

Strategic Implications of U.S. LNG Exports

WHITE PAPER



American Security Project



In this Report

The United States is the world's leading producer of natural gas and largest exporter of liquefied natural gas (LNG). Over the past decade, affordable U.S. LNG exports have facilitated a global shift from coal and mitigated the geopolitical risks of fossil fuel imports from Russia and the Middle East. Today, U.S. LNG plays a critical role in diversifying global energy supplies and reducing reliance on adversarial energy suppliers. However, rising global dependence on natural gas is creating new vulnerabilities, including pricing fluctuations, shipping route bottlenecks, and inherent health, safety, and environmental hazards. The U.S. also faces geopolitical challenges related to the LNG trade, including China's stockpiling and resale of cheap U.S. LNG exports to advance its renewable energy industry and expand its global influence.

In an ideal scenario, the international community would align around a shared vision of gas production and consumption to facilitate the transition from coal to renewable energy. Instead, the U.S. LNG industry's plans for rapid growth are increasingly disconnected from international partners and global gas demand, which is expected to peak as early as 2030. With U.S. LNG exports poised to double by 2028, further gas infrastructure expansion could lock in long-term global dependency at a time when energy systems must evolve. To foster a sustainable and secure energy future, U.S. energy policies must stabilize domestic demand for LNG, improve methane tracking and reduction, pursue comprehensive energy partnerships, invest in renewable energy projects, and develop a long-term strategy for LNG supply.

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Introduction

In January 2024, the Biden administration temporarily suspended new authorizations of liquefied natural gas (LNG) exports to non-free trade agreement (FTA) countries amidst recent, rapid changes in the international economic and energy environment.¹ This “pause” was intended to accomplish two objectives: to determine whether continuing the years-long unprecedented degree of U.S. natural gas export volumes serves the public interest, and to grant time for policymakers and other authorities to determine a long-term strategy for U.S. LNG exports.

While pausing, rejecting, and regulating export authorizations for reasons of public interest are activities sanctioned under the U.S. Natural Gas Act, determining what priorities comprise the “public interest” is less clearly enshrined.² The underlying economic analysis used by the U.S. Department of Energy (DOE) to evaluate new LNG export facilities has not been updated since 2018, only two years after the U.S. began exporting LNG from the lower 48 states.³ Since then, the U.S. has become the largest global LNG exporter, jumping ahead of Qatar and Australia in 2023.⁴ Additional export capacity in construction is expected to double the volume of U.S. LNG exports by 2030.⁵

THE U.S. NATURAL GAS ACT

[June 21, 1938, Chapter 556]

SECTION 1. (a) As disclosed in reports of the Federal Trade Commission [...] it is hereby declared that the business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest, and that Federal regulation in matters relating to the transportation of natural gas and the sale thereof in interstate and foreign commerce is necessary in the public interest.

Given the drastically expanding role of U.S. LNG in the global energy trade, a comprehensive review of U.S. LNG policy is needed to clarify and adapt U.S. exports to the current domestic and geopolitical landscape. In the coming decades, competition between the U.S. and other LNG exporters could intensify if the demand for LNG does not keep pace. With major U.S. LNG buyers in Europe, Japan, and the Republic of Korea (ROK) transitioning away from fossil fuels, the U.S. needs a forward-looking strategy to mitigate future oversupply risks. In the short-to-medium term, U.S. LNG can provide countries with an offramp from coal and help allies avoid geostrategic risk from Russian and Middle Eastern fossil fuel chains. Optimizing current exports to secure allies’ energy security while maximizing revenue will allow the U.S. to reinvest profits into its domestic and international priorities in the long term.

However, rising global dependence on natural gas—fueled partly by massive production and export volumes of cheap U.S. LNG—carries immediate and tangible risks with destabilizing global implications as well as domestic consequences. China continues to benefit from the resale of cheap U.S. LNG exports, investing profits to expand its influence in global energy markets and across the international community.⁶ This dynamic intensifies China’s strategic competition with the U.S. and thus presents concerns for U.S. national security. The growing LNG industry also presents problems within the United States, as increasing LNG export volumes are associated with higher domestic LNG prices. Additionally, LNG is a hazardous substance that can pose immediate health and safety risks to the environment and American communities through methane leakage and pollution.

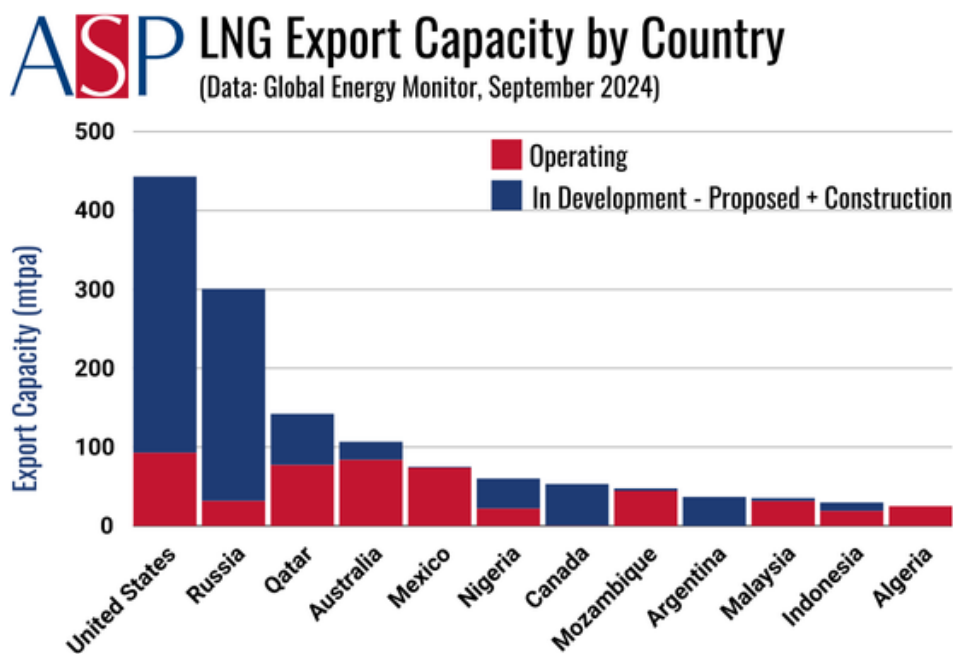
Reliable access to energy at home and secure critical commodity supply chains are the number one priority of the DOE, but to remain a world energy leader and mitigate political risk from foreign adversaries, U.S. energy exports must provide the global market a fair and ethical counterweight to adversary energy giants such as Russia, China, and Iran. It is possible for the U.S. to capitalize on the advantages of its growing LNG trade while shielding U.S. citizens and allies from many of the risks. Through increased methane tracking and abatement measures, the U.S. can mitigate the harmful environmental effects of LNG and remain competitive in an increasingly climate-concerned market. Additionally, by stabilizing domestic demand for LNG, building robust energy partnerships, and investing in renewable energy projects, the U.S. can bolster domestic and allied energy security in the long and short term.

The U.S. Role in Global LNG Markets

U.S. LNG exports have transformed global energy markets by introducing flexible contracts, competitive pricing, and an alternative to traditional suppliers—enhancing energy security for nations seeking to diversify supplies amid geopolitical tensions. While this flexibility has fostered global LNG price convergence, it has also increased global market volatility, with U.S. LNG often pricing out developing countries during supply shocks. This is especially true when intermediaries purchase low-cost U.S. LNG for resale, a strategy aggressively pursued by the People’s Republic of China (PRC). U.S. LNG’s high life-cycle methane emissions also challenge its sustainability, prompting increased scrutiny from key buyers in the European Union (EU), Japan, and South Korea. Balancing U.S. LNG’s role in energy security with these risks will be crucial to maintain strategic leadership in a decarbonizing global energy market.

The Rise of U.S. LNG

For more than half a century, the United States consumed more energy than it produced.⁷ This changed in the early 2000s, when hydraulic fracturing (also known as fracking) and horizontal drilling unlocked new sources of oil and gas from landlocked shale across the nation.⁸ When cooled to minus 260 degrees Fahrenheit, natural gas becomes liquified and shrinks to one-six hundredth of its original size.⁹ U.S. LNG is then loaded into tankers and shipped to distant global markets using specialized equipment to maintain appropriate temperatures and conditions.



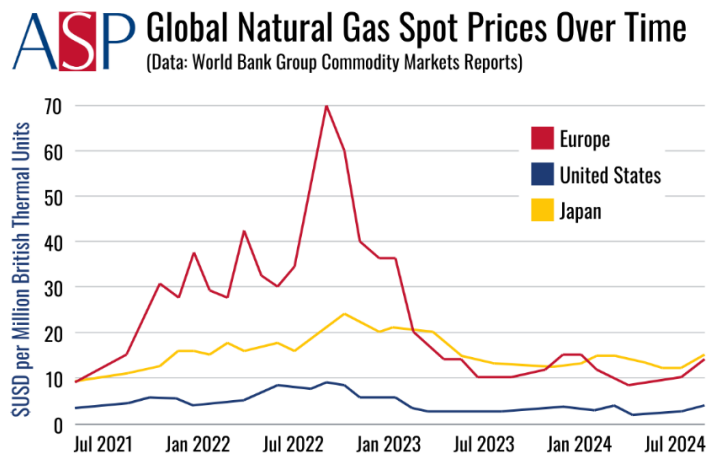
Note: Russia is expected to fall significantly short of its export capacity goals in the coming years. By 2030, it will likely trail U.S. export capacity by a dramatic margin.

Cheniere Energy became the first American company to export LNG from the Gulf Coast in 2016.¹⁰ Since then, the U.S. LNG export industry has grown dramatically, exporting 11.4 billion cubic feet per day (Bcf/d) in 2023, the equivalent of 12 percent of total U.S. gas production.¹¹ As exports accelerate and create new demand, domestic capacity expands in tandem. As of September 2024, the U.S. is responsible for 39.6 percent of all new global LNG export capacity currently under construction.¹² This pending capacity is expected to nearly double U.S. LNG exports by 2028, adding 9.7 Bcf/d mainly from projects in Louisiana and Texas.¹³

U.S. LNG exports have contributed to global price stability, supply security, natural gas market growth, and diversification of energy markets. These factors have sparked novel competition in the LNG trade globally, including from traditional fossil fuel-extractive regions like the Middle East. The world’s second-largest LNG exporter, Qatar, plans to expand its LNG export capacity to 19.7 Bcf/d by 2028 due to improved market factors.¹⁴ Overall, LNG supplies to the global market are expected to grow 40 percent from 2025 to 2028.¹⁵

Impacts on Global LNG Contracts and Pricing

Over the past decade, U.S. LNG exports have transformed the global LNG industry by introducing greater flexibility and competitive pricing structures. Unlike traditional LNG contracts, U.S. LNG is often sold on a “free on board” basis, with ownership transferring to buyers before shipping.¹⁶ These contracts are also destination-flexible, allowing buyers to redirect cargo as they wish in compliance with U.S. law.¹⁷ This flexibility has encouraged the rise of portfolio players who secure large contracts from LNG producers and sell them to end users, often on the spot market.¹⁸ These traders can direct shipments to where prices are highest and engage in arbitrage—a practice in which a commodity is recurrently bought and sold in different markets to generate profit.



U.S. LNG serves as a balancing force in the global LNG market, appealing to buyers seeking to diversify away from the political risks and oil-linked pricing offered by competitors like Qatar and Australia. Increased global supply has contributed to greater price convergence across regions as global availability rises.¹⁹ This convergence has been further accelerated by the international adoption of U.S. LNG pricing as a benchmark, which is linked to the Henry Hub distribution center in Louisiana and pegged to the U.S. dollar.²⁰

However, as LNG markets worldwide become increasingly interconnected, regional shocks increasingly create price volatility across the market. A recent Institute for Energy Economics and Financial Analysis (IEEFA) report found that LNG is more price-sensitive to geopolitical disturbances than other commodity markets, including oil and gold.²¹ This became evident after the Russian invasion of Ukraine in 2022 led to global gas supply shocks, sending LNG spot prices soaring worldwide. In addition, conflict, criminal activity, and extreme weather events lead to tighter LNG supplies in the market and higher prices. During these market contractions, wealthier nations outbid developing countries for LNG, preventing them from securing sufficient energy supplies. This is an emerging challenge for South and Southeast Asian countries where coal-to-gas switching, decreased domestic gas production, and economic growth have driven up demand for LNG.

Impacts on the Global Energy Transition

Global commitments to the UN Paris Agreement goal of limiting global temperature rise to 1.5 °C are driving countries to increase the deployment of renewable energy technologies and lower their greenhouse gas (GHG) emissions. Natural gas has served as a bridge for the energy transition, as when combusted by the end user, it releases lower carbon dioxide (CO₂) emissions and air pollutants per unit energy produced.²² When burned, natural gas releases 50 percent less CO₂ into the atmosphere than coal and 30 percent less than oil.²³ It is also useful because fossil fuels are not always interchangeable with renewables within current energy generation and transmission infrastructure. Renewable energy sources have lower power densities than non-renewable sources, requiring a larger surface area to produce an equivalent amount of power.²⁴ Third, when renewable energy generation from wind and solar is insufficient, gas can provide reliable baseload power. Until renewable energy fully replaces fossil fuels, LNG will remain strategically crucial as one component of a balanced energy diet.

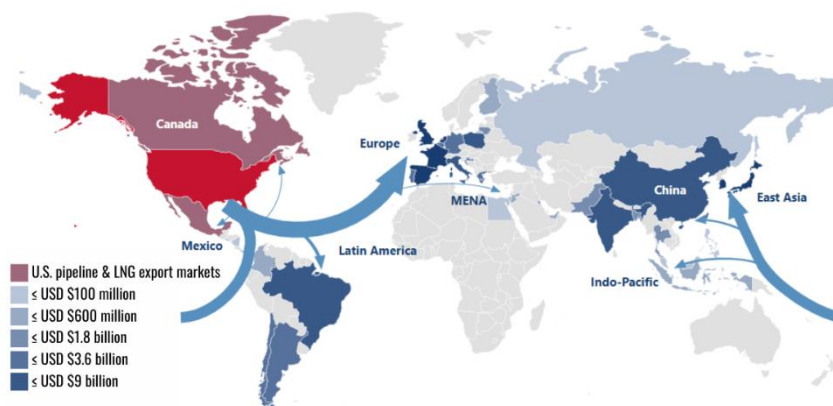
Despite these interim benefits, LNG is not a long-term solution due to its non-renewability and impact on global methane emissions. Methane is a greenhouse gas that is 80 times more potent than CO₂ in the first 20 years after it is released into the atmosphere.²⁵ Leakage of this gas can occur throughout LNG's life cycle, including during production, transport, shipping, regasification, and combustion. Despite this drawback, some evidence suggests that if U.S. LNG replaces coal for power production, this change could result in a net reduction in global GHG emissions.²⁶ However, other studies indicate that LNG's emissions can be greater than coal's when accounting for its entire life cycle.²⁷ A recent American Security Project report noted that rather than paving the way for a transition to clean energy, new LNG projects may be replacing more renewable energy infrastructure than coal plants.²⁸

Regardless of LNG's contributions to the global energy mix, the United States must prepare for increased scrutiny of methane emissions in U.S. LNG supply chains. Several of U.S. LNG's largest customers—Europe, Japan, and the ROK—are pursuing initiatives to limit methane leaks in their supply chains. In 2023, Japan and the ROK began requesting emissions data from their LNG producers as part of the Coalition for LNG Emission Abatement Towards NetZero (CLEAN).²⁹ The European Union followed in 2024, establishing a legal framework for monitoring, reporting, and verifying emissions of imported fossil fuels.³⁰ Starting in 2026, the European Commission will publish publicly available “methane performance profiles” which will disclose the downstream methane intensity of the EU's imported LNG.³¹ By 2030, the EU will determine and enforce “maximum methane intensity values” on LNG and fossil fuels entering the European market.³² These regulations will require suppliers to make significant operational changes to access the critical EU market, likely imposing a global cost premium for LNG with low methane intensity. They will also impose strict requirements for independent monitoring, reporting, and verification (MRV) data to ensure that LNG exporters are accurately disclosing their emissions.³³

If the United States aggressively curbs methane emissions in its gas operations and ensures that its MRV processes meet the EU's standards before these 2030 initiatives come into effect, then U.S. LNG could become a preferred premium supplier to the low-methane intensity market ahead of its clean-air competitors. Currently, U.S. gas has higher methane emissions than that of Australia, Saudi Arabia, and Norway, but lower emissions than in Russia, Algeria, and Turkmenistan.³⁴ In a positive first step towards emissions abatement, the Inflation Reduction Act reduces methane emissions from oil and gas operations by implementing a fee on excess methane emissions set at \$900/ton in 2024 and rising to \$1,500/ton in 2026.³⁵ As long as future presidential administrations maintain this fee structure, the U.S. gas industry is projected to reduce methane emissions by 1.2 million metric tons through 2035.³⁶ This will improve the competitiveness of U.S. LNG and its ability to be sold to climate-concerned buyers at a premium price.

ASP U.S. Natural Gas Export Value Flows, 2000-2023

(Data: U.S. Energy Information Administration, accessed June 2024)



Regional Security Implications of U.S. LNG

Reliable and abundant electricity provision is required for communication and transportation systems, food and water supply, healthcare services, and national defense, making access to global energy supply chains a vital government function. Across the globe, U.S. LNG exports have helped regions diversify and bolster these energy supplies while mitigating their political risk. In Europe, U.S. LNG has been central to countering Russian aggression and bolstering energy security. In Asia, Africa, Latin America, and the Caribbean, U.S. LNG can serve as a reliable energy source as the regions seek to diversify their energy mix. Rising LNG exports from the Middle East will likely compete against U.S. LNG, but escalating regional conflict endangers LNG shipping flows from countries such as Qatar.

Europe

According to NATO, Russian aggression is the foremost security concern in the Euro-Atlantic region.³⁷ If Russian President Vladimir Putin wins the war in Ukraine, U.S. allies fear that he will be emboldened to expand his campaign into other European states. For this reason, the continent began divesting from Russian fossil fuels to diminish revenue going into Putin's war chest and reduce Russia's leverage over its neighbors soon after his invasion of Ukraine.

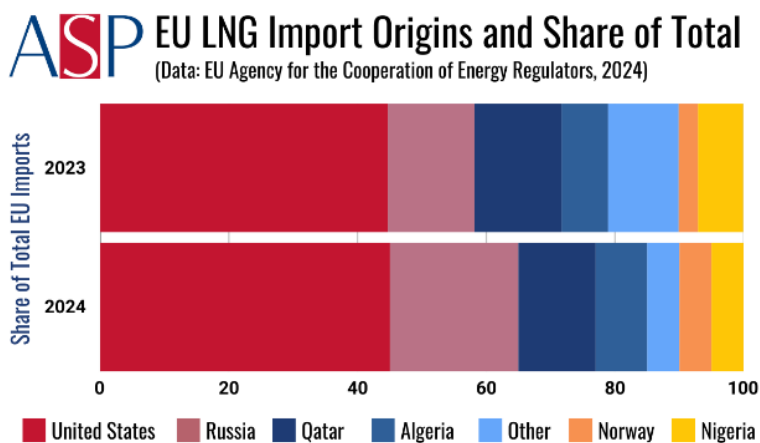
Before Europe fully divested, however, Russian pipeline gas flows to Europe were halted in retaliation for expanded Western sanctions which crippled the ruble.³⁸ U.S. LNG exports quickly rose to fill the gap, and in 2023, the United States supplied 50 percent of total LNG imports to the European Union, tripling export volumes from 2021.³⁹

Trajectory for Reducing European Dependence on Russian Gas

U.S. LNG plays a key role in diversifying Europe's energy supplies and supporting the EU in achieving its goal of stopping all Russian gas imports by 2027.⁴⁰ Europe also seeks to reduce its overall gas demand by investing heavily in renewables, electrification, and energy efficiency measures. The RePowerEU plan lays out a €210 billion energy efficiency and clean energy strategy to reduce European gas demand by 50 percent by 2030.⁴¹ Since 2022, Europe's gas consumption has decreased by 20 percent, and its LNG demand is predicted to peak by 2025.⁴²

Dwindling European demand for natural gas will reduce the need for U.S. LNG in the long term. In the short term, however, the U.S. LNG industry can take advantage of opportunities to substitute Russian pipeline gas. In 2023, approximately half of the pipeline gas still flowing from Russia to Europe passed through Ukraine, totaling 483.8 Bcf.⁴³ As this pipeline went offline on January 1, 2025,⁴⁴ the Rystad Institute estimates that 254.3 Bcf of LNG per year will be needed to replace Ukraine pipeline supplies to Austria, Moldova, Slovakia, and other nations dependent on these previous gas volumes.⁴⁵ With the Ukraine pipeline offline, Russia is likely to lose an estimated \$6.5 billion annually unless it redirects the flows to other pipelines or LNG importers.⁴⁶

While the EU has been successfully weaning itself from Russian pipeline gas, it remains a prominent buyer of Russian LNG. In 2024, Europe purchased "record levels" of LNG from Russia, with Moscow providing the second-highest volumes of LNG to Europe after the United States.⁴⁷



The largest importers, including Belgium, France, and Spain, argue they cannot ban Russian LNG because of long-term contract obligations and energy security concerns.⁴⁸ Russian LNG imports are also a source of profit for some Western European countries, which re-export this product at a discounted price to other European nations and third countries around the world.⁴⁹ After Russian LNG enters the EU, it is re-labeled as European gas instead of Russian gas and can be resold without political stigma. Putin wants to take full advantage of this loophole and increase the Russian LNG market share from 8 percent to 20 percent, using LNG's growing profits to finance the war in Ukraine.⁵⁰ To maximize revenue on this trend, the Russian government raised the profit tax on its national LNG exporting company, Novatek, from 20 percent in 2022 to 32 percent in 2023.⁵¹

Starting in March 2025, the EU will halt the re-export of Russian LNG to non-EU countries, but despite its firm measures against other Russian fossil fuels, the future of the EU's reliance on Russian LNG is unclear.⁵² If the EU implements stronger measures against LNG imports from Moscow, the United States may seek to fill this gap with its own LNG exports.

Russia

Western sanctions have forced Russia to deepen its economic ties with China and seek alternative pathways to sustain its energy exports and financial ambitions. However, Chinese gas imports will not be able to fully offset the loss of the European market.

Russia's Gas Pivot to China

Imports of Russian fossil fuels to the European Union dropped from \$16 billion per month in early 2022 to \$1 billion at the end of 2023, successfully reducing the funds available for Putin's war in Ukraine.⁵³ The earnings of Russian state-owned gas company Gazprom decreased by 40 percent from 2022 to 2023, with the company suffering from a net loss of \$6.8 billion, its first net loss since 1999.⁵⁴ Russia quickly turned to China as its primary importing partner for its pipeline gas and LNG, but Russia's gas trade with China is less lucrative than its trade with Europe. Russia's Ministry of Economic Development forecasts that by 2027, the average price of its gas exports to China will be \$228 per thousand cubic meters, while exports to remaining European buyers will average \$315 for the same volume.⁵⁵

Despite increasing Sino-Russian cooperation, China wants to avoid becoming overly dependent on Russian gas and is hesitant to offtake the large volumes of gas that Russia seeks to export. To help Russia circumvent gas sanctions imposed by the U.S. and EU, Russia intends to construct the Power of Siberia 2 (PS-2) pipeline with the capacity to transport 1,765.7 Bcf of natural gas annually to China.⁵⁶ However, China is hesitant to authorize PS-2 because the pipeline would boost its import dependence on Russian pipeline gas to 40 percent by 2030, matching the EU's level of dependence on Russian gas before the Ukraine invasion.⁵⁷

Arctic Ambitions

As the Arctic holds an estimated 72 percent of Russia's total gas reserves,⁵⁸ Russia sees Arctic LNG development as critical for its future energy security and prosperity.⁵⁹ Navigation through the Northeast Passage to Asia is only possible six to seven months per year, from July to November, depending on the quantity of ice.⁶⁰ However, climate change and advances in ice navigation technology make this route increasingly accessible each year. Using nuclear-powered icebreakers to carve paths through the thinning sea ice,⁶¹ Russia plans to capitalize on the opening of the Northeast Passage, located in the country's exclusive economic zone.⁶² This route, which Russia calls the Northern Sea Route, significantly shortens the journey between Europe and Asia. Shipping from the Russian Yamal Peninsula to China via the Northern Sea Route takes only 15 days, while the next shortest journey from Yamal to China via the Suez Canal is more than twice as long at 36 days.⁶³ Due to the increasing risk of attacks launched by the Yemeni

Houthi group along the Suez Canal shipping route, Russia has been diverting LNG shipments heading to Asia using a longer route around the Cape of Good Hope off South Africa, which adds at least ten more days to the journey.⁶⁴ Moscow is already dealing with a tanker shortage due to Western sanctions, and this 46-day LNG shipping journey further exacerbates the problem.⁶⁵

Despite its continued reliance on Russian LNG, the EU has contributed to multilateral efforts obstructing Russian access to LNG markets in Asia. For instance, after Russia invaded Ukraine, the U.S., EU, and other G-7 countries came together to jointly sanction Russia's flagship Arctic LNG 2 terminal. In August 2024, the U.S. expanded sanctions to include individual tankers transporting LNG from the plant. As of November 2024, no Arctic LNG 2 tankers have docked at foreign ports due to concerns over potential U.S. retaliation.⁶⁶ Sustaining these sanctions to target more than 400 individuals and businesses requires federal resources and staffing, which the incoming Trump administration may hesitate to fund. A looser enforcement of sanctions might embolden non-sanctioning countries like China or India to accept Arctic LNG 2 cargos. At the same time, increased flows of Arctic LNG 2 to Asia would directly compete with U.S. LNG in the global marketplace, threatening Donald Trump's promise of American energy dominance.⁶⁷

Asia-Pacific

In 2023, China, Japan, South Korea, India, and Taiwan were among the top LNG importers globally.⁶⁸ Asia was the second largest destination for U.S. LNG after Europe, receiving 26 percent of U.S. total exports in 2023. As Europe transitions away from fossil fuels, Asia is poised to be a leading market for U.S. LNG in the coming decades.⁶⁹ Asia is forecasted to have a large and growing appetite for LNG through 2030 due to rapid economic growth, coal-to-gas switching, and dwindling regional gas production.⁷⁰ A recent study conducted by the DOE concluded that China will likely become the world's largest importer of LNG by 2025,⁷¹ but countries with emerging economies in South and Southeast Asia will also increasingly drive this rising demand for LNG.⁷² Competition to supply LNG to the Asian market will be fierce, and U.S. LNG does not always have a competitive advantage over geographically closer suppliers like Qatar and Australia. This competition will be exacerbated by wealthier Asian countries like Japan and China as they increasingly shift from their status as LNG importers to LNG re-exporters.

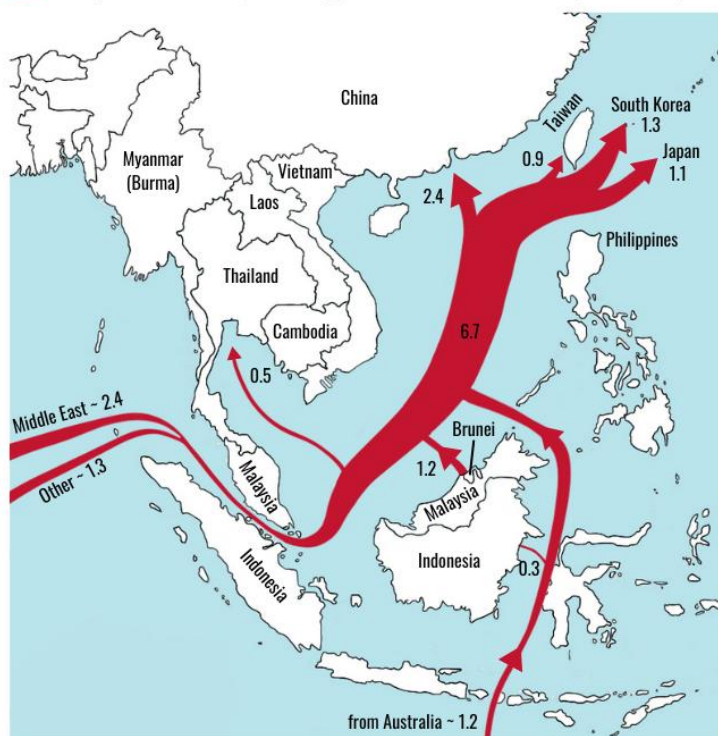
Tensions in the South China Sea

The South China Sea (SCS) is a region of significant geopolitical importance, with over one-third of global LNG trade passing through its key maritime trade routes in 2023.⁷³ The SCS is home to an estimated 40,300 Bcf of natural gas that has remained underdeveloped due to territorial disputes.⁷⁴ To bolster its claims and control of the vital sea lanes in the SCS, China has built and rapidly militarized artificial islands in the Spratly Islands, installing radar systems, airstrips, and cruise missiles.⁷⁵ These activities jeopardize the security and free trade of regional powers and the U.S., as these artificial islands reduce the area of international waters available to other states.⁷⁶

China's territorial claims around the Paracel and Spratly island chains encompass several gas-rich areas also claimed by regional producers, including Vietnam, the Philippines, and Malaysia.⁷⁷ As former U.S. Secretary of State Mike Pompeo noted in 2019, "By blocking development in the SCS through coercive means, China prevents members of the Association of Southeast Asian Nations (ASEAN) from accessing more than \$2.5 trillion in recoverable energy reserves."⁷⁸ China has repeatedly interfered in Vietnam's gas production activities, endangering Vietnam's Power Development Plan 8 (PDP8), which aims to transition the country from coal-fired power plants by increasing domestic gas and LNG usage to ~25 percent of Vietnam's total power generation capacity by 2030.⁷⁹ While the U.S.

ASP South China Sea LNG Trade Flows, 2023

(Data: World Bank, U.S. Energy Information Administration, and Vortexa, March 2024)



Figures represent trillion cubic feet of LNG

made up 59 percent of China's natural gas imports in 2023.⁸² Although natural gas accounts for only 9 percent of China's energy mix, it plays a vital role in key sectors of the economy, including mining and manufacturing.⁸³ A conflict-induced LNG shortage would significantly harm Beijing's economy.

The Threat of a Chinese Invasion of Taiwan

As China ramps up its military capabilities and tensions escalate in the Taiwan Strait, there are growing concerns about the risk of conflict that could involve the United States. Washington has historically maintained a policy of "strategic ambiguity" over whether it would intervene militarily against a Chinese invasion of Taiwan. However, President Biden has said that U.S. forces would defend Taiwan.⁸⁴ President-elect Trump has stated that Taiwan should pay for U.S. protection, but his administration's ultimate policy on Taiwan's defense is unclear.⁸⁵

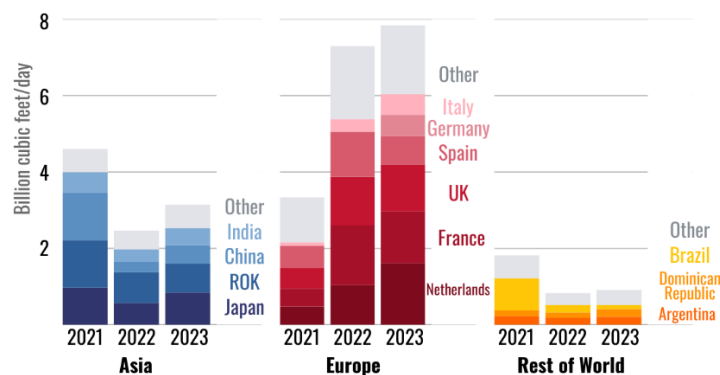
In the case of an escalating security situation, Taiwan's overdependence on seaborne LNG is a weakness that China may choose to weaponize. The country was among the top ten LNG importers in 2023, and relies on LNG imports to generate 40 percent of its electricity.⁸⁶ A Chinese blockade around Taiwan preventing LNG shipments would significantly endanger the island's energy security, exacerbated by the fact that Taiwan's natural gas storage only covers 11 days.⁸⁷ In the short term, contracting with U.S. LNG producers may moderately bolster Taiwan's energy security, as China might be reluctant to intercept LNG cargo out of fear of provoking the U.S. into a military conflict. Taiwan received just under 10 percent of its LNG from the U.S. in 2023;⁸⁸ Increasing these volumes could give the country added protection from a Chinese blockade risk. In the long term, Taiwan should expand its LNG storage capacity and pursue an energy diversification policy to reduce its energy vulnerability.

does not take a formal position on the sovereignty over these disputed territories, it regularly conducts freedom of navigation operations (FONOPs) in the region to challenge China's expansive claims.⁸⁰

The U.S. maintains security partnerships with the Philippines, Japan, and Australia, which are concerned about China's territorial encroachment. In a China-Philippines conflict over natural gas reserves in the disputed SCS territory, the United States' mutual defense treaty with the Philippines obligates Washington to defend Manila.⁸¹ Any military conflict in the SCS would negatively impact the LNG industry by disrupting LNG shipping routes, raising shipping and insurance costs, and creating volatility in LNG prices. An SCS conflict would also endanger China's energy security as LNG

ASP Annual U.S. LNG Exports by Destination

(Data: U.S. Energy Information Administration, December 2024)



U.S.-China Trade War

As discussed in ASP's recent report on the U.S.-China LNG trade relationship, China leverages its cheap U.S. LNG imports to turn a significant profit by purchasing large quantities at low price points and reselling to its neighbors when regional supply is low and prices rise.⁸⁹ Chinese companies have made hefty gains from reselling American LNG to Asian and European buyers when spot market prices are high.⁹⁰ Beijing then directs these profits toward developing advanced energy technology and expanding its presence in the Global South through energy infrastructure investments.⁹¹

Although the U.S. supplies only a small fraction of China's LNG imports,⁹² tariffs proposed by the incoming Trump administration may jeopardize this struggling trade relationship further. President-elect Trump has vowed to impose a 60 percent tariff on imported Chinese goods.⁹³ If he carries out this policy, Beijing would likely retaliate by imposing tariffs on U.S. LNG as it did from 2018 to 2019, at rates ranging from 10–25 percent.⁹⁴ This scenario would not significantly threaten China's energy security, as the U.S. currently only supplies 6 percent of China's total direct LNG imports.⁹⁵ It would be a greater loss for U.S. gas companies, since Chinese purchasing comprises 10.3% of monthly U.S. LNG exports.⁹⁶ Future expected impacts would be even greater, as beginning in 2026, Chinese companies have signed contracts to import over 4,870 Bcf of LNG each year,⁹⁷ with significant volumes contracted to come from the United States.⁹⁸ If tariffs are imposed on these amounts, Chinese companies will likely take advantage of the destination flexibility of U.S. LNG contracts and opt to resell contracted volumes to buyers in other countries with lower tariff rates at a profit.

To mitigate the future import risk of high tariffs and maximize potential profit in the case that tariffs are less severe than predicted, China has been aggressively stockpiling U.S. LNG. In the first nine months of 2024, China imported more LNG from the U.S. than it did during the entire 2023 calendar year.⁹⁹ As a result, China's LNG storage and strategic stockpiles have been reported to be near capacity, indicating that China plans to use LNG from the U.S. and other suppliers to avoid a supply crunch as global markets tighten this winter.¹⁰⁰

Japan and the Republic of Korea

Japan and the ROK are Asia's top U.S. LNG importers.¹⁰¹ Though Japan only imported 8.4 percent of its LNG from the United States in 2023, the nation is the world's second-largest buyer of LNG and has invested billions of dollars in public and private funds into American LNG projects.¹⁰² Three Japanese companies are the largest financiers of LNG export projects in the United States, each having invested between \$10.7 billion and \$13.8 billion since 2012.¹⁰³ Japanese government agencies have invested \$8 billion in the build-out of the Louisiana-based Freeport and Cameron LNG export terminals.¹⁰⁴

The strategic advantages of Japan and the ROK's use of U.S. LNG include increased energy security, LNG supply diversification, and access to alternate supply routes. Delivery via the Panama Canal allows U.S. LNG to avoid shipping chokepoints connected to the Red Sea and South China Sea faced by Australia and Qatar. Recently, this advantage has eroded as low water levels in the Panama Canal have delayed the transit of Asia-bound cargo.¹⁰⁵ The ROK also has political motivations for using U.S. LNG. During a 2017 trade dispute, the Trump administration cited the uptake of U.S. LNG as a potential solution for addressing a trade deficit caused by the U.S.-ROK FTA.¹⁰⁶

Like in Europe, however, Japan and the ROK are shifting away from heavy reliance on fossil fuels and are working to reduce their GHG emissions.¹⁰⁷ Japan's natural gas demand has decreased by 25 percent since its peak in 2014.¹⁰⁸ As LNG is replaced by increasing renewable and nuclear power, it is expected to decline by an additional 25 percent by 2030.¹⁰⁹ Likewise, the ROK's LNG imports fell 5 percent from 2022 to 2023 and are expected to fall further by 2030.¹¹⁰ While U.S. LNG can help both countries improve their energy security in the short term, their long-term demand for LNG is uncertain.

As Japan's domestic demand declines, Tokyo intends to re-export its excess LNG to Southeast Asian countries, including Indonesia, Vietnam, and Singapore.¹¹¹ Ship tracking data indicates that Japan is already reselling U.S. and Australian LNG to the ROK, China, Taiwan, and India.¹¹² In the best-case scenario, Japan's rise as an LNG re-exporter will create more opportunities for collaboration between the U.S. and Japan to reach Asian markets where Japan has established deep energy trading relationships.¹¹³ U.S.-Japan LNG cooperation would also compete against China's resale of LNG to third countries.¹¹⁴ In the worst-case scenario, however, Japan will increasingly compete with the U.S. to sell LNG to ASEAN countries. As U.S. LNG export capacity grows exponentially, the LNG market will likely become oversupplied by 2030; this scenario would put downward pressure on prices and exacerbate financial risks for LNG traders in both the U.S. and Japan.

LNG Price Sensitivity in South and Southeast Asia

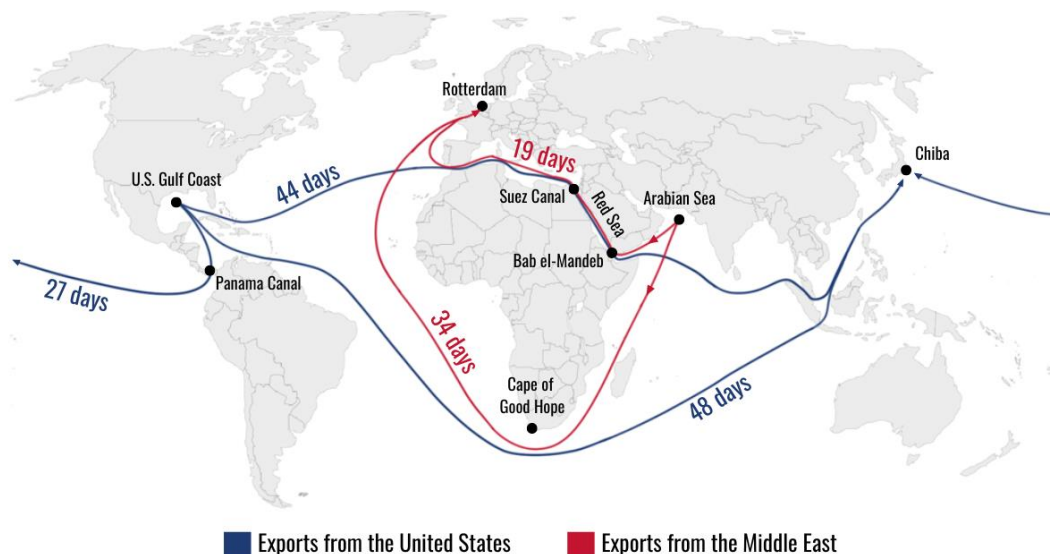
Economic expansion in South and Southeast Asia, particularly in manufacturing and industrial sectors, is driving a rising demand for affordable electricity and energy storage solutions. The price volatility of LNG has undercut its cost competitiveness in meeting this demand, as South and Southeast Asian countries are particularly sensitive to LNG's price volatility.¹¹⁵ When South Asian countries could not afford high LNG spot market prices in the aftermath of Russia's invasion of Ukraine in 2022, LNG imports decreased by 17 percent in India, by 16 percent in Pakistan, and by 14 percent in Bangladesh as wealthier nations outbid South Asia on the gas market.¹¹⁶ These countries attempted to sign new long-term contracts, but available volumes were insufficient.¹¹⁷ Reduced LNG flows led to widespread power outages in Bangladesh, forcing the country to enact emergency measures to reduce electricity use.¹¹⁸ Meanwhile, Pakistan did not buy any LNG spot cargo for over a year after the invasion of Ukraine as it was outbid by European importers and unable to pay the high spot prices.¹¹⁹ Lack of cheap LNG increased electricity prices, making its state-owned power supply the most expensive in South Asia.¹²⁰ This led Pakistani businesses and residences to increasingly leave the grid, sourcing power from cheap Chinese solar panels instead.¹²¹

As prices trend down, price-sensitive Asian buyers are cautiously re-entering the LNG market. A 2019 U.S. Agency for International Development (USAID) report estimated that the price of LNG delivered from the U.S. to the Philippines would be around \$7.55 per one thousand cubic feet (Mcf) and that the cost of gas-powered electricity would be much lower than coal-powered electricity.¹²² Based on these assumptions, the Philippines invested heavily in its LNG-importing infrastructure. While the average price paid for U.S. LNG in 2023 was close to the forecasted price at \$7.57 per Mcf, however, the Philippines paid an average of \$10.89 per Mcf when it imported LNG for the first time in 2023.¹²³ Purchasing U.S. LNG did not safeguard the Philippines from volatile pricing, which drove up the country's electricity costs. Meanwhile, China paid a lower average price for U.S. LNG during the same period.

The best way for Asian allies to guard themselves against high spot market prices in the LNG market would be to secure longer-term LNG import contracts directly with U.S. exporters. This scenario is appealing because U.S. tolling agreements allow off-takers to pay a fee to cancel cargoes and avoid paying the full shipment cost.¹²⁴ Simultaneously, however, renewables are gaining an edge over natural gas and LNG in these markets due to supportive policies and competitive pricing.

ASP LNG Exports from the U.S. and Middle East

(Data: U.S. Energy Information Administration, using calculations from Vortexa, February 2024)



Note: Voyage time is calculated for laden Suezmax tankers traveling at 14 knots without extended chokepoint delays. Shipping routes are approximate.

The Middle East

Almost a quarter of the world's LNG is produced in the Middle East, which is vulnerable to risks from regional conflict and shipping chokepoints in the Red Sea and the Strait of Hormuz. While this region traditionally dominates global energy markets through oil and gas production, Middle Eastern countries are transitioning to pursue renewable energy targets and invest in decarbonization and economic diversification. Profits from major LNG exporters like Qatar are being reinvested into renewable energy infrastructure and carbon capture technologies, enhancing the competitiveness of their LNG supplies as importers increasingly seek out low-emission gas.

Conflict in the Red Sea

Since the start of the war in Gaza in October 2023, Yemeni Houthis have attacked 80 commercial vessels in the Red Sea, prompting the U.S. and its allies to take a defensive stance to prevent broader regional escalation in the Middle East.¹²⁵ Aside from several Russian vessels, no other LNG tankers have traversed the Red Sea route since January 2024.¹²⁶ U.S. LNG tankers must use alternative routes to reach Asia when the Suez Canal and Bab el-Mandeb Strait chokepoints surrounding the Red Sea are inaccessible. The Panama Canal route is the fastest option, but historic droughts have slowed shipping between the U.S. and Asia on this route.¹²⁷ During the first half of 2024, a record number of U.S. LNG exports transited to Asia via the Cape of Good Hope,¹²⁸ adding about 21 extra transit days compared to the Panama Canal route and 17 days compared to the Suez Canal route for a journey from the U.S. Gulf to Chiba, Japan.¹²⁹ Longer voyages result in higher transportation costs and more boil-off gas inside LNG tankers.¹³⁰ Geographically, Australia and Qatar have an augmented advantage in serving these markets as their LNG exports do not transit through the Suez or Panama canals to reach Asian importers.

Blockades in the Red Sea also make it more expensive for the second largest LNG exporter, Qatar, to access European markets. The journey from Qatar to Rotterdam, the Netherlands, takes only 19 days via the Suez Canal, while the Cape of Good Hope route increases this trip to 34 days.¹³¹ LNG from the U.S. Gulf traverses the Atlantic Basin

uninterrupted by maritime chokepoints and can reach Rotterdam in 15 days.¹³² Shipping routes give the U.S. a competitive edge in serving European markets, and the Red Sea blockage significantly strengthens this advantage.

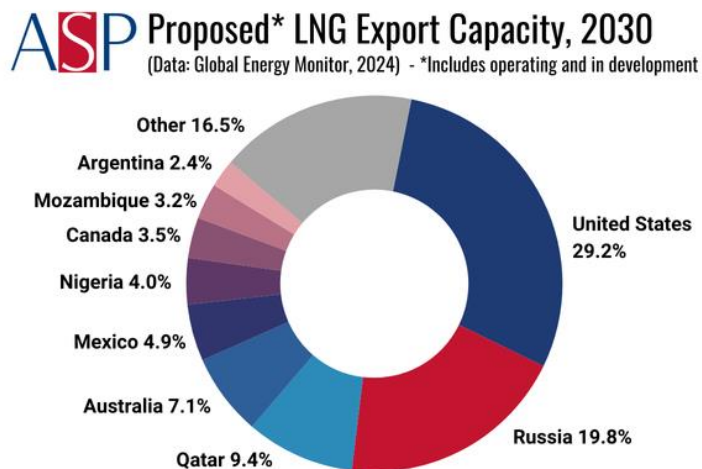
With 15 percent of global trade volumes and 8 percent of seaborne LNG dependent on the trade that passes through the Suez Canal, the global energy market would benefit significantly from resumed shipping in the Red Sea.¹³³ For this reason, the U.S. formed a multinational task force, Operation Prosperity Guardian, with more than twenty other nations to patrol the Red Sea and safeguard freedom of shipping.¹³⁴ Apart from Bahrain, however, Middle Eastern countries have been hesitant to join the initiative due to concerns over assisting the United States in its direct defense against actors opposing Israel.¹³⁵ Without deep regional partnerships, the operation has not been able to deter Houthi attacks, and most LNG tankers continue to avoid transiting through the Red Sea.

Chokepoint in Strait of Hormuz and Conflict in the Persian Gulf

Approximately 24 percent of global LNG supply is produced in the Middle East,¹³⁶ with 20 percent coming from Qatar and passing through the Strait of Hormuz, which connects the Persian Gulf to the Gulf of Oman.¹³⁷ Amid increasing tensions between Iran and Israel, Arab states and their LNG production rely on the United States for security commitments to stabilize the region. The U.S. remains worried that if Israel attacks Iranian energy infrastructure, Iran will retaliate against Gulf energy installations, which would, in turn, necessitate a U.S. military response against Iran. Such a conflict would disrupt the supply of LNG from this region and create supply shocks in global energy markets. While Saudi Arabia and the United Arab Emirates can divert some of their oil and gas to avoid shipping through the Strait of Hormuz, Kuwait, Qatar, and Bahrain currently cannot.¹³⁸ If Qatar and neighboring countries cannot meet supply commitments, it would be disastrous for Asian markets, which receive more than 70 percent of Qatar's LNG shipments.¹³⁹ Obstructed supply from Qatar would drive up demand for alternate suppliers of LNG, including the United States, and make spot LNG prohibitively expensive for emerging countries.

Qatar

The growing relationship between the U.S. and Qatar benefits from shared geopolitical and security interests as the leading exporters in the energy market. As the third Gulf country designated as a major non-NATO U.S. ally, Qatar hosts the largest U.S. military base in the Middle East.¹⁴⁰ It serves as a liaison, representing U.S. and NATO security interests to other countries in the Middle East. The U.S. and Qatar cooperate on regional security, aviation, and counterterrorism.¹⁴¹ Economic cooperation is centered on LNG trade, though Qatar does not allow foreign investment in national gas companies above 49 percent.¹⁴² The government has pegged the Qatari riyal to the dollar to facilitate Qatar's oil and gas revenues, which are priced in U.S. dollars in international markets.¹⁴³ American companies ExxonMobil and ConocoPhillips own a share of Qatar's LNG mega-project, North Field East,¹⁴⁴ through which Qatar plans to almost double its LNG production, from 3,750 Bcf/year to 6,915.4 Bcf/year by 2030.¹⁴⁵



Economic Diversification and Decarbonization Efforts by Gulf States

Gulf States like Qatar, Saudi Arabia, and the United Arab Emirates funnel oil and gas profits into carbon capture and storage (CCS) and renewable energy infrastructure to achieve net-zero goals and reduce industry-related emissions.¹⁴⁶

Qatar will use returns from its LNG exports to reinvest in its economy and aid its decarbonization efforts. Doha plans to sequester 11 million tons of carbon dioxide annually by 2035¹⁴⁷ by installing CCS plants to trap emissions from Qatar's LNG trains and inject them into existing wells.¹⁴⁸ Qatar's National Energy Strategy aims to grow the nation's renewable energy capacity to 18 percent of the power mix by 2030, with solar energy powering 30 percent of the nation's total electrical capacity.¹⁴⁹ Simultaneously, Qatar and other Gulf states are actively working to diversify their economies away from fossil fuels by investing in sectors like tourism, logistics, finance, and technology, aiming to reduce their dependence on oil and gas revenues as the world transitions toward cleaner energy sources.¹⁵⁰ The United States could learn from this model and reinvest LNG tax revenue into renewable and CCS infrastructure, including infrastructure used by the U.S. oil and gas industries.

Africa

African electricity consumption is rising as its population rapidly grows and urbanizes. Energy demand is expected to increase by 30 percent between 2020 and 2030.¹⁵¹ Meeting demand while ensuring affordability will be critical to Africa's energy security. Regional energy insecurity is exacerbated by inadequate infrastructure, limited investment, and geopolitical shocks leading to excessive inflation and cost-of-living crises.¹⁵² However, Africa's expected long-term gas consumption remains strong as countries seek to diversify their energy mix and transition towards cleaner fuels. Gas is considered a flexible and reliable energy source that can stabilize electric grids, support intermittent renewable energy generation, and help meet the growing energy demand.¹⁵³

Natural gas is widely available in several African countries, with Mozambique, Algeria, and Nigeria projected to be the continent's leading LNG exporters during the next decade.¹⁵⁴ However, these projects face both security and economic challenges. With high breakeven prices for their LNG exports, it is hard for African exporters to compete against other exporters like the U.S. and Qatar, who incur lower costs.¹⁵⁵ African gas infrastructure is also vulnerable to terrorist attacks. For example, Islamic State-linked militants attacked TotalEnergies' LNG project in Mozambique in 2021, forcing the company to evacuate its personnel, declare force majeure, and delay the final investment decision.¹⁵⁶ Before the attack, the U.S. government approved a \$4.7 billion loan for the project from the Export-Import (EXIM) Bank, estimating it would create 16,700 American jobs and boost U.S. exports.¹⁵⁷ While this project remains in EXIM's queue, the loan disbursements have yet to be made as of late 2024.¹⁵⁸

Helping African nations invest in trans-continental energy infrastructure may be a safer investment for the United States and serve to counter Chinese energy investments on the continent. Since 2000, China has issued more than \$170 billion in loans across the continent,¹⁵⁹ with a significant portion allocated to the energy sector to invest in and secure access to critical minerals needed to deploy renewable energy, like cobalt and lithium.¹⁶⁰ Many African governments view investments in renewable energy technologies and supply chains as essential to their energy independence. To counter Chinese influence, the U.S. and G7 partners have committed millions of dollars to the Lobito Corridor project, which connects land-locked, mineral-rich countries like the Democratic Republic of the Congo and Zambia to the Atlantic Ocean via Angola.¹⁶¹ This strategic initiative seeks to facilitate trans-continental trade and to rival China by bolstering Western access to key mineral markets and Angola's vast oil and gas resources.¹⁶²

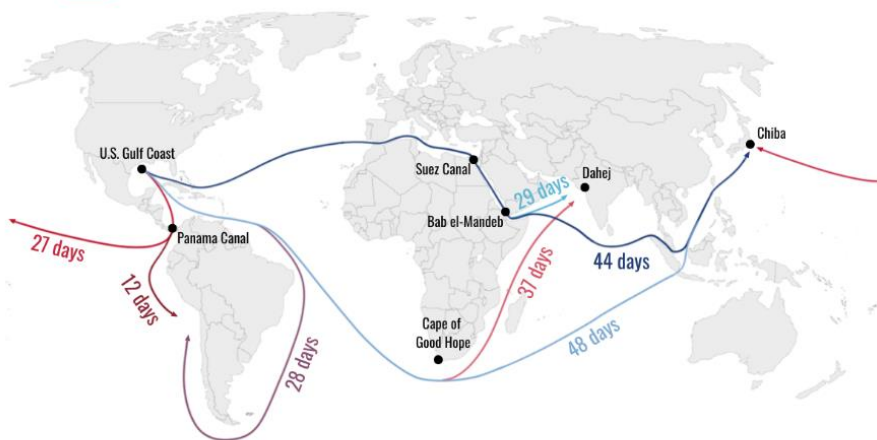
Latin America and the Caribbean

In Latin America and the Caribbean (LAC), renewables contribute 60 percent of total electricity generation, with 45 percent coming from hydropower.¹⁶³ However, historic droughts threaten the region's hydropower generation and highlight the need for energy diversification.¹⁶⁴ As water levels fall to historic lows in the reservoirs of Colombia, so does the country's hydroelectric output, forcing Colombian authorities to pivot to LNG imports in 2024.¹⁶⁵ In

September, Colombia imported the highest volume of LNG ever recorded in Latin America, at 14.13 Bcf.¹⁶⁶ Brazil, the largest LNG importer with the most regasification capacity in the LAC region, is facing similar hydropower declines, creating an opportunity for U.S. LNG suppliers.¹⁶⁷ While hydropower and coal power generation use are declining, electricity consumption in LAC is projected to grow by more than 70 percent by 2030, increasing demand for gas and other renewable energy sources.¹⁶⁸ In 2017, 30 percent of American LNG was shipped to LAC, but in recent years, U.S. exports have been disproportionately small. In 2023, U.S. LNG prices in LAC regularly exceeded \$10.30 per Mcf, the highest of any region.¹⁶⁹ This yields an opportunity for the U.S. to pursue bilateral and multilateral energy deals in the region to benefit LAC regional energy security while improving U.S. LNG export returns.

ASP U.S. LNG Shipping Routes

(Data: U.S. Energy Information Administration, using calculations from Vortexa, February 2024)



Note: Voyage time is calculated for laden Very Large Gas Carriers traveling at 14 knots without extended chokepoint delays. Shipping routes are approximate.

Panama Canal Chokepoint

In 2023, the Panama Canal saw a 65 percent decline in LNG traffic as drought levels led to long waits and expensive fees.¹⁷⁰ U.S. LNG tankers, which pass through the Panama Canal en route to East Asia, increasingly transited using alternative routes. With the Suez Canal impassable due to Houthi attacks in the Red Sea, U.S. LNG tankers must take the much longer route around the Cape of Good Hope through the conflict-prone South China Sea. While the Panama Canal route began to recover in 2024, the potential for future blockages has increased demand for LNG export projects on the Pacific Coast to supply

Asian markets. Japan and other Asia-Pacific buyers encourage these initiatives, eager to diversify their energy supplies with a source of LNG that bypasses the South China Sea. While local opposition to LNG export projects is strong on the west coast of Canada and the U.S., Mexico has proposed at least four projects along the Pacific coast using U.S. feed gas.¹⁷¹ However, as of September 2024, only one Mexican LNG project on the west coast has begun construction, and all are facing significant delays.¹⁷²

Mexico

Mexico imported almost 30 percent of U.S. natural gas exports in 2023,¹⁷³ predominantly via pipelines from the Permian and Eagle Ford shale basins in Texas.¹⁷⁴ Dependence on U.S. gas imports to meet ~70 percent of Mexican natural gas demand has prevented Mexico from developing its domestic gas industry.¹⁷⁵ All proposed Mexican LNG export projects are underpinned by U.S. gas production, which is dangerous for Mexican energy security since the U.S. prioritizes domestic flows in the event of supply disruptions. During Winter Storm Uri in 2021, when extreme cold affected natural gas production and led to electricity generation failures in Texas, Governor Greg Abbott barred natural gas producers from exporting for five days.¹⁷⁶ During this time, gas exports from Texas to Mexico fell by more than 1 Bcf/d,¹⁷⁷ five million Mexican customers lost power, and at least 14 Mexicans died from hypothermia.¹⁷⁸ Natural gas interdependence with Mexico also puts the U.S. at risk. If global demand for LNG increases and Mexico's need for piped gas grows, U.S. consumers could face rising gas prices if domestic production fails to keep up.

Domestic Security Implications of U.S. LNG Exports

While the U.S. LNG industry has created new economic opportunities and allowed the country to greatly reduce its reliance on energy imports, tensions between rising export volumes and domestic energy demand remain. The volatility of the war in Ukraine continues to influence U.S. natural gas prices, highlighting the vulnerability of American households and businesses to global market fluctuations. Expanding U.S. export volumes may raise domestic energy prices, and the country's heavy reliance on this resource for heating and electricity generation is risky. Extreme weather events such as Winter Storm Uri in 2021 jeopardize U.S. natural gas infrastructure, underscoring the need for a diversified energy mix and coordinated federal oversight to ensure public safety and mitigate risks.

Impact on Domestic Natural Gas Prices

Global demand for U.S. LNG has been a growing segment of the overall demand for U.S. natural gas since 2017. Some U.S. policymakers are concerned that additional U.S. LNG export volumes will raise domestic natural gas prices,¹⁷⁹ a position supported by the results of a 2024 DOE study.¹⁸⁰ The study also found that increased LNG export volumes would likely result in a higher GDP for the country, which could potentially (but not necessarily) create domestic economic benefits to counterbalance these costs.¹⁸¹

As LNG exports reached record levels in 2023, U.S. natural gas production continued to outpace consumption, helping facilitate a return to low U.S. natural gas spot prices. The average Henry Hub price in 2023 was \$2.67 per Mcf, the lowest level since the 2020 COVID-related demand slump.¹⁸² However, high domestic natural gas production failed to protect Americans from the price volatility of the global natural gas market. For example, when the Russian invasion of Ukraine triggered a surge in international LNG demand in 2022, Henry Hub spot prices reached their highest level in more than a decade, averaging \$6.70 per Mcf.¹⁸³ Global price spikes cost U.S. consumers an extra \$111 billion to purchase wholesale natural gas during the sixteen months from September 2021 through December 2022, according to a study by IEEFA.¹⁸⁴ The U.S. electricity price continues to be tied to the price of natural gas, which fueled 43.1 percent of electric power generation in 2023.¹⁸⁵ Even small gas price increases can drive electricity costs up as utilities powered by gas-fired power plants increase their rates. States like Connecticut, Florida, Massachusetts, Ohio, and Pennsylvania have experienced significant electricity rate increases due to their heavy reliance on natural gas for power generation.¹⁸⁶ Given the high number of future U.S. LNG export projects already approved, domestic gas markets will continue to be exposed to price volatility resulting from global market forces, which risks putting American households and businesses under financial stress from higher electricity prices.

Domestic Energy Security Implications

A diverse energy mix is essential for energy security, as relying on multiple sources enables a country to maintain operations by increasing other forms of power generation when others are compromised. While the United States fuels only one-third of its total energy consumption with natural gas, the country relies heavily on natural gas for heating and electricity generation.¹⁸⁷ The Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corporation determined that Texas' heavy dependence on natural gas was the primary driver of blackouts during Winter Storm Uri in 2021 when residential electric heating demand surged 250 percent above normal levels.¹⁸⁸ More than 80 percent of natural gas-powered backup generators failed, leaving some households without electricity for up to four days in freezing temperatures.¹⁸⁹ A Union of Concerned Scientists report found that natural gas-fired plants are disproportionately vulnerable to extreme winter temperatures. The study found that gas plant failures resulted in 56 percent of the power outages during Winter Storm Uri and 63 percent of the offline power during Winter Storm Elliott, which struck the Central and Eastern U.S. in 2022.¹⁹⁰ Diversifying energy sources used

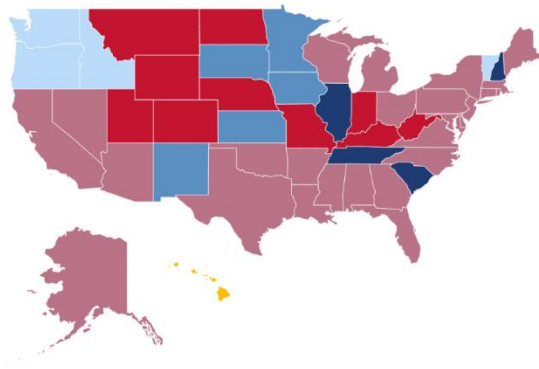
by U.S. electric grids can strengthen their resilience in the face of extreme temperatures. This was the case in Texas, where an additional 16 gigawatts (GW) of solar capacity were installed in 2023.¹⁹¹ When the state experienced record electricity demand in August 2024, Texas produced near-record amounts of solar energy to help meet the demand without interruption.¹⁹²

While most natural gas is delivered by pipeline, LNG is used as a backup or supplement to pipeline gas. More than 170 LNG facilities operate in the U.S. to produce, store, transport, and re-gasify LNG.¹⁹³ Twenty-seven of these facilities are regulated by FERC, the agency responsible for authorizing and overseeing LNG import and export facilities under Section 3 of the Natural Gas Act.¹⁹⁴ As of December 2024, FERC oversees eight LNG export facilities in Louisiana and Texas.¹⁹⁵ It also oversees 12 peak-shaving plants,¹⁹⁶ which store LNG during periods of low demand and re-gasify it during high-demand periods, like on cold winter days, essentially “shaving off” the peak demand in local markets by providing a supplemental gas supply. Peak shaving aids domestic energy security by ensuring a consistent energy supply at a sustainable price during high-demand times.

ASP Top Source of Electricity Generation, 2023

(Data: U.S. Energy Information Administration, November 2024)

■ Coal ■ Natural Gas ■ Wind ■ Nuclear ■ Hydroelectric ■ Petroleum



Since 2017, U.S. natural gas production has exceeded domestic consumption, allowing the United States to meet domestic demand with U.S. natural gas supplies and reduce reliance on LNG imports.¹⁹⁷ Despite this trend, New England has been unable to end dependence on LNG imports due to the region’s limited pipeline infrastructure and high winter energy demand for heating.¹⁹⁸ In 2023, the LNG terminal in Everett, Massachusetts, imported 13.3 Bcf of LNG—87 percent of total U.S. LNG imports that year—from countries including Jamaica and Trinidad and Tobago to ensure continual gas supply to New England states during the winter months.¹⁹⁹ In theory,

American LNG could be shipped to New England to replace reliance on foreign LNG. However, in practice, requirements from the Jones Act that domestic shipping vessels must be U.S.-flagged, built, owned, and crewed make shipping American LNG for domestic use prohibitively expensive.²⁰⁰ A 2011 U.S. Maritime Administration (MARAD) study determined that a Jones Act-compliant ship costs more than \$20,000 to operate daily, while a foreign-flagged ship would only cost around \$7,400 per day.²⁰¹

In May 2024, U.S. Navy Secretary Carlos Del Toro testified before Congress that no shipyard in the United States can build LNG tankers and that the U.S. depends on Japanese and Korean allies for these vessels.²⁰² Puerto Rico is also subject to the Jones Act and was denied a 10-year waiver to receive bulk shipments of LNG from the U.S. mainland. Instead, it imports LNG primarily from Trinidad and Tobago.²⁰³ Ironically, the U.S. Customs and Board Protection ruled in January 2024 that Mexico’s Fast LNG 1 export facility, which uses U.S. feedstock gas, can use foreign-flagged LNG carriers to serve U.S. markets without violating the Jones Act because the plant is based in Mexico.²⁰⁴ This decision creates a loophole for Puerto Rico and New England to import U.S.-originated LNG.

The switch to renewable energy may provide a more direct pathway to reducing New England's dependence on LNG imports. A 2020 analysis by the New England-based nonprofit Acadia Center determined that current legislation and plans for renewable energy deployment in New England would reduce the region’s reliance on natural gas for electricity generation from 45 percent in 2020 to 10 percent by 2030.²⁰⁵ Switching to renewable energy would lower New England's gas demand enough to eliminate the region’s need for LNG imports.

Domestic Security and Safety Implications

Expanding domestic LNG export infrastructure poses significant safety, security, and environmental risks, highlighting the growing burden on federal regulatory agencies and the need for enhanced oversight, resources, and climate resilience measures. A 2009 Congressional Research Service (CRS) report found that “LNG is inherently hazardous, and its infrastructure is potentially attractive to terrorists.”²⁰⁶ As LNG is highly combustible and can catch fire, explode, or release choking clouds when released,²⁰⁷ a successful attack on a U.S. LNG facility or tanker could yield substantial public safety, environmental, and economic consequences. Such an accident happened in 2014 when a Washington LNG peak-shaving plant exploded, forcing nearby residents to evacuate their homes, injuring five workers,²⁰⁸ and emitting more than 3,000 metric tons of methane into the surrounding air.²⁰⁹

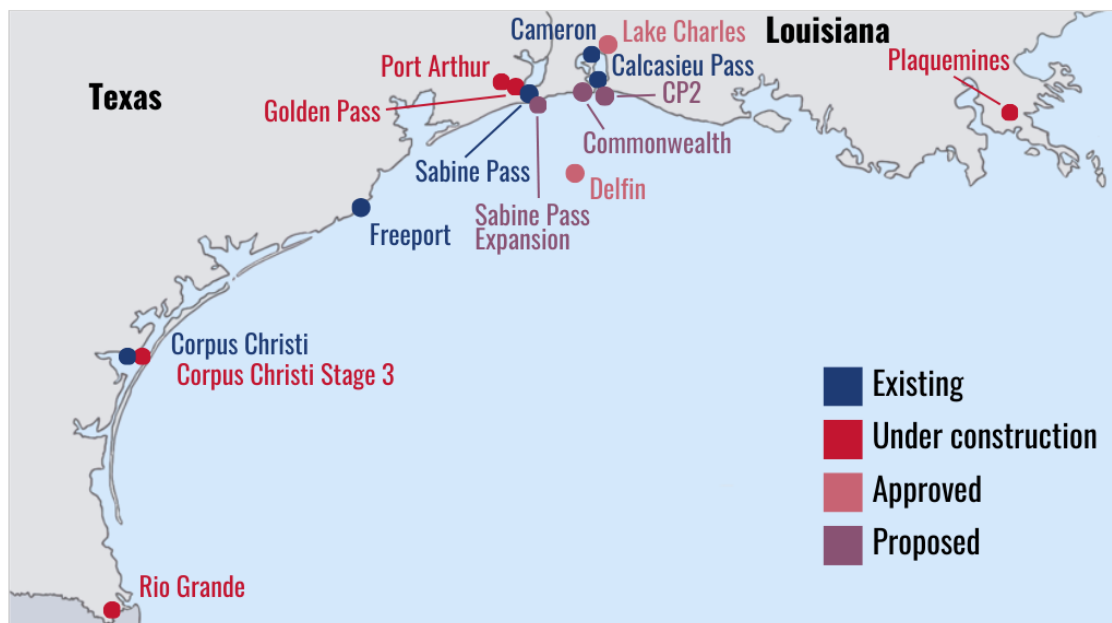
As LNG infrastructure expands, so does the burden on federal regulatory agencies. Three federal agencies regulate LNG facilities domestically: FERC, the Pipeline and Hazardous Materials Safety Administration (PHMSA), and the U.S. Coast Guard (USCG). The USCG protects the public from LNG accidents or terrorist attacks on LNG ports; for instance, under the Maritime Transportation Security Act, the USCG assesses the vulnerability of marine vessels to terrorist threats and enforces maritime security standards at LNG facilities.²¹⁰ The USCG also carries out inspections and patrols, develops action plans for security breaches, and gathers intelligence to prevent terrorism targeting LNG tankers and facilities in the United States.²¹¹ The rate of LNG tankers entering U.S. ports has nearly tripled from 2011 to 2020, requiring additional USCG staff and budget resources to ensure marine security related to LNG carriers.²¹² A 2020 Government Accountability Office (GAO) study found that the USCG had a shortage of ~400 marine inspectors required to conduct LNG carrier compliance exams, with key operational field units staffed below 70 percent of their estimated need from 2016 to 2020.²¹³

Like the USCG, PHMSA faces increased administrative burdens from expanding LNG export operations and infrastructure. PHMSA regulates the safety of on-land LNG facilities but uses regulations established in the 1980s—long before the U.S. was a major LNG exporter—that do not require companies to disclose their safety and emergency plans publicly.²¹⁴ PHMSA’s budget does not sufficiently cover the costs of siting reviews of LNG facilities, so the agency requested to implement a cost recovery fee of \$65,000 per review for LNG facilities with a construction budget of \$2.5 billion or higher in August 2024.²¹⁵ To improve intragovernmental regulatory collaboration, PHMSA was allotted a \$8.4 million budget to establish the National Center of Excellence for Liquefied Natural Gas Safety in 2023.²¹⁶ This center aspires to address regulatory gaps and position the U.S. as a leader in LNG operational safety and environmental performance.²¹⁷

The U.S. Gulf region, which hosts most of the U.S. LNG export facilities, is vulnerable to a variety of climate threats. The sea level in this region is rising three times faster than the global average, increasing vulnerability to flooding, storm surges, and erosion.²¹⁸ Hurricanes also pose considerable risks to Gulf Coast LNG facilities. During Hurricane Laura in 2020, the Cameron LNG export terminal lost power for a month,²¹⁹ and facility damage resulted in the release of methane and other pollutants.²²⁰ Two LNG terminals currently operate in this vulnerable region between Lake Charles and Cameron, with five new export terminals in the pipeline at various stages of development. Louisiana state regulators responsible for managing the region's flood risk expect LNG companies to “self-mitigate” climate risks.²²¹ Unlike Cameron LNG, the Commonwealth LNG export terminal plans to use a 26-foot levee to protect its facilities.²²² Although the continuous monitoring and investment required to ensure the reliable and safe operations of these facilities may cut into LNG profits, such measures are critical to protect U.S. LNG facilities in the climate-vulnerable Gulf region.

ASP U.S. Gulf Coast LNG Projects

(Data: U.S. Energy Information Administration, February 2024)



Note: Locations are approximate.

Economic and Employment Impacts

An analysis conducted for the National Association of Manufacturers estimated that the U.S. LNG export sector directly or indirectly supports 222,450 jobs, generating ~\$7.2 billion in labor income in 2023.²²³ The report estimates that the LNG export sector contributed \$17.3 billion to GDP and generated \$4.5 billion of federal, state, and local taxes in the same year.²²⁴ The drilling, production, and export of U.S. LNG spans many states and has local economic effects in host communities. Studies have shown that communities hosting feed gas drilling and production sites experience economic benefits, seeing an increase in local employment,²²⁵ income,²²⁶ and tax revenue.²²⁷

The rise of LNG export facilities also imposes economic tradeoffs. Oil and gas production increases local government costs by increasing demand for public services to repair water and road infrastructure damage caused by gas production, as well as increasing staff costs for emergency services and law enforcement.²²⁸ Dredging and erosion associated with increased LNG ship traffic has decimated the local fishing industry in Cameron Parish, which was once the country's largest seafood producer.²²⁹ A Sierra Club report released in December 2024 asserts that LNG developers in Texas and Louisiana benefit from large tax abatements, which leave local governments underfunded.²³⁰ The report estimates that industry property tax exemptions in Louisiana effectively subsidize LNG export terminals at an average rate of \$6.7 million per job for the three terminals currently operating in the state and the six planned or under construction.²³¹

Health and Environmental Effects

The production and export of LNG releases air pollution that poses risks to human health. Communities near fracking sites experience harmful environmental and health effects, including elevated local air²³² and water²³³ pollution and increased traffic congestion and accidents.²³⁴ Research shows that residential proximity to fracking is associated with

significant health consequences, including poor birth outcomes, cancer, heart disease, mental health problems, and premature death.²³⁵ Since LNG facilities tend to be located near low-income communities and communities with Black, Indigenous, and Hispanic residents, marginalized U.S. populations disproportionately shoulder the environmental and health consequences of LNG.²³⁶ Even after oil and gas operations have ceased, inactive wells leak methane and other harmful substances that contribute to greenhouse gas emissions and water and air pollution, cause explosions and fires, and harm residents' health.²³⁷ A 2021 Environmental Defense Fund study found that 14 million people (approximately ~4 percent of the U.S. population) live within one mile of an inactive, unplugged well.²³⁸

LNG export terminals have also been linked to harmful air pollution. The Texas Commission on Environmental Quality fined Freeport LNG for violating air pollution emissions regulations from 2019 to 2021.²³⁹ Two LNG terminals in Louisiana also release excessive emissions from flaring. Cameron LNG had persistent trouble with its thermal oxidizers and devices used for combustion, resulting in 67 accidental pollution releases, an average of 2 per month since operations began.²⁴⁰ The Venture Global LNG terminal at Calcasieu Pass, which started operations in 2022, has continually violated air permits due to excessive flaring with no repercussions from state regulators.²⁴¹

To help limit these harmful byproducts of LNG, the National Environmental Policy Act mandates FERC to perform an environmental assessment or impact statement for proposed LNG facilities.²⁴² In several instances, the DC Circuit appeals court has found that FERC did not fully assess an LNG facility's environmental impacts. The court has ordered FERC to repeat its analyses for two Texas-based projects, NextDecade's Rio Grande LNG and Glenfarne Energy Transition's Texas LNG²⁴³ and to reassess the environmental impacts of GHG and other pollution emissions from the Commonwealth LNG project in Louisiana.²⁴⁴ To produce maximally comprehensive and accurate analyses, FERC should reference up-to-date research and reports as new insights emerge on the community and environmental impacts of LNG (see, for instance, the DOE's recently released "Energy, Economic, and Environmental Assessment of U.S. LNG Exports," which provides timely findings on LNG's human and ecological consequences.²⁴⁵

Recommendations

The United States faces a dual challenge: protecting Americans from the risks of LNG while capitalizing on LNG export opportunities. By stabilizing domestic gas demand, advancing methane tracking and abatement efforts, and fostering strategic energy partnerships with allies, the U.S. can strengthen energy security while reinforcing its position as a leader in the global energy market.

Stabilize Domestic Gas Demand

The volatility of international LNG markets continues to influence U.S. gas prices, as seen in the 2022 price spikes linked to the Russia-Ukraine conflict. Domestic prices are also at risk of elevation due to expanded U.S. LNG export volumes. The trajectory of domestic gas demand will influence how much LNG can be exported to global markets without causing supply shortages or high prices in the U.S. market. Stabilizing domestic gas consumption supports the LNG export industry by freeing up more natural gas for export, enabling producers to boost revenue.

The electric power sector has become the dominant driver of U.S. natural gas demand, accounting for 40 percent of total domestic gas use in 2023.²⁴⁶ The IRA includes \$86 billion to help Americans implement electric efficiency efforts, such as adopting electric heat pumps, which reduce direct gas use by homes and businesses.²⁴⁷ U.S. investments in renewable energy and battery storage could also reduce domestic reliance on gas for electricity generation. In 2023, installed solar capacity reached 161 GW, enough to provide 5 percent of the nation's electricity.²⁴⁸ Implementing

renewable energy and energy efficiency measures will reduce domestic gas demand and ensure a stable gas supply for export markets.

Mobilize Methane Tracking and Abatement

Abating the U.S. LNG industry's methane emissions from leaks and flaring will enhance economic competitiveness as climate-concerned countries seek out low-emissions gas. Domestically, methane abatement will create jobs and reduce risks to American health and safety. All active LNG terminals in Texas and Louisiana have produced substantial methane emissions, with some facilities, like Venture Global's Calcasieu Pass, exceeding permitted emission limits over 100 times in 2022.²⁴⁹ Since 2024, new satellite capacity has come online using remote sensing technology to track individual facilities and hold them accountable for their emissions.²⁵⁰ This will make it easier to pinpoint flaring and methane leaks and hold accountable facilities that continually pollute at high levels. According to a U.S. International Energy Agency (IEA) report, "almost all of the options to reduce flaring and methane emissions from oil and gas operations could be implemented at no net cost because the abatement measures cost less to deploy than the market value of the gas that would be captured."²⁵¹

Economic benefits would expand beyond the gas industry and into the local community, as building a workforce to detect and repair methane leaks would generate local employment. A report found that methane regulations proposed by the Environmental Protection Agency (EPA) could create between 19,000 and 35,000 jobs in Texas to detect and repair leaks.²⁵² U.S. methane abatement expertise can also be leveraged to strengthen bilateral energy relations. For example, from 2023 to 2024, the U.S. Trade and Development Agency convened four delegations of oil and gas industry leaders from Latin America, Africa, and Central Asia to learn techniques and best practices for methane abatement from leading U.S. experts.²⁵³ A commitment to methane reduction would allow the U.S. to maintain a global leadership role in this field and to compete with Middle Eastern LNG exporters who are reducing emissions in their supply chains. Buyers from Europe and East Asia who prefer low-methane gas may also be willing to pay premium prices for U.S. LNG.

Coordinate U.S. LNG Flows with Allies

Price-sensitive allies in Asia, Africa, and LAC should secure contracts for U.S. LNG supplies to safeguard themselves against high spot prices during times of high demand and geopolitical upheaval. Unlike other suppliers, the United States offers tolling agreements allowing off-takers to pay a fixed fee for the right to receive LNG deliveries, known as a tolling fee. If a buyer no longer wants the LNG cargos, they pay the tolling fee and cancel their order, avoiding obligations to pay for feed gas or liquefaction charges.²⁵⁴ Using U.S. tolling agreements, price-sensitive allies can cancel shipments when LNG prices get too high. If their gas demand drops faster than anticipated, European allies can also take advantage of tolling agreements to avoid paying for unneeded LNG volumes.

Washington should prioritize bilateral and multilateral LNG deals with allies to mobilize competitive pricing that prioritizes allies over adversaries. Promoting LNG cooperation with U.S. security allies is a win-win strategy, allowing allies to fulfill their energy needs while the United States maximizes LNG profits with limited political risks. Both President Trump and President Biden have used their executive powers to facilitate LNG export volumes to the EU. President Trump also established an Executive Working Group to eliminate trade barriers and increase the sale of U.S. LNG to the EU.²⁵⁵ Renewing this ally-focused approach in his next term would help expand U.S. LNG market options and provide alternatives to the Chinese market, disincentivizing Beijing's stockpiling and resale practice and reducing its profit from resold U.S. gas.

The European Commission has expressed renewed interest in this type of cooperation. “We still get a lot of LNG from Russia and why not replace it by American LNG, which is cheaper for us and brings down our energy prices,” said European Commission President Ursula von der Leyen in November 2024.²⁵⁶ She hopes to incorporate LNG into trade deals and negotiations with the incoming Trump administration. As Belgium, France, and Spain accounted for 87 percent of Russian LNG imports to the EU during the first half of 2024, Washington can target these countries to switch from Russian to American LNG.²⁵⁷ EU restrictions on reexporting Russian LNG will enter into force in March 2025, further incentivizing this transition.²⁵⁸

Strengthen Renewable Energy Partnerships

The U.S. should cooperate with political and economic allies on developing and enhancing renewable energy technologies and building resilient energy supply chains, an essential practice not only for natural gas but also for all energy sectors, including renewable and nuclear energy. While China dominates global supply chains for renewable energy and batteries, Russia dominates global supply chains for nuclear energy, supplying 40 percent of the world's enriched uranium, including 20 percent of the U.S. total supply.²⁵⁹ The United States should attempt to close the gap, and President-elect Trump has said he will seek American “energy dominance” during his second term.²⁶⁰ To ensure long-term American energy security and competitiveness, this objective must incorporate renewable energy sources.

In Southeast Asia, the United States can continue to promote energy cooperation bilaterally and with ASEAN. While the Biden administration included energy cooperation as a pillar of the U.S. Comprehensive Strategic Partnership agreement with ASEAN, there is still room for enhanced coordination across U.S. agencies to support national regional energy security goals. The Energy for Growth Hub has proposed a cross-cutting mechanism known as Energy Security Compacts (ESCs) to improve coordination on energy investments between the U.S. and allies through targeted five-year bilateral investment packages.²⁶¹ With support from Congress, the new administration can grant the Millennium Challenge Corporation (MCC) authority to spearhead U.S. interagency efforts directing U.S. investment, policy, technical, and commercial support for ally energy security solutions. The MCC would work with the National Security Council to identify priority countries and negotiate agreements in line with national security priorities, such as diversifying energy supply chains and protecting allies’ energy security from adversaries. Countries like the Philippines and Vietnam, which could use U.S. support to develop both renewable energy and LNG infrastructure, would benefit from an ESC partnership.

Develop a Long-Term Strategy for U.S. LNG Supply Volumes

Unrestrained LNG exports risk driving up domestic gas prices, exacerbating pollution and climate change, and endangering American health and security. As two of three International Energy Agency models predict that global LNG trade demand will decline after 2030,²⁶² strategically reducing contract volumes and bolstering revenues from existing exports is the best strategy to prevent supply shocks in the case of a global contraction in LNG demand. Increased methane emissions and pollution mitigation standards can be imposed to motivate suppliers to raise prices and stabilize volumes, enhancing U.S. economic competitiveness while creating jobs and safeguarding American health and safety.

Unlike other major LNG exporters such as Qatar and Oman (and re-sellers like China), the U.S. lacks substantial programs directing LNG export profits toward renewable energy projects.²⁶³ Higher tax revenue from LNG exports should support the construction of more resilient and efficient energy infrastructure, particularly renewable and nuclear energy projects, to replace remaining coal plants in lieu of coal-to-gas switching.

Conclusion

While U.S. LNG serves as a transitional fuel and helps allies overcome immediate threats to their energy security, it is vulnerable to price volatility and geopolitical disruptions like conflict, natural disasters, and blockades. The growing American LNG industry presents ongoing concerns for American prosperity and health in the form of increased domestic energy prices and environmental and safety hazards. Furthermore, China's resale of U.S. LNG offers Beijing an economic advantage that contributes to its geopolitical objectives and expands its global influence, challenging U.S. national security interests.

When comparing natural gas and renewables for energy security, renewables generally offer greater long-term energy security due to their local availability, reduced dependence on imports, and lower vulnerability to geopolitical disruptions. U.S. partners are thus keen to transition from natural gas to renewables as a more secure form of energy. U.S. deployment of renewable energy and efficiency initiatives would enhance domestic security by ensuring affordable energy for Americans, stabilizing domestic gas demand, and freeing up resources for export. At the same time, implementing robust methane abatement measures would enhance environmental sustainability and improve the global competitiveness of U.S. LNG.

By deepening collaboration with allies and investing in comprehensive energy partnerships, the United States can advance global energy security and incentivize competitive pricing to profit in global markets. Looking ahead, Washington needs a strategic approach to managing LNG supply volumes and preparing the U.S. LNG industry for increased competition and dwindling demand. Investing in critical energy infrastructure and emissions reduction will position the U.S. as a leader not only in natural gas but across the entire energy spectrum. Embracing these strategies will ensure that U.S. energy policies align with global demand trends and promote economic growth and environmental stewardship for decades to come.

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