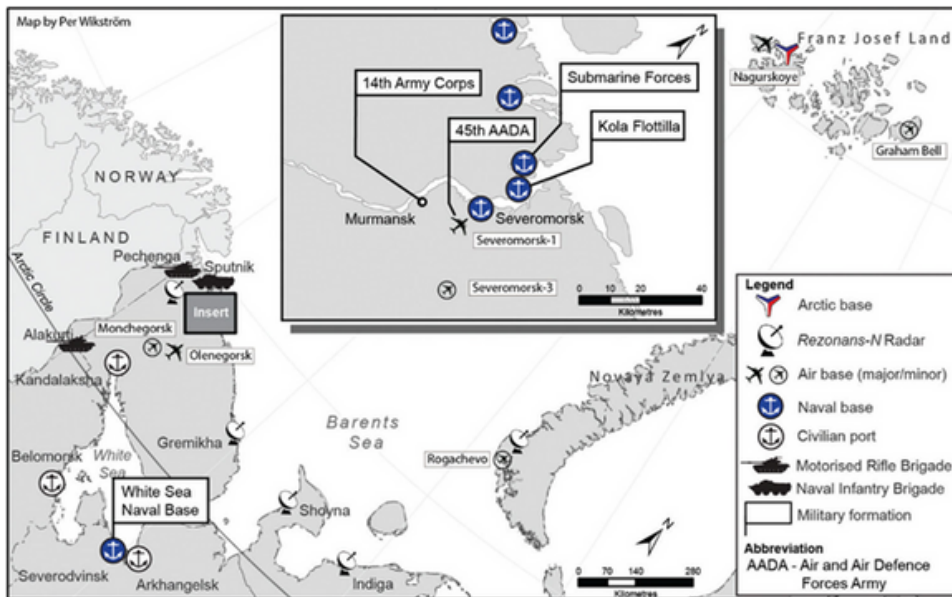
Modern era: Since 2011, Russia has been pursuing a multi-billion dollar "Integrated Development of the Murmansk transport hub" project to enhance the port's role as the main base for the Northern Sea Route.

Increased Arctic shipping: As Arctic sea ice continues to melt, shipping traffic on the Northern Sea Route is expected to increase, further amplifying Murmansk's importance as a key hub.

Severomorsk – Northern Fleet HQ

The port of Severomorsk is the main administrative and naval base of the Russian Northern Fleet. Located on the Kola Peninsula in northwestern Russia, it is a restricted, "closed town" that is generally inaccessible to foreign visitors.

Strategic importance: As the headquarters of Russia's most powerful fleet, it is a crucial military



outpost in the Arctic. The base houses a significant portion of Russia's nuclear-powered submarines and surface ships, which are responsible for operations in the Arctic, Atlantic, and other northern waters.

Ice-free access: Despite being located above the Arctic Circle, the port remains ice-free all year due to the warming effect of the

Gulf Stream. This provides the Northern Fleet with year-round, unrestricted access to the open sea.

Location: Severomorsk is situated on the eastern side of the Kola Bay, approximately 25 kilometers (16 miles) northeast of the larger port city of Murmansk.

Civilian vs. military status: While the port of Severomorsk is an exclusively military installation, the nearby port of Murmansk is a civilian port that handles freight and serves as a base for nuclear-powered icebreakers.

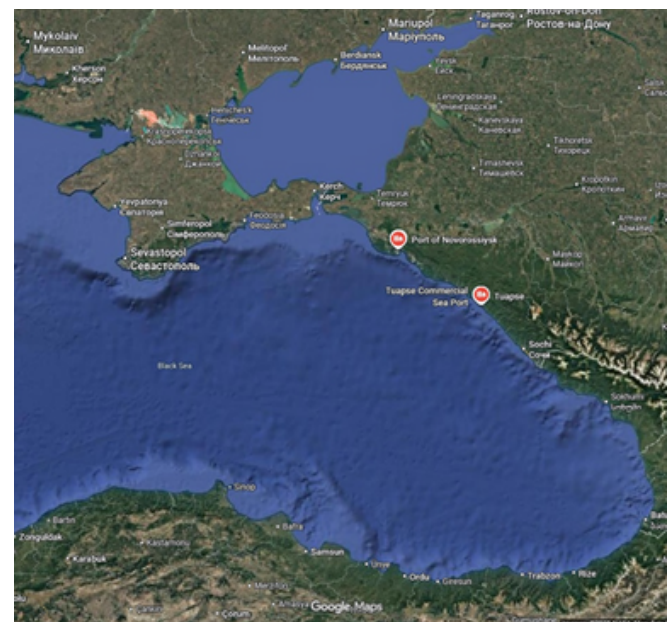
Recent events: In June 2025, several news outlets reported that explosions and smoke were seen at the naval base, with some citing social media reports. As of late September 2025, Russia has not officially confirmed these reports, which some observers interpreted as a potential Ukrainian attack on deep Russian infrastructure.

Novorossiysk & Tuapse (Black Sea) – Critical for resupply of Black Sea Fleet.

Novorossiysk and Tuapse are two major seaports on the northeast coast of the Black Sea, both part of Russia's Krasnodar Krai. They are crucial industrial, commercial, and military hubs for Russia, handling significant exports of oil and grain.

Novorossiysk

Largest port: Novorossiysk is one of the largest



ports in the Black Sea and the largest in Krasnodar Krai. Its berthing line is also the longest among all Russian ports.

Geography: The city is located on the deep-water Tsemes Bay and surrounded by the North Caucasus Mountains, which protect it from continental winds. The bay is ice-free year-round, but winter navigation can be halted by the strong northeastern "bora" wind.

Economy: It is a major industrial hub and the largest Russian transport hub on the Black Sea. Key economic activities include:

- **Exports:** Novorossiysk is a primary port for Russian grain and oil exports. The Baku-Novorossiysk pipeline terminates here.
- **Industry:** It is a major center for cement production, and other industries include shipbuilding and food processing.
- **Military importance:** Novorossiysk is a crucial naval base for the Russian Black Sea Fleet. It became the main base for the fleet after Ukrainian strikes on Crimea forced a partial withdrawal from Sevastopol. The base protects Russian economic interests and has strategic advantages.

Tuapse

Seaport and resort town: Tuapse functions as both a major seaport and a resort town on a sheltered Black Sea bay.

Economy: Its economy is driven by shipping, industry, and tourism.

Oil exports: Tuapse is a significant oil-refining and oil-export center. The Rosneft-owned Tuapse oil terminal is one of the biggest on the Black Sea.

Industry: Other industries include food processing and petroleum machinery manufacturing.

Transport hub: Tuapse is a key transport hub for the Russian Black Sea coast, serving as a critical ground link to Sochi. It has a railway station that connects to other regions.

St. Petersburg / Ust-Luga – Major Baltic ports for trade, fuel, and supply.

The phrase "St. Petersburg / Ust-Luga Port" refers to two distinct and separate Russian ports on the Baltic Sea, not a single facility. Ust-Luga was developed to handle cargo traffic away from the historical Great Port of St. Petersburg and the ports of the newly independent Baltic states.

Great Port of St. Petersburg

This is a major, long-established seaport serving the city of St. Petersburg in northwest Russia.



Location: Situated at the head of the Gulf of Finland.

Historical context: The port was developed on Peter the Great's orders to create Russia's "window to Europe" and provide a warm-water port.

Capabilities: It features 147 berths, a total berthing length of 21.7 km, and a maximum vessel draft of 13 meters.

Governance: The port's commercial navigation is overseen by the Port Authority of the Great Port of St. Petersburg.

Cargo: It is equipped to handle various cargo types, including bulk, containers, and dry bulk.

Ust-Luga Port

This is a major, modern deep-water port located about 170 km west of St. Petersburg, closer to the Estonian border.

Construction: Construction on the port began in 1997, and it officially opened in 2001, partly to bypass the Baltic states for shipping dry cargo.

Location: Situated on the mouth of the Luga River, which flows into the Gulf of Finland.

Capacity: It has a deep approach channel capable of accommodating large vessels up to 150,000 tonnes or more.

Capabilities: Ust-Luga features multiple specialized terminals for handling various goods, including:

- Oil and gas: The port contains facilities for handling oil, gas condensate, and liquefied natural gas (LNG).
- Bulk cargo: It serves as a major terminal for coal and fertilizer.
- Containers: A container terminal, operated by the National Container Company, opened in 2011.
- Ro-Ro: The port has facilities for roll-on/roll-off (Ro-Ro) cargo.
-

Recent events: In 2024 and 2025, several of Ust-Luga's oil and gas terminals have been targeted by Ukrainian drone strikes, causing fires and disrupting operations.



Vladivostok & Nakhodka – Eastern ports, resupply Pacific Fleet and Far East military districts

Vladivostok and Nakhodka are two major Russian ports in Primorsky Krai, with Vladivostok being the larger, historic port and naval base, while Nakhodka, located about 85 km east of Vladivostok, is a prominent commercial port centered on the oil terminal of Kozmino and an important hub for timber, coal, and seafood exports. While Nakhodka has a naturally sheltered bay and specialized infrastructure, Vladivostok serves as the administrative center of the region and the eastern terminus of the Trans-Siberian Railway.

Vladivostok Port

Significance: The historic administrative center of Primorsky Krai and a key naval base.

Infrastructure: The port is a major terminal for the Trans-Siberian Railway.

Activity: It handles various cargoes and serves as the main base for foreign vessels in the Far East, though it is not ice-free.

Nakhodka Ports

Location: Situated on the Nakhodka Bay, about 85 km east of Vladivostok.

Key Components: The Nakhodka complex includes a commercial port (Marine Terminal), an oil port (Nakhodka Terminal), and a fishing harbor, which are all managed by a common VTS system.

Economic Focus: Primarily handles forest products, coal, and seafood. The port of Kozmino serves as the terminal for the Eastern Siberia–Pacific Ocean (ESPO) oil pipeline.

Infrastructure: Features the Vostochny Port complex, a modern, high-tech coal port, and facilities for various types of cargo.

Port Features: The port is noted for its deep and sheltered waters, which are less prone to freezing than other ports in the region.

Bottom Line Last

China's warfighting logistics hinge on coastal refineries, rail-to-port corridors, and pipelines feeding oil from Russia/Central Asia. Maritime ports are its Achilles' heel.

Russia's logistics depend on its rail arteries, inland refineries, and pipelines feeding fuel to fronts. Long-distance overland supply is its main vulnerability.

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